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Turkish Journal of Public Health

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REVIEWER LIST

From the Editor

Turkish Journal of Public Health has made significant contributions to the development of public health discourse in Turkey with a legacy of nearly 20 years. In the past months, with the recommendation of the Journal Editorial Board and the decision of the HASUDER Board of Directors, it has been decided to publish our journal only in English. One of the important motivations of this decision is to increase our international visibility. International indexes play a pivotal role in the realm of scientific journals, serving as crucial benchmarks that gauge the quality, visibility, and impact of scholarly research on a global scale. As a result of this perspective and policy, we are proud to announce that our efforts are appreciated, as the Journal was recently indexed by SCOPUS as a testament to the quality and impact of the research we have published. This achievement expands the scope of our joint efforts, opening new avenues for collaboration, dissemination and global engagement. Inclusion in reputable international indexes enhances the journal's credibility and visibility within the global research community, attracting a wider readership and increasing the likelihood of receiving high-quality submissions. For researchers international indexes act as reliable guides, helping them identify journals that adhere to rigorous editorial and peer-review standards. Journals indexed in international databases often signify adherence to ethical publishing practices, ensuring that the research they publish is of high integrity and accuracy.

We would like to express our gratitude to the researchers, authors, reviewers, current and previous editorial board members and HASUDER Executive Boards as all played an important role in making the Journal what it is today. However, as we continue our journey towards excellence, we acknowledge the need for more support from the public health professionals' community. The invaluable contributions of referees, who tirelessly evaluate and improve the quality of manuscripts deserve special mention. Additionally, raising the visibility of our published works through increased citations is a shared responsibility that can contribute to the broader impact of our Journal.

In this issue, we are delighted to present a collection of 9 research articles and 1 review article that exemplify the depth and diversity of research in the field of public health. These contributions shed light on critical topics, offering insights that inform policy, practice, and public awareness. We would like to express our sincere thanks to all authors, referees and editors who supported this issue. We wish you pleasant reading.

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TURKISH JOURNAL OF PUBLIC HEALTH

ORIGINAL ARTICLE

Self-reported anxiety and depression among COVID-19 patients within six months of follow-up: A prospective cohort study

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Abstract

Objective: This prospective cohort study aimed to investigate the prevalence of self-reported moderate or severe anxiety and depression among COVID-19 patients during a six-month follow-up and to identify associated baseline factors.

Methods: The study included patients aged ≥18 years who tested positive for SARS-CoV-2 at Dokuz Eylul University Hospital, Turkey, between November 2020 and May 2021. Telephone interviews were conducted at 1st, 3rd, and 6th months post-diagnosis to assess feelings of anxiety and depression using the EQ-5D-3L scale. Generalized estimating equations were employed to identify factors associated with anxiety and depression after infection.

Results: A total of 5446 patients participated in the study. The prevalence of feeling anxious or depressive at 1st, 3rd, and 6th months post-diagnosis was 18.5%, 17.9%, and 15.4%, respectively. Several factors were associated with self-reported anxiety or depression: Older age (≥65 years; OR: 1.17, 95% CI: 0.95-1.44), female gender (OR: 1.76, 95% CI: 1.58-1.96), unfavourable economic status (OR: 1.62, 95% CI: 1.34-1.97), more symptoms (4-5, OR: 1.48, 95% CI: 1.21-1.81; ≥5, OR: 1.65, 95% CI: 1.35-2.01), having multiple underlying health conditions (1-2, OR: 1.35, 95% CI: 1.19-1.54; ≥3: OR: 1.50, 95% CI: 1.13-1.99), and intensive care unit admission (OR: 2.58, 95% CI: 1.70-3.90).

Conclusion: COVID-19 patients commonly experience anxiety or depression, which may persist long-term. Gender, economic status, and disease severity play significant roles in their psychological well-being. Identifying vulnerable groups can be instrumental in early diagnosis and provision of targeted mental care services.

Keywords: Long COVID, Anxiety, Depression, Cohort Studies

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INTRODUCTION

Stressful events like disasters or outbreaks trigger emotional disorders such as posttraumatic stress disorder (PTSD), major depression, anxiety and sleep disorders [1,2,3]. Previous outbreaks taught that there were psychological impacts as well as biological ones on the infected population [4]. The cohort study that included the patients with severe acute respiratory syndrome coronavirus (SARS-CoV) in Hong Kong has shown that psychiatric disorder prevalence 30 months after diagnosis was 33.3% [2]. The studies about the post-acute stage of MERS (Middle East respiratory syndrome) and SARS indicated that depressive mood, anxiety, euphoria and sleep disorders were the most common complaints among patients [5].

Coronavirus disease 2019 (COVID-19) caused by SARS-CoV-2 is a newly emerged infectious disease with higher fatality in certain groups such as people with low immunity and the elderly population [6,7]. Therefore, the pandemic has been an unpredictable stressor for people in medical, social, economic, and cultural contexts.

COVID-19 affected the mental state of populations in various ways [8,9]. In the beginning, the strict restrictions in daily life to prevent the spread of the virus combined with the lack of knowledge about an unknown disease became a threat to the mental well-being of patients who were infected by SARS-CoV-2 [10,11]. Precautions for the pandemic such as lockdowns, self-isolation and compulsory lifestyle changes also affected people's physical and mental health [12,13]. Those containment measures increased feeling lonely, anxious and depressive, alcohol and drug abuse, sleep disorders, self-harm and suicide [14].

Knowledge on post-COVID-19 conditions grew rapidly with an increasing number of studies [15–17]. Studies have supported that SARS-CoV-2 can cause neuropsychiatric symptoms and damage the central nervous system (CNS) directly or indirectly through the immune response mechanism [18–20]. For the acute phase of the disease, neuropsychiatric symptoms such as sleep disorders, concentration deficit, change in appetite, anxiety, somatization, loss of energy and amnesia have been reported in various studies [21–25]. In a meta-analysis, the most common persistent neuropsychological symptoms after 6 months of diagnosis were sleep disorder, anxiety and PTSD [26,27].

Assessing the level of anxiety or depression during the pandemic is important to identify the vulnerable groups for mental health services. EuroQol five-dimension three-level (EQ-5D-3L) is a generic measurement for the quality of life which includes a dimension assessing anxiety and depression. It is useful and efficient to detect anxious and depressive moods [28]. A prospective cohort study in Canada used patient-reported outcome measures and reported that COVID-19 patients had a moderate problem in the anxiety/depression dimension. Patients with higher comorbidities had more anxiety or depression compared to others [29].

There is limited number of studies on a wide group of patients' mental health states after being diagnosed with COVID-19. In this study, we aimed to determine the prevalence and possible baseline determinants of feeling anxious or depressive among the COVID-19 patients within six months of follow-up time.

METHODS

Study Type and Follow-Up Center

This prospective cohort study included participants aged ≥18 years who were diagnosed with COVID-19 between November 1, 2020 and May 31, 2021 in Dokuz Eylul University (DEU) hospital. DEU hospital is a large tertiary care public hospital in Izmir, Turkey. At DEU hospital, COVID-19 Follow-up Center (DEU-COVIMER) was established in January 2021 to monitor the long-term health conditions of COVID-19. Under the supervision of two epidemiology experts, and five public health researchers, five staff have been working in DEU-COVIMER [30].

Data Collection Tools/Methods

At the 1st, 3rd and 6th months after the first positive test date, pre-trained DEU-COVIMER staff called patients by telephone and interviewed using structured questions. Data collection forms were developed after revising the existing guidelines and literature [31,32]observational multisite study. This protocol is linked with the International Severe Acute Respiratory and emerging Infection Consortium (ISARIC. The staff were trained on data collection forms, data registration and basic communication skills at the beginning of the follow-ups. Telephone interviews were standardized using role-play technics with the staff. Prior to starting data collection, we piloted the questionnaire on five COVID-19 healthcare workers. In order to increase the response rate, the staff made at least five attempts until the end of the working hour. All participants provided oral informed consent before starting the telephone interview. Ethics committee approval was obtained from the Dokuz Eylul University Non-Interventional Research Ethical Board (No: 2021/02-66) for the study.

Study Group

Between November 1st, 2020 and May 31th, 2021, a total of 6701 individuals aged ≥18 years were tested positive for SARS-CoV-2 RNA. Figure 1 shows the flowchart of the patients included in the study. Due to DEU-COVIMER becoming fully operational on January 11, 2021; two cohorts were established. The first cohort was November 2020 cohort that the first-month interview was already missed, so they were interviewed in the 3rd and 6th months. The second cohort was December 2020-May 2021 cohort which had been monitored for one, three and six months after the diagnosis. If patients refused to participate at a time point, we excluded them from the next follow-up call. In total 5610 respondents completed the first interview corresponding either in the 1st month or the 3rd month. We also excluded 164 respondents who reported a psychiatric disease in the first interview. In total, data from 5446 people were included in the analysis (Figure 1). The minimum sample size estimated was 1266 assuming a minimum effect size as w=0.10, power=0.90 alpha=0.05 and df=2 using G power [33].

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┌─────────────────────────────────────────────────────────────────────┐
│ SARS-CoV-2 PCR (+) patients aged ≥18 years from November 1st, 2020    │
│ to May 31th, 2021                                                     │
│                          n=6701                                       │
└─────────────────────────────────────────────────────────────────────┘
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Figure flowchart content:

- Patients from 01.11.2020 to 31.11.2020 **n=2163**
  - ----> No 1st month interview
  - Excluded:
    - Deceased: **n= 91**
    - Refused to participate: **n=112**
    - Did not respond: **n=77**
    - History of psychiatric disease: **n=53**
  - Completed the 3rd month interview **n=1830**
    - Excluded:
      - Deceased: **n=3**
      - Refused to participate: **n=31**
      - Did not respond: **n=131**
  - Completed the 6th month interview **n=1665**

- Patients from 01.12.2020 to 31.05.2021 **n=4538**
  - Excluded:
    - Deceased: **n= 125**
    - Refused to participate: **n=184**
    - Did not respond: **n=502**
    - History of psychiatric disease: **n=111**
  - Completed the 1st month interview **n=3616**
    - Excluded:
      - Deceased: **n= 8**
      - Refused to participate: **n=105**
      - Did not respond: **n=405**
  - Completed the 3rd month interview **n=3098**
    - Excluded:
      - Deceased: **n= 6**
      - Refused to participate: **n=33**
      - Did not respond: **n=228**
  - Completed the 6th month interview **n=2831**

Figure 1: Flowchart of the patients included in this study, DEU Hospital, Izmir, Turkey, November 2020-May 2021

Variables in The Study

The dependent variable of the study was self-reported moderate or severe feeling of anxiety or depression within six months of monitoring according to the EQ-5D-3L general quality of life scale. The EQ-5D-3L is a measurement tool of self-reported health, which gives an opinion about a health state, reflecting the relative importance of different types of health problems. The EQ-5D-3L consists of five dimensions: Mobility, Usual Activities, Self-care, Pain & Discomfort, Anxiety & Depression [34]. The fifth dimension of EQ-5D-3L measures emotional state. EQ-5D reflects the quality of life at the time of application. This questionnaire was administered during 1st, 3rd and 6th month follow-ups. Responses for feeling of anxiety or depression were as follows: "I am not anxious or depressed", "I am moderately anxious or depressed" and "I am extremely anxious or depressed".

To ensure its applicability in different populations, the EQ-5D has been translated and validated in various languages, including Turkish. The EQ-5D was developed and validated into Turkish in 1999. The study included the translation process and validation of the Turkish version of the EQ-5D, as well as the assessment of its psychometric properties. The findings suggest that the Turkish version of the EQ-5D is a reliable and valid tool for measuring health-related quality of life in the Turkish population [35].

Reverse transcriptase-polymerase chain reaction (RT-PCR) test date, age, gender and hospital admission were retrieved from the hospital information system. Educational status,

jobs, perceived economic status, marital status, underlying health conditions and symptoms were patient-reported.

Statistical Analysis

Categorical variables were summarized as numbers and percentages (n, %) and were compared with chi-squared test or Fisher's exact test. The data structure was longitudinal so we used generalized estimating equations (GEE) with a first-order autoregressive AR-1 as the working correlation structure to evaluate reporting moderately/extremely anxiety or depression within six months of follow-up. GEE models are a statistical approach for analyzing longitudinal data, which often exhibit correlation structures due to the repeated measurements taken over time on the same individuals. It allows controlling for the potential confounding effects of correlation. In model 1, separate models were fitted for each explanatory variable with time adjustment. The final multivariate model included all explanatory variables. Estimates were presented as odds ratios with 95% confidence intervals. Data management and analysis were performed with R version 4.0.2 (packages: tidyverse, compareGroups, geepack, sjPlot).

RESULTS

Table 1 presents the general characteristics of the participants. A total of 5446 patients (female: 51.3%, age: 42.9±15.1) followed for a mean of 168 ±47 days after RT-PCR positivity. Among them, 29.6% (n=1613) had underlying health conditions. The most common three underlying health conditions were hypertension (15%), diabetes (10.3%) and coronary artery disease (5.9%), 8.1% of the patients received inpatient care.

The percentages of anxious and depressive

Table 1. General characteristics of the COVID-19 patients who agreed to participate in the study

	n	%	n (total)
Age group			5446
18-49 years	3716	68.2	
50-64 years	1205	22.1	
≥65 years	525	9.64	
Female gender	2792	51.3	5446
Education			5412
University	2011	37.2	
High school	1513	28.0	
Secondary school	623	11.5	
Primary school	1058	19.5	
Less than primary school	207	3.82	
Healthcare worker	571	10.5	5446
Perceived economic status			5385
Bad	682	12.7	
Moderate	3625	67.3	
Good	1078	20.0	
Marital status			5412
Married	3613	66.8	
Not married	1799	33.2	
Number of underlying health conditions			5446
None	3833	70.4	
1-2	1436	26.4	
≥3	177	3.2	
Number of symptoms			5446
None	585	10.7	
1-3	2299	42.2	
4-5	1266	23.2	
>5	1296	23.8	
Hospitalization			5446
No	5005	91.9	
Inpatient care service	375	6.9	
Intensive care unit	66	1.2	

feelings were 18.5%, 17.9% and 15.4% on the 1st, 3rd and 6th-month follow-up, respectively. Of the 3616 respondents who completed the 1st month interview, 2.9% (n=106)

reported insomnia, 2.2% reported (n=78) hypersomnia/sleepiness and %1.9 reported (n=70) difficulty in concentrating. For the 3rd month (n=4928) and 6th month (n=4496), percentage of insomnia were 1.3% (n=62) and 0.5% (n=24), respectively while for the hypersomnia/sleepiness, 0.9% (n=43) and 0.5% (n=22), respectively. Difficulty in concentrating were also reported as 0.8% (n=39) and 0.4% (n=39) for 3rd month and 6th month, respectively.

Table 2 shows percentages of reporting moderately/extremely feeling of anxiety or depression at the 1st, 3rd and 6th months. Feeling of anxiety and depression were more common in patients aged ≥65 years (3rd month: 22.2%) and in females (3rd month: 21.7%). Participants with less than secondary school education and those with bad economic status reported more feeling of anxiety or depression. There was a positive relationship between the increase in the total number of symptoms, increase in the number of underlying health conditions and reporting of anxious or depressive feelings. The reported frequency of anxious or depressive feelings in the third month was 39.7% in the ICU survivors.

Table 2. Number and percentages for reporting moderately/extremely feeling of anxiety or depression at the 1st, 3rd and 6th stratified by baseline patient characteristics

		1st month				3rd month				6th month		
		Yes				**Yes**				**Yes**		
	n	**n=659**	**%**	**p**	**n**	**n=876**	**%**	**p**	**n**	**n=691**	**%**	**p**
Age group	3555			0.007	4891			<0.001	4493			0.20
18-49 years		428	17.8			551	16.5			453	14.8	
50-64 years		150	18.3			224	20.6			163	15.9	
≥65		81	25.0			101	22.2			75	18.1	
Gender	3555			<0.001	4891			<0.001	4493			<0.001
Male		249	14.6			333	13.9			225	10.2	
Female		410	22.2			543	21.7			466	20.3	
Education	3535			<0.001	4867			0.01	4474			0.008
University		259	19.8			320	17.6			229	13.7	
High school		153	15.3			222	16.3			186	14.8	
Secondary school		63	15.5			89	16.2			81	16.4	
Primary school		144	20.8			194	20.3			153	17.4	
Less than primary school		37	28.0			46	24.2			40	22.3	
Healthcare worker	3555			0.66	4891			0.14	4493			0.99
Yes		65	19.6			105	20.3			74	15.5	
No		594	18.4			771	17.6			617	15.4	

Table 2. (Contiuned) Number and percentages for reporting moderately/extremely feeling of anxiety or depression at the 1st, 3rd and 6th stratified by baseline patient characteristics

| | 1st month | | | | 3rd month | | | | 6th month | | | |
| | | Yes | | | | Yes | | | | Yes | | |
	n	n=659	%	p	n	n=876	%	p	n	n=691	%	p
Perceived economic status	3512			0.001	4843			<0.001	4449			0.02
Bad		106	24.3			147	23.8			109	19.3	
Moderate		437	18.6			556	17.1			450	15.0	
Good		113	15.6			168	17.3			125	14.0	
Marital status	3530			0.85	4865			0.80	4468			0.38
Married		431	18.5			589	18.0			457	15.1	
Not married		225	18.8			281	17.7			231	16.1	
Number of underlying health conditions	3555			<0.001	4891			<0.001	4493			<0.001
None		415	16.7			551	16.0			435	13.8	
1-2		217	22.8			284	22.0			225	18.8	
≥3		27	23.1			41	26.6			31	21.2	
Number of initial symptoms	3555			<0.001	4891			<0.001	4493			<0.001
None		56	14.0			88	17.1			52	11.2	
1-3		212	14.6			294	14.3			234	12.3	
4-5		168	20.5			243	21.3			186	17.7	
>5		223	25.2			251	21.3			219	20.4	
Hospitalization	3555			<0.001	4891			<0.001	4493			0.08
No		592	18.2			788	17.5			621	15.0	
Inpatient care service		46	17.8			65	19.3			58	18.6	
Intensive care unit		21	48.8			23	39.7			12	22.6	

Data was presented as row percentages.

Considering the underlying health conditions; anxiety or depression was more common in the patients with coronary artery disease (29.1%), chronic renal failure (35.5%) and rheumatologic disease (31.7%) at the 1st-month follow-up (Supplementary Table 1).

Multivariate GEE model indicated that female gender (aOR: 1.76, 95% CI: 1.58-1.96), bad economic status (vs. good economic status) (aOR: 1.62, 95% CI: 1.34-1.97), reporting ≥3 underlying health conditions (aOR: 1.50, 95% CI: 1.13-1.99), having more than five baseline symptoms (aOR: 1.65, 95% CI: 1.35-2.01) and type of care (vs. no hospitalization) (ICU care, aOR: 2.58, 95% CI: 1.70-3.90) were positively associated with reporting symptoms within six months (Table 3).

Table 3. Results of GEE models showing the adjusted odds ratios of baseline independent variables for reporting feeling of anxiety or depression

	Model 1	Final model
	aOR (95% CI)	aOR (95% CI)
Age group		
18-49 years	ref	ref
50-64 years	1.14 (1.01-1.29)	1.07 (0.93-1.22)
≥65 years	1.42 (1.21-1.68)	1.17 (0.95-1.44)
Gender: female	1.85 (1.67-2.05)	1.76 (1.58-1.96)
Education		
University	ref	ref
High school	0.89 (0.78-1.02)	0.90 (0.79-1.03)
Secondary school	0.93 (0.78-1.11)	0.91 (0.76-1.09)
Primary school	1.18 (1.02-1.35)	0.97 (0.74-1.26)
Less than primary school	1.59 (1.25 2.03)	0.97 (0.74-1.26)
Healthcare worker	1.11 (0.95-1.31)	1.12 (0.94-1.33)
Perceived economic status		
Good	ref	ref
Moderate	1.09 (0.96-1.25)	1.11 (0.97-1.28)
Bad	1.55 (1.30-1.86)	1.62 (1.34-1.97)
Marital status: Not married	1.02 (0.92-1.14)	1.03 (0.92-1.15)
Number of underlying health conditions		
None	ref	ref
1-2	1.46 (1.31-1.64)	1.35 (1.19-1.54)
≥3	1.77 (1.37-2.27)	1.50 (1.13-1.99)
Number of symptoms		
None	ref	ref
1-3	0.97 (0.80-1.17)	0.99 (0.81-1.20)
4-5	1.51 (1.24-1.85)	1.48 (1.21-1.81)
>5	1.73 (1.42-2.10)	1.65 (1.35-2.01)
Hospitalization		
No	ref	ref
Inpatient care service	1.14 (0.94-1.38)	1.00 (0.82-1.23)
Intensive care unit	2.78 (1.89-4.09)	2.58 (1.70-3.90)

In model 1, each explanatory variable was adjusted with time. The final multivariate model includes all variables and time.

DISCUSSION

This study aimed to evaluate the prevalence of anxious and depressive feelings by using EQ-5D-3L scale fifth dimension among COVID-19 patients in six months of follow-up time. One out of six patients had anxious/depressive feelings within six months. The prevalence of feeling anxious/depressive at the 1st and 3rd-month follow-up was similar, however, it was slightly decreased at the 6th-month follow-up. According to studies utilizing EQ5D as a measure of quality of life among COVID-19 survivors, the dimension of anxiety and depression was found to be the second most highly affected dimension, following the dimension of pain and discomfort. [36,37] In a case-control study in Morocco, there was a significant difference in anxiety and depression dimension between COVID-19 survivors and non-COVID-19 group and COVID-19 survivors were mentally negatively effected by the disease. [38]. This study found that older age, female gender, bad economic status, having health conditions, having more than three symptoms at the time of diagnosis and ICU stay were identified as independent risk factors for anxious and depressive feelings.

In a study with a four-month follow-up, anxiety, stress and depression were reported significantly higher in COVID-19 patients than in non-COVID-19 patients [39]. Furthermore, a systematic review showed that depression and anxiety were the most common psychiatric symptoms in COVID-19 patients [40]. Previous studies reported an increased prevalence of anxiety and depression among COVID-19 survivors and these mental health problems may become long-term comorbidity in patients [25,26]. Our study provides qualitative evidence supporting the literature, although it does not conclusively demonstrate the prevalence.

Compared to the pre-pandemic period, rates of anxiety and depression increased in Turkey during the COVID-19 pandemic and women had a greater likelihood of COVID-19 related anxiety and depression than men [41]. A study conducted in Wuhan among COVID-19 patients during the early pandemic era has shown that females were more vulnerable to depression [42]. Consistent with the results in the general population, we found that women diagnosed with COVID-19 were more susceptible to being anxious and having depressive feelings. This may be due to the predisposition of women to anxiety and depression in general [43,44].

As one of the social determinants of health, bad economic status had a negative impact on mental well-being [45]. Also, the COVID-19 pandemic hurt economic security. Both studies in the United Kingdom and Japan have shown that poor economic status and loss of income worsened mental state and increased anxiety and depression in participants [46,47]. Similarly, in this study, having a bad perceived economic status is a risk factor for feeling anxious and depressive. This may be associated with economic insecurity, fear of losing their job because of pandemic restrictions, or disabilities caused by illness.

Our study revealed that having at least four symptoms was associated with feeling anxious/depressive in COVID-19 patients. The severity of the acute phase of COVID-19 disease can be described along with having comorbidities, initial symptoms, and hospitalization [48,49]. Having numerous symptoms may cause psychiatric distress and COVID-19 symptoms like shortness of breath, fever, and headache may provoke anxiety symptoms [50]. Severe

illness and fear of the clinical progression of illness can be related to feeling anxious and depressive.

We found that having at least one underlying health condition and ICU stay were independent risk factors for feeling anxious or depressive. Studies found that patients who were admitted to inpatient care services were at risk for mental disorders [26,51,52.] ICU survivors were prone to having anxiety, depression or post-traumatic disorder (PTSD) [53]. It may be due to consequences of social isolation during the stay, inflammatory process and clinical predictors [22,54].

The study has several strengths. The study has a large sample size. Data from over 6700 patients diagnosed in a public hospital were analyzed. The study population included a wide range of patients, from asymptomatic patients to patients with a heavy clinical condition. The population-based prospective study design increases the generalizability of our findings. The follow-up period is relatively long given that most of the studies in the literature are based on 12 weeks follow up or on a small number of patient groups. [55] However, this study has a few limitations. Data were collected by telephone interviews based on patients' statements. This may have caused recall bias. Although the secretaries were trained and standardized for telephone interviews, interviewer bias is possible in collecting the data. In addition, the study does not present data on patient's clinical or laboratory parameters.

CONCLUSION

In conclusion, feeling of anxiety or depression are common in COVID-19 patients and may persist in the long term. Particularly, these feelings were associated with gender, economic status and disease severity. Determination of vulnerable groups for anxiety and depression after COVID-19 can be helpful for early diagnosis and initiation of mental care services.

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ORIGINAL ARTICLE

Radiofrequency electromagnetic field of base stations in Northern Cyprus: A descriptive study

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Abstract

Objective: The purpose of this study is to analyze the change in Radiofrequency Electromagnetic Field (RF-EMF) public exposure caused by base stations (BSs) between 2009-2020 in Cyprus with respect to the parameters stated in the reports, and to define potential adverse health effects by comparing the results with national and international guidelines.

Method: In this study, six measurement reports published by Information Technologies and Communication Authority (ITCA) in Cyprus between 2009-2020 were reviewed, the change in the RF-EMF public exposure caused by BSs were analyzed and adverse health effects comparing the results with national and international guidelines were defined.

Results: The total of measurement points is 18.390 in 2009, 20.000 in 2011, 28.691 in 2013, 170.725 in 2016, 486.214 in 2018, 353.819 in 2020. The number of mobile phone users is 596.000 in 2013, 804.345 in 2016, 877.990 in 2018, 818.728 in 2020. In Lefkoşa, Girne, Gazi Mağusa, Güzelyurt and Yeni İskele the measurement values varied between 5.65-0.63, 2.82–0.57, 3.26-0.58, 3.27–0.57 and 3.85–0.55 V/m in 2009 and 2020, respectively.

Conclusion: The present data along with scientific evidence lead to the conclusion that short-term RF-EMF exposure results should be defined within the precautionary principle. Measurement results were highly variable and varied considerably between years within as well as between districts. To define the explicit reason for exposure level change during the years, the measurements must be done by considering short- and long-term adverse effects in the same location in each year.

Keywords: Radiofrequency, Electromagnetic Fields, Health Effects, ICNIRP

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INTRODUCTION

Today, mobile telephones have become an unavoidable part of regular lifestyles. People are under uncontrolled exposure to electromagnetic (EM) radiation of mobile phone base stations (BSs) even if they do now no longer use mobile phones. Due to the explosive growth of the mobile phone industry, the variety of mobile phone BSs have placed at many residential areas in urban areas within a mile of each BS. The deployment of the next generation of cellular network technology, 5G, will increase BS density to a great extent and there have been health concerns related to wireless radiation from (1) portable communications equipment, (2) occupational exposures, (3) home exposures, (4) indoor wireless networks at businesses and schools, (5) automotive radars and (6) other sources of non-ionizing EMF radiation, such as "Internet of Things" and "Smart Meters".[1]

The final outcome of this increase is the growth of health and biological effects of the electromagnetic radiation produced on all living beings. There is scientific consensus on some effects, such as thermal and microwave hearing effects, while other biological and health effects are still under investigation. This is why the electromagnetic field measurement according to international recommendations is often the subject of worldwide research. It is important to expect EMF levels before establishing BS traffic, especially in the case of a next generation mobile system deployment.[2]

Exposure to EM radiation is categorized as non-ionizing and ionizing radiation. Non-ionizing radiation contents; (i) 3–3000 Hz frequencies which are referred to as Extremely Low Frequency (ELF), involving highvoltage transmission towers, electrical lines and inhouse wiring and (ii) 30 kHz to 300 GHz frequencies which are referred to as Radio Frequency (RF), involving mobile phones, BSs, 5G technologies, and smart devices. EM radiation generates electrical field, measured as volt per meter (V/m), and magnetic field, stated in Tesla or defined as magnetic flux density, measured as ampere per meter (A/m).[3]

A part of the EMF energy is turned into kinetic energy to be transformed to heat in the body (described as "warmth" at 10 MHz), which can negatively affect health. Also, if the induced electric field is strong enough and below about 10 MHz, it can perform electrical forces that are sufficient to cause change in the permeability of biological membranes (with continuous 18 GHz wave exposure), and to stimulate nerves (described as tingle feeling for about 100 kHz frequencies). EMF below 6 GHz penetrate deep into tissue. On the contrary, absorbed EMF above 6 GHz is more superficial. However, epidemiological and experimental investigations on the EMF exposure's adverse effects on the brain electrical activity, higher cognitive functions, on neurodegenerative diseases, on the neuroendocrine system, on the cardiovascular system, thermoregulation or autonomic nervous system, on the haematology or immune system, on reproduction or fertility, and on auditory, ocular, or vestibular function or pathology are still ongoing.[4]

The Council of the European Union (EU) issued Recommendation (1999/519/EC, "EU Recommendation") on limiting the public electromagnetic fields exposure (0-300 gigahertz) in 1999. It contains basic limitations for induced electric fields and currents as well as absorbed energy in the

body and reference levels for the strength of electromagnetic fields outside the body. The EU recommended limits are derived from the 1998 guideline on limiting EMF exposure of the International Commission on Non-Ionizing Radiation Protection (ICNIRP).[5] The World Health Organization (WHO) has created the International EMF Project to evaluate the scientific evidence regarding the potential health effects of EMFs between the 0-300 GHz frequency.[6] ICNIRP published an update to the ICNIRP guidelines in March 2020.[4] Also in October 2019, the Institute of Electrical and Electronics Engineers (IEEE) published an update to the standard C95.1-2019.[7] IEEE and ICNIRP limits are harmonized and energy density limits for total body exposure fields are uniform above 30 MHz.[7] In 2011, WHO's International Agency for Research on Cancer (IARC) classified RF radiation between 30 kHz and 300 GHz frequency as Group 2B as 'possible' carcinogen for human.[3]

Most countries have accepted exposure limit values of RF-EMF based on IEEE standards or ICNIRP guidelines; however, some countries like Türkiye have decided to adopt additional precautions to protect their people. International reference values are given in Table 1.[9,10,4] The lowest reference level for the public is 27.7 V/m.[4,11] National reference values correspond to 70% for the environment and 20% per device of the BS limit reference values determined by ICNIRP. In Cyprus ITCA reports, it corresponds not to exceed one quarter (1⁄4) per a single device.[9,12,13]

Using different exposure limits in various countries has increased scientific and public concern. Public institues are encouraged by WHO to follow guidelines established by IEEE and ICNIRP scientific expert panels or restricts set by experts. Best practice for public institutes is to measure RF levels in the environment caused by mobile network technologiesis to define the exposure limits accordance to the international and national guidelines.

METHOD

Measurements and evaluation of RF-EMF levels, the RF-EMF exposure guidelines for the workers and general public are the main issues of risk communication management and assessment. RF-EMF measurements are made for various reasons. These reasons are to define regulatory documents or safety hygiene standard, to obtain data to be used for epidemiologic studies, to identify RF-EMF sources, and to observe long term exposure results. So that the methodology to define accurate exposure assessment should be chosen with special attention. Taking into account the basic physical properties of electromagnetic waves (interference, reflection, and absorption), the measurement equipments setting can effect the correctness of the results due to changing circumstances.[14]

The crucial point while settling RF-EMF field measurements is to identify measurement locations properly.[14,15] In previous measurement studies, several different measurement methods and different kinds of devices were used. This differentiation leads to difficulties to compare the measurement results among studies.[15]

National and international guidelines defining the limit values for RF-EMF exposure generated by BSs are used for RF-EMF measurement assessments. Nevertheless, to evaluate the main components of the physical measurement area and to estimate RF-EMF

measurement results on the main and side lobes of the radiation pattern and to calculate the total exposure level of various antennas is difficult. Correspondingly, RF-EMF measurement methodologies (measurement points, measurement devices and related probes, measurement duration and etc.) should be detailed in order to predict the radiation level in the environment.[14,15]

Determining the main radiation direction pattern from each BS antenna at which point the RF-EMF measurement results will be the highest is one of the most important part to start the measurement. This part is done either by conducting real time field measurements or by analyzing the technical characteristics of mobile BS antennas. On the other hand, all the directional diagrams of in the horizontal and vertical planes of BS antennas are utilized while determining the main radiation direction.[14]

The hypothesis of our study is that in the measurement reports published by the ITCA between 2009-2020, the number of mobile phone users, the technical data of the BS, the number of the BS, comparability of BS RF levels in measurement areas, and what precautionary measures have been taken are to be able to reached and evaluated. Hence, this study gives information about the errors while defining the measurement points and all other steps during the measurement process.

RF-EMF exposure levels from the BSs located in Cyprus were taken from the reports published by the ITCA in Cyprus between 2009-2020. In these measurement reports, it was reported that those electromagnetic field levels in North Cyprus were measured with Narda EMR300 in 2009, 2011, 2013 and with Narda SRM3006 in 2016, 2018, 2020.

RF levels are measured with specific measurement devices and their isotropic probes. Factors affecting the measurements reliability can be classified into two groups. The first category is related with measurement device concerns such as calibration, measurement units and recording duration. The second category is related with measurement conditions such as measurement time, measurement location, weather conditions and technical specifications of BSs.

Each ITCA studies done in same districts (Lefkoşa, Girne, Gazi Mağusa, Güzelyurt, Yeni İskele) in each year were examined with the common data including number of BSs, number of mobile phone users and electric field strengths (maximum value, average value and number of measurement points). There were two kinds of reports; one is quarterly published documents about sector developments including number of BSs and users, the second type documents were about the electromagnetic measurements results conducted around North Cyprus.

For the purpose of this study, the change in RF-EMF of BSs between 2009 and 2020 was analyzed and the results were compared with national and international guidelines, thus creating a discussion ground in terms of negative health effects.

The measured results for the different districts were compared with respect to years, number of BSs, electromagnetic field measurement results/number of measurement points and number of users for each year. In the specified area where RF-EMF measurement will be done the most important parameters to be selected are order to identify spatial distribution of antenna: The antenna's geometric center

height, the main radiation direction (main lobe), and the required down tilting of the directional pattern on the horizontal and vertical planes.[14]

Unfortunately, the measurement conditions have different designs and the distribution of parameters across these reports are heterogeneous, so that comparability is quite limited. In order to obtain reliable conclusion, we evaluated the largest appropriate independent information from different six reports.

2.1. Regulations about Precuationary Measures

Relevant regulations of human RF radiation exposure contain: 1. Permissible limits for ambient exposure due to emissions from wireless networks and BSs, known as maximum exposure limits allowed in the countries; and 2. exposure limits for local exposure at body and head from mobile phones, home and personal devices, known as specific absorption rate (SAR) limits. The ICNIRP and IEEE standards used as the basis for many government limits have remained largely unchanged since the 1990s, and they are intended to protect against the effects of high-power exposure over short-term. These limits are not designed to protect against the effects of chronic, long-term, low-level exposure.[16]

In United States, limits for RF radiation were issued by the Federal Communications Commission (FCC) in 1996, largely based on a 1986 report by the National Council on Radiation Protection and Measurement (NCRP) and the IEEE (ANSI/IEEE) C95.1-1991 standard. US limits for environmental RF levels are similar to those in Japan,

Australia, Germany and other countries have also adopted ICNIRP limits.and among the mildest in the world.[16]

However, some countries such as Switzerland, Italy, Russia and China, have imposed regulatory limits on emissions from mobile phone BS networks that are much stricter than the limits stated in ICNIRP and FCC limits which are based on thermal effects of RF radiation.

European countries have prepared their regulatory policies and limits based on the precautionary principle which is used as a decision-making key factor. This principle is based on the wise advice of Benjamin Franklin: *prevention is better than cure.*[16]

The Parliamentary Assembly of the Council of Europe (PACE) resolution strongly recommended that "as low as reasonably achievable" (ALARA) principle is performed covering both the biological effects or thermal and non-thermal effects of electromagnetic radiation or emissions in 2011.[17]

On the contrary, some countries, such as Russia and China, apply not preventive but "scientific-based" limits which are based on studies done by their own scientists. India reduced the limit to one-tenth the ICNIRP limit in 2012 in response to a report by an inter-ministerial committee that reviewed studies on impacts on wildlife, including bees and insects, pollinators, and concluded that "the majority of the published literature points to harmful effects of EMF in different species".[16]

The ICNIRP exposure limits are frequency dependent and national frequency dependent precautionary exposure limits have been set as to limit the radiation level from one single BS and special limit values for sensitive

areas such as schools, kindergartens and hospitals. The national precautionary limits of electric field strengths are four times less than the ICNIRP guidelines. General public exposure limit values defined by national and international organizations are comparatively given in Table 1.[4,12,18-20]

in 2020. The number of mobile phone users is 596.000 in 2013, 804.345 in 2016, 877.990 in 2018, 818.728 in 2020 however no data available in 2009 and in 2011. In Lefkoşa, Girne, Gazi Mağusa, Güzelyurt and Yeni İskele the measurement values varied between 5.7 - 0.6, 2.8 – 0.6, 3.3 – 0.6, 3.3 – 0.6 and 3.9 –

Table 1. General public exposure limits defined by the ICNIRP and national authority at mobile communication frequencies.

Frequency (MHz)	900			1800			2100			2700		
Institute	ICNIRP	ITCA Türkiye	ITCA Cyprus	ICNIRP	ITCA Türkiye	ITCA Cyprus	ICNIRP	ITCA Türkiye	ITCA Cyprus	ICNIRP	ITCA Türkiye	ITCA Cyprus
Electric field for total environment (V/m)	41.3	28.8	N/A	58.3	40.7	N/A	61	42.9	N/A	61	42.9	N/A
Electric field for single antenna (V/m)	N/A	8.3	10.3	N/A	11.7	14.6	N/A	12.3	15.4	N/A	12.3	15.4

N/A: Not applicaple

RESULTS

In the present study, six measurement reports published by ITCA in 2009, 2011, 2013, 2016, 2018, 2020 were analyzed with respect to the parameters stated in the reports; number of users, measurements, BSs, measurement points, and measurement levels defined by V/m. In Figure 1, change in the number of BSs over the years, in Figure 2 change in the number of measurement points over the years and in Figure 3 average measurement levels in five different districts were analyzed. Although the measurements in each year were done in different districts, we have chosen Lefkoşa, Girne, Gazi Mağusa, Güzelyurt, Yeni İskele since they were common in all reports. The total of measurement points is 18.390 in 2009, 20.000 in 2011, 28.691 in 2013, 170.725 in 2016, 486.214 in 2018, 353.819

0.6 V/m in 2009 and 2020, respectively. The number of BSs and the electromagnetic field measurement results-number of measurement points are given in Tables 2 and 3 respectively.[13,21-25] The analysis of the reports is discussed according to the international policies on electromagnetic fields based on precautipnary principle.
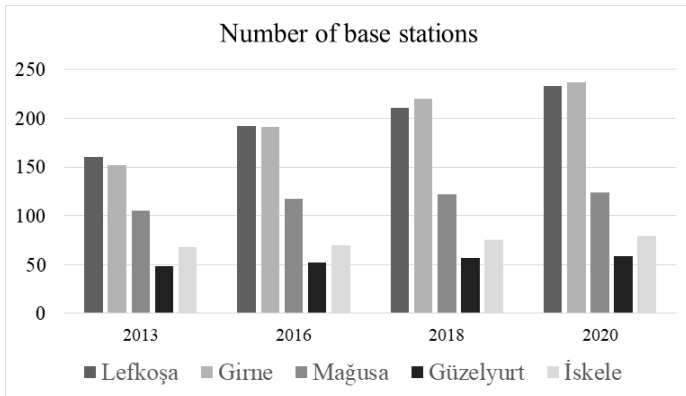
Figure 1. Number of base stations in five different districts.
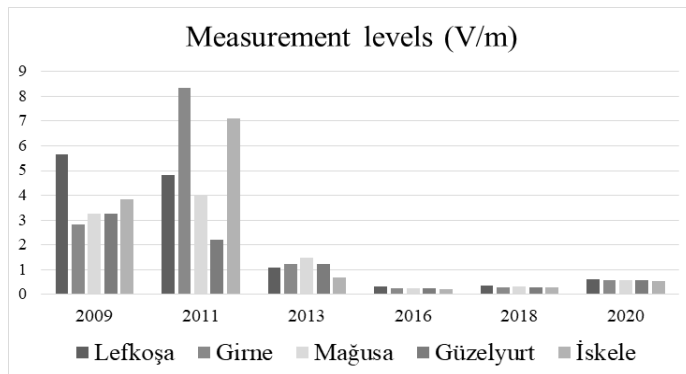
Figure 2. Number of measurement points in five different districts.
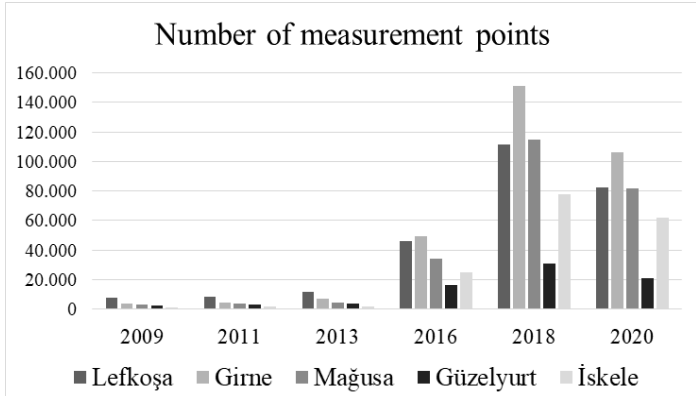
Figure 3. Average measurement levels in five different districts.

Table 2. Number of base stations change according to time in five different districts.

	Lefkoşa	Girne	Gazi Mağusa	Güzelyurt	Yeni İskele	Total
2009	NA	NA	NA	NA	NA	NA
2011	NA	NA	NA	NA	NA	NA
2013	160	152	105	48	68	533
2016	192	191	117	52	70	622
2018	211	220	122	57	75	685
2020	233	237	124	59	79	732

NA: No data available

Table 3. Electromagnetic field measurement results/number of measurement points change according to time in five different districts.

		2009	2011	2013	2016	2018	2020
Lefkoşa	Average E-field (V/m)	5.7	4.8	1.1	0.3	0.4	0.6
	Number of measurements	7.500	8.100	11.871	46.183	111.514	82.633
Girne	Average E-field (V/m)	2.8	8.3	1.2	0.2	0.3	0.6
	Number of measurements	3.900	4.100	6.971	49.077	151.263	106.509
Gazi Mağusa	Average E-field (V/m)	3.3	4.0	1.5	0.2	0.3	0.6
	Number of measurements	3.100	3.500	4.118	34.168	115.077	81.848
Güzelyurt	Average E-field (V/m)	3.3	2.2	1.2	0.2	0.3	0.6
	Number of measurements	2.500	2.800	3.893	16.114	30.713	21.138
Yeni İskele	Average E-field (V/m)	3.9	7.1	0.7	0.2	0.3	0.6
	Number of measurements	1.390	1.500	1.838	25.183	77.647	61.691

DISCUSSION

This paper analyzed the result of measurements conducted by ITCA between 2009-2020 and utilized the health effects of RF-EMF exposure caused by BSs. In contrast to our hypothesis, any clarification indicating the reason for BS exposure levels would be increased due to the increased number of mobile phone users and number of BSs could not find in the measurement reports. Measurement results were extremely variable and varied considerably between years within as well as between districts. For example, in Lefkoşa the measurement values varied between 5.7 V/m (in 2009) and 0.6 V/m (in 2020). Also between districts meaningful differences were observed for each report. To define the explicit reason for exposure level change during the years, the measurements must be done in long durations and in the same location in each year.

All RF-EMF measurement results given in the reports were below both ICNIRP and national reference levels. Until now, no health effects can be mentioned under this level. However, there is some uncertainty about long-term health effects at low exposure levels and reducing exposure to RF-EMF has been suggested with previous studies and thus numerous countries have introduced precautionary measures.[16,26-28] The results of the precautionary exposure limits are difficult to predict because more necessary regulations effect the BS network configuration. It is conceivable that elevated exposure values can be reduced by precautionary limits but mean value may even be increased due to the higher network density with more microcells installed closed to where the population spends its time. The measurement reports used in our study however did not show any indications to support this situation. In Figure 3 it is seen that average measurement levels are decreasing during years while number of BSs is increasing. Within this study the reason for sharp decrease in the electric field levels caused by BSs cannot be defined since in all reports technical specifications of BSs i.e. frequency, antenna directions, etc. were not given in the reports. Hardly, to increase general public's awareness it is important to give the technical specifications must be given with measured exposure levels.

It can be argued that the RF-EMF exposure level is not important as long as the reference levels are not exceeded. However, there is some uncertainty regarding long-term health effects, and reducing exposure can minimize this uncertainty. The measurements were only own street level. We cannot ignore that more exposure levels can occur at such sites in the districts with higher regulatory limits. If there is concern about such high exposure, the exposure level can be reduced by limiting the output of BS.[29] This problem can be explained with the results of spot RF measurements that they are not capable of fully representing the spatial distribution of the RF field. The reasons for this are: a) the measurement pattern may be too small and does not take into account high exposure areas b) measurement points do not overlap with the RF hotspots that usually occur around the BS antennas. Also, the field distribution is uneven as RF hotspots depend on the surrounding environment and the radiation pattern of the antenna. Only computer simulations or detailed measurements can identify RF hotspots around the antenna.[30]

Current scientific data lead us to the conclusion

that short-term mobile phone RF-EMF exposure is not associated with health levels or physical symptoms in individuals with EMF hypersensitivity. Also, thesee individuals fail to detect the presence of RF-EMF and present with a range of severe symptoms and often have a very poor life quality.[26,31]

In recent years, there are studies in the dentistry literature investigating the adverse effects of RF-EMF on oro-facial structures.[32-34]

In their study, Berto and Al-Hijazi showed that there can be retardation in development of teeth and palate in the embryos of mice at the 16th day of intrauterine life when its mothers were exposed to mobile phone radiation for 120 minutes duration daily. They also reported that, tooth germ recorded to be missed and oral ectodermic thickness was hardly detected.[32]

A study by Alchalabi et al. on rats stated that, intrauterine mobile phone radiation exposure can change the intensity of bone turnover processes of certain parts of the skeleton majorly in head and the processes of bone mineralization, and thus impact embryonic skeleton development and formation directly.[33]

In another study to evaluate the effect of RF-EMF on oro-facial tissues, Yan and colleagues found that if rats continue to be exposed to mobile phone radiation, there can be potentially permanent damage over the years, most likely in the buccal and mandibular branches of the facial nerve.[34] In summary, the majority of studies with electromagnetic radiation exposures show biological responses. As a result, the findings of current studies on dentistry reveal the need for more studies on this subject.

With these results, many researchers strongly recommend that experimental and epidemiologic studies are urgently needed to better identify the health effects caused by new emerging Technologies i.e. 5G Technologies for different populations due to increasing electromagnetic field exposure density.[35]

One of the main problems in defining the RF radiation exposure assessment is to do with field level variation since the radiated power of modern mobile communication systems varies over time with unstable data traffic. To solve this problem, in the latest generation of cellular systems, the peak power extrapolation technique has been proposed and applied successfully. Basically, these techniques allow to estimate the maximum level of electromagnetic field that the BS can emit at the optimal location from measurement points in a relatively short time and represents a fundamental tool for assessing exposure to RF electromagnetic fields.[36]

While most countries follow the limits set by ICNIRP (10 W/m2) for mobile information in the frequency range (2 - 300 GHz), few countries, like Türkiye, impose much more restrictive limits on the power density of electromagnetic field values in the same frequency range. The most restrictive value for flat wave equivalent power density, 0.1 W/m2, is implemented in countries such as Lithuania, Poland, Italy and Bulgaria, which may raise concerns about the future development of 5G infrastructure for frequencies above 2 GHz.[37]

Without exception, for a highly accurate assessment of people's exposure to various mobile services, the measured electric field strength values need to be estimated

according to the maximum load of the mobile network.[37]

The limitation of the current study is that data obtained from the reports having gaps about the measurement standarts during RF-EMF measurement. Therefore, it is difficult to identify adverse health effects over the years. Further limitation of our investigation, the points such as measurement duration and time, weather conditions, far field / near field issues, criteria how the BS was excepted, technical specification of BSs that should be taken into consideration while performing the RF measurements should be clearly expressed in the reports. So that there is no gap the public information about health effects.

Under uncontrolled states such as a complex environment, quite dissimilar results can be obtained with different measurements due to variable conditions. The accuracy of the measured values of RF EMF can also be affected by the settings of the measuring equipment. The another limitation of present study was failing to access information about other sources of electromagnetic waves, such as television waves, radio-frequency waves, and satellite waves; [38] evaluation of the physical environment (such as aparment buildings) restricting RF EMF propagation, the height of the geometric center of the antenna, the main radiation's direction, the incidence of individual symptoms, the distance between the inhabited area and the BS, and the RF exposure level at the vicinity of the BSs.

CONCLUSION

Electromagnetic radiation should be regarded as "environmental pollution" typically occurring in the everyday environment. There is a need to assess the potential health effects and the environmental effects of electromagnetic radiation, as well as the economic burden on the health system of the increase in health effects including hypersensitivity. The present data along with scientific evidence let to the conclusion that short-term RF-EMF exposure is not related to levels of well-being or physical symptoms in individuals. However, the results of this study indicate that long-term low-level EMF exposures, which typically occur in the daily environment, may be hazardous and preventive measures should be taken. Therefore, measurements should be made taking into account long-term and short-term negative effects. We are raising a warning flag for to define exposed subjects as potentially vulnerable, the invoke the precautionary principle and to revise existing limits.

The curiosity about whether the environmental pollution caused by the emissions of the developing 5G technology has adverse effects on individual health is increasing day by day. It is important in terms of public health science to use the possible health interruptions that may be caused by the BSs, whose sections will increase significantly with the new technology.

collection and entry: FA, BA, Analysis and interpretation: FA, BA, KN, Literature search: FA, BA, KN, Writing: FA, BA, KN, Critical review: FA, BA, KN.

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ORIGINAL ARTICLE

Consumption of sugar-sweetened beverages: A cross-sectional study among university students in Sarawak

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Abstract

Objective: This study aimed to examine the prevalence and type of Sugar-sweetened Beverages (SSB) consumption among students at a public university in Sarawak.

Methods: This was a cross-sectional study conducted among undergraduate students in a public university in Malaysia. Using questionnaires, data on socio-demographics, SSB consumption, family and personal history of diabetes, as well as knowledge of SSB intake was collected. Anthropometry measurement was also taken in the survey. Data were analyzed using IBM SPSS version 22.0.

Results: A total of 208 respondents participated in the study. About one-fourth of the respondents consumed SSB at least once daily (83.6%) and as high as 72.1% consumed SSB more than three times a week. The top three most consumed types of SSBs were coffee, flavored milk, and 3-in-1 sachet drink (53.4 to 76.0%). Malay and other ethnic groups (Bumiputra Sarawak, Bumiputra Sabah, Indian, and other ethnic groups) recorded a significantly higher daily consumption of SSB (≥1 time) compared to Chinese respondents.

Conclusions: Understanding the pattern of SSB consumption among young adults is important to establish an effective intervention strategy. The findings highlighted the need for targeted interventions aimed at different ethnicities in view of their dietary consumption patterns in a multicultural society like Malaysia.

Keywords: Sugar-Sweetened Beverages, Young Adults

INTRODUCTION

Sugar-sweetened beverages (SSB) are defined as all types of beverages containing free sugars such as monosaccharides and disaccharides[1] These include cordials, carbonated soft drinks, flavored mineral water, energy drink, sports drinks, electrolyte drinks, vitamin-fortified juice drinks, fruit and vegetables-based drinks with added sugar, as well as sweetened tea and coffee.[2] Even though many sweeteners in the market are marketed as healthier and prepared from natural and organic ingredients, these claims may be misleading as these sweeteners remain sugar-based compounds that produce excessive calories and virtually no other beneficial nutrients for body metabolism.[3]

The worsening obesity epidemic has gained the attention of public health and clinical practitioners worldwide. Recently, local studies reported a high prevalence of obesity ranging from 20 to 30%among Malaysian university students.[15,16] The high prevalence of overweight and obesity among university students is a public health concern as excessive weight gain leads to various comorbidities such as diabetes, hypertension, and cardiovascular diseases.[17] Consumption of SSB can be one of the contributing factors to such health concerns. Increased consumption of SSB has been linked with obesity, high blood pressure, dental caries, type 2 diabetes, cardiovascular disorders (CVD), inflammation, insulin resistance, metabolic syndrome with impaired glucose tolerance, and impaired β-cell function among both pediatric and adult age groups.[8,9,10,11] Besides that, SSB consumption was also reported to predispose to a higher risk of psychological health problems such as depression.[12,13,14]

Due to the adverse implications, SSB consumption behaviors among the younger generation have always been monitored by health practitioners.[4,18,19,20] Globally, the type of SSB consumed by adolescents and young adults varied in different countries. In Australia and New Zealand, the most popular SSB include soda, energy drinks, sports drink, fruit juice, and artificially-sweetened soda.[4] In Brazil, apart from the above-mentioned SSB, the local population also favors the intake of sweetened coffee and tea, as well as milk and milk products.[5] In certain countries like Korea, the type of SSB changes according to season whereby the consumption of fruit juice and carbonated beverages tend to be during summer. SSB consumption was also higher in girls than in boys [6] In Malaysia, based on a local study in one of the public universities, sweetened coffee and tea, as well as 3-in-1 sachet drinks are the most popular type of SSB.[7] Furthermore, the prevalence of SSB consumption also varies worldwide. In the United States (US), the National Longitudinal Study of Adolescents and Adults Health revealed a high consumption of SSB, in which 87.3% of the respondents consumed SSB in the previous week and 47.8% of them consumed eight or more such beverages.[19] In addition, the findings from the National Health and Nutrition Examination Survey 2007-2008 also reported a high consumption of SSBs (≥500kcal/day) among adolescents and young adults (36%). In Malaysia, the National Health and Morbidity Survey (NHMS) 2017 showed that 36% of Malaysian adolescents consumed at least a can of carbonated drinks every day.[21] The findings were consistent with other local studies. A study among 401 undergraduate students reported that 89.3% of them consumed SSB at least once

a day while another 53.3% consumed three or more SSBs in one day (high level of SSB consumption).[7] Similar pattern was observed in another study by Reid et al.[22] whereby 86% of their respondents (college students) consumed energy drinks. In Jordan, Bawadi et al.[23] reported that 60% of college students consumed an average of 1.53 servings of SSB daily.

SSB consumption is influenced by a wide range of factors. Sociodemographic characteristics such as younger age, being a male, being from low household income, and a lack of interest in health have been associated with a higher prevalence of SSB consumption.[24,25,26] In addition, body weight status was also linked with SSB consumption in a recent study[27]. However, the same association was not observed in a local study.[28] In view of the inconsistent findings, further exploration into the issues is warranted to obtain a better understanding of SSB consumption so that a more strategic intervention program can be customized for adolescents and young adults. The purpose of this study was to examine the prevalence and type of SSB consumed by students in a public university in Sarawak. We aimed to find out if the consumption pattern of SSB in Sarawak differs from other parts of the country and whether the knowledge of SSB among local adolescents and young adults is sufficient to guide them in making the correct choice in beverage selection.

METHODS

This was a cross-sectional study conducted among undergraduate students who stayed in the residential colleges of the university. Two residential colleges with the highest occupancy (2,016 and 1,998 respectively) were selected based on a sampling frame of 10. For each of the residential colleges, three blocks were randomly selected. The sample size was calculated using OpenEpi (version 3) based on a prevalence of at least one daily SSB intake (89.3%) by Ahmad et al.[7], giving rise to a minimum sample size of 189 after considering an attrition rate of 30%.

The questionnaire was adapted from Ahmad et al.[7] and it included socio-demographic characteristics, SSB consumption, and knowledge of SSB intake. Sociodemographic characteristics included age, gender, ethnicity, family income, parental educational status, personal and family history of diabetes. Knowledge of SSB was ascertained based on five questions: (1) Do you know what is SSB?; (2) Do you know the various types of SSB?; (3) Are commercially prepared fruit drinks a healthier choice?; (4) Does drinking three or more SSB per day have physical and health hazards?; (5) Can frequent consumption of SSB lead to overweight and obesity? Each correct answer was given a score of one. The total knowledge score was categorized into high level (≥4 questions answered correctly) and low level (≤3 questions answered correctly). The frequency of SSB consumption was captured based on the past seven days and within the past one day by using the adapted Beverage Intake Questionnaire (BEVQ).[29] By referring to Ahmad et al.[7], a total of eight types of SSB - soda, coffee, diet soda, sports drink, energy drink, flavored milk, processed fruit juice, and 3-in-1 sachet drink were listed as the options. Respondents were then classified into two groups based on the frequency of SSB consumption, namely high (three or more times per day) and moderate (one to two times per day).[30]

Weight and height measurements were carried out using calibrated weighing scale and stadiometer before being computed to obtain body mass index (BMI). The height was measured using a SECA 213 stadiometer. The stadiometer was suspended upright against a straight wall. The participants were asked to stand upright barefooted on a flat surface with the back of the heels and occiput against the stadiometer before the measuring beam was pushed down to rest on top of the participant's head. The visual display recorded the height to the nearest 0.5 cm. After that, each participant was weighed in their lightweight clothing without shoes by using a calibrated SECA weighing scale. Weight was recorded to the nearest 0.1 kg. Their BMI status was classified as underweight: below 18.5kg/m^2, normal weight: 18.5kg/m^2 to 22.9kg/m^2, overweight: 23.0kg/m^2 to 24.9kg/m^2, or obese: more than 25.0kg/m^2.[31]

Data collection was conducted after obtaining permission from the university and college administration offices. All the students who stayed in the selected blocks of the residential college were invited to participate in the study. Data collection was conducted every Friday from 11 am to 4 pm between 14th February and 6th March 2020. The researchers first explained the nature and purpose of this study to respondents. Respondents who met the criteria and agreed to participate were then asked to fill in the consent form. Questionnaires were handed out to respondents after that. Their weight and height were measured after they completed the questionnaire.

All data were entered and analyzed using Statistical Package for Social Science Progress (SPSS IBM) version 22.0. Descriptive analysis was conducted and numerical data were reported as mean and standard deviation. The Chi-square test of independence was applied to examine the association between sociodemographic characteristics and body weight status with the consumption of SSB. The significance level was set as p-value < 0.05.

Ethical approval was obtained from the Ethics Committee of the Faculty of Medicine and Health Science (FMHS), UNIMAS [(UNIMAS/NC-21.02/03 Jld.4 (20)]. Written informed consent was obtained from respondents before data collection. Respondents were allowed to withdraw from the study without any penalty. All the information obtained was kept confidential.

RESULTS

Table 1 shows the socio-demographic characteristics of the respondents. The majority of them were females, Malays, and older than 21 years. More than half of them came from B40 households. A high proportion of their parents had at least a secondary school education or higher. One-fourth of the respondents reported a family history of diabetes. Collectively, about half of them were either overweight (13.5%) or obese (33.2%). The majority of them (88.9%) reported a high level of knowledge about SSB.

Table 1. Socio-demographic characteristics and BMI of the respondents (n= 208)

	Mean (SD)	n	%
Age (years)	21.2 (1.29)		
	Min: 19, Max: 27		
≤21		145	69.7
>21		63	30.3
Gender			
Male		62	29.8
Female		146	70.2
Ethnicity			
Malay		86	41.3
Chinese		42	20.2
Bumiputera Sarawak		35	16.8
Bumiputera Sabah		27	13.0
Indian & others		18	8.6
Family Income			
B40 (<RM4360)		149	71.6
M40 (RM4360-RM9619)		45	21.6
T20 (>RM9619)		14	6.7
Father Educational Level			
No formal education		6	2.9
Primary school		19	9.1
Secondary school		100	48.1
Certificate/ Diploma & higher		83	40.0
Mother Educational Level			
No formal education		8	3.8
Primary school		17	8.2
Secondary school		124	59.6
Certificate/ Diploma & higher		59	28.3
Family history of diabetes		48	23.1
Father		32	15.4
Mother		23	11.1
Siblings		6	2.8
Type 1 Diabetes		4	1.9
Knowledge Score	4.4 (0.8) Min:1, Max:5		
Low (≤3 questions correct)		23	11.1
High (≥4 questions correct)		185	88.9
BMI			
Underweight (<18.5)		27	13.0
Normal (18.5-22.9)		84	40.4
Overweight (23-24.9)		28	13.5
Obese (>25.0)		69	33.2

Table 2 presents the SSB consumption pattern among respondents. About one-fourth of the respondents consumed SSB at least one time daily (83.6%) and as high as 72.1% consumed SSBs more than three times a week. The top three most consumed types of SSBs were coffee, flavored milk, and 3-in-1 sachet drink (53.4 to 76.0%)(Table 3).

Table 2. Consumption of SSB by day and by week (n=208)

	n	%
SSB intake by day		
None	32	15.4
At least 1 time	97	46.6
More than 3 times	79	38.0
SSB intake by week		
None	6	2.9
At least 1 time	52	25.0
More than 3 times	150	72.1

Table 4 present the association of daily SSB intake with socio-demographic characteristics and other independent variables. Based on the findings, only ethnicity showed a significant association with a daily intake of SSB. Students who were Malay and of other ethnic groups (Bumiputra Sarawak, Bumiputra Sabah, Indian, and other ethnic groups) recorded a

Table 3. Frequency of SSB consumption per week and day (n= 208)

	Weekly						Daily					
	None		1-3 times		>3 times		None		1-3 times		>3 times	
	n	%	n	%	n	%	n	%	n	%	n	%
Soda	95	45.7	108	51.9	5	2.4	125	60.1	81	38.9	2	1.0
Coffee	50	24.0	106	51.0	52	25.0	75	36.1	117	56.3	16	7.7
Diet Soda	161	77.4	44	21.2	3	1.4	169	81.3	38	18.3	1	0.5
Sport drink	131	63.0	73	35.1	4	1.9	152	73.1	53	25.5	3	1.4
Energy drink	193	92.8	14	6.7	1	0.5	194	93.3	12	5.8	2	1.0
Flavoured milk	73	36.1	118	56.7	14	6.7	97	46.6	101	48.6	10	4.8
Processed fruit juice	135	64.9	66	31.7	7	3.4	148	71.2	56	26.9	4	1.9
3-in-1 sachet drink	58	27.9	109	52.4	41	19.7	78	37.5	114	54.8	16	7.7

higher daily consumption (≥1 times) of SSB compared to Chinese respondents. Other independent variables such as age, gender, family income, parents' education level, family history of diabetes, knowledge score, and BMI showed no significant difference between those who did not consume SSB and those who consumed SSB more than once per day.

Table 4. Association of daily SSB intake with socio-demographic characteristics and other factors (n=208)

	Per Day				
	None		≥1 time (moderate to high)		p-value
	n	%	n	%	
Age (years)					0.837
≤21	23	71.9	122	69.3	
>21	9	28.1	54	30.7	
Gender					1.000
Male	10	31.3	52	29.5	
Female	22	68.7	124	70.5	
Ethnicity					<0.01**
Malay	9	28.1	77	43.8	
Chinese	15	46.9	27	15.3	
Others[a]	8	25.0	72	40.9	
Family Income					0.286
B40 (<RM4360)	25	78.1	124	70.5	
M40 (RM4360-RM9619)	7	21.9	38	21.5	
T20 (>RM9619)	0	0	14	8.0	
Father education level					0.523
No and Primary	5	15.6	20	11.4	
Secondary	17	53.1	83	47.2	
Tertiary	10	31.3	73	41.4	
Mother education level					0.293
No and Primary	2	6.3	23	13.1	
Secondary	23	71.9	101	57.4	
Tertiary	7	21.8	52	29.5	

Table 4. Association of daily SSB intake with socio-demographic characteristics and other factors (n=208)

Family history of diabetes						0.820
	No	24	75.0	136	77.3	
	Yes	8	25.0	40	22.7	
Knowledge score						0.392
	Low (≤3 questions correct)	2	6.3	21	11.9	
	High (≥4 questions correct)	30	93.8	155	88.1	
Body mass index						0.482
	Underweight (<18.5)	3	9.4	24	13.6	
	Normal (18.5-22.9)	16	50.0	68	38.6	
	Overweight and obese (≥23.0)	13	40.6	84	47.7	

[a] Bumiputra Sarawak, Bumiputra Sabah, Indian and others; *significant at p<0.05; **significant at p<0.01

DISCUSSION

Based on the findings, the frequency of SSB consumption was considered high among the university students in this study. Our results are consistent with Bipasha et al.[32] in Bangladesh whereby almost all (99.3%) of their students reported that they consumed SSB at least once per week. The prevalence of high SSB intake per day (38.0%) in our study was lower compared to a local study (51.6%) by Ahmad et al.[7]. However, for high SSB intake per week, our study reported a higher percentage of 72.1% compared to 53.3% by Ahmad et al.[7] Such findings are not surprising as our study respondents were students who stayed in the residential colleges on campus. They have limited access to food preparation facilities and are more likely to adopt unhealthy dietary habits such as the consumption of SSB.[33] In addition, most of the residential colleges are equipped with vending machines that dispense affordable SSB and unhealthy snacks. Unlike some workplaces or public buildings, there are no policies that regulate the items or their content for vending machines in universities, thus further increasing the likelihood of SSB

purchase and consumption.[34]

In terms of the types of SSB consumed, coffee and 3-in-1 sachet drinks were the most popular SSBs among the respondents. In other studies, soda was the most common SSB.[5,32] Fontes et al.[5] found that the consumption of sweetened coffee and tea were major contributors to energy intake besides soda. In Malaysia, such sweetened coffee and tea are often packaged in the form of 3-in-1 sachet drinks that consist of coffee or tea, sugar, and creamer. A study at the University of New Hampshire found that their students consumed a lot of caffeinated beverages, particularly coffee because it was the most affordable and readily available product on campus. Furthermore, coffee is perceived as beneficial for them in performing school-related tasks as it can boost their energy throughout the day, making them more alert and productive. Some students even rely on coffee to stay up late and study.[36] Such findings mirrored a local study among university students in Peninsular Malaysia in which caffeinated drinks (coffee or tea) were the most popular SSB whereby 18.4% of the respondents consumed it daily and another 31.9% consumed six times or less per week.[37]

Interestingly, our study shows a significant variation in daily SSB consumption between students of different ethnicities. Malays and other ethnic groups (bumiputra Sarawak and Sabah, Indian, and others) consumed more SSB than Chinese students. Similarly, Tasevska et al.[38] also reported an ethnicity disparity whereby non-Hispanic black race/ethnicity was associated with high SSB consumption. Such disparity may reflect the food intake or dietary differences in various socio-cultural practices. For example, a local study that explored the dietary patterns among major ethnic groups showed that Malay adolescents had a lower intake of health-based food such as SSB when compared to Chinese.[39] Apart from ethnicities, many studies have also compared SSB intake with age, gender, income, education, and BMI.[4,5,38] However, there were no significant differences between these variables with SSB intake in this study. This was aligned with another local study that was conducted at a public university in Malaysia in which no significant association was observed between age, sex, and parental education with SSB consumption.[26] This also indicated that other factors such as physical availability and economic accessibility of the SSB might play a more important role in determining the unhealthy behavior of SSB consumption.[40]

Last but not least, family history of diabetes and knowledge of SSB did not show any association with SSB consumption. This was consistent with the results in Norliza et al.[26] and Park et al.[41] Family history and SSB knowledge did not increase the uptake of healthy lifestyles among family members. This can be extrapolated from cancer research. For example, among respondents with a family member diagnosed with cancer, protective health behaviors such

as involvement in regular screening, quitting smoking, and being physically active did not show any increment.[42] In other words, greater knowledge of certain conditions does not always result in the uptake and practice of healthy behaviors.[43]

Limitations

Some limitations of this study should be taken into consideration. As a cross-sectional study, the causality between variables cannot be ascertained. In addition, the estimation of SSB intake relied on self-reporting and recall bias could be present, leading to potential over- or under-overestimation. A food diary will be a more comprehensive and accurate method to determine SSB intake. Furthermore, the involvement of only dormitory students from a single university might limit the generalization of the findings to all university students in Malaysia.

CONCLUSION

In conclusion, an in-depth understanding the SSB consumption among young adults is important to formulate an effective intervention strategy, especially in view of the distinctive eating cultures of different ethnicities in a multicultural society like Malaysia. Adolescence is a timely period for the adoption and consolidation of sound dietary habits so that healthy nutritional behaviors from young adulthood can lead to better adult health. More importantly, it will be a golden opportunity to correct any nutritional inadequacies and ease various disease burdens later on. In addition, universities should collaborate closely with public health personnel in educating students on how to reduce the consumption of SSB. A more environmental-centered and population-

based approach will be more effective in achieving a more successful response from the university community in the efforts to reduce the availability and acceptability of SSB.

ACKNOWLEDGEMENTS

Abbreviations

Sugar-sweetened beverages (SSB)

Cardiovascular disorders (CVD)

National Health and Morbidity survey (NHMS)

Beverage Intake Questionnaire (BEVQ)

Body mass index (BMI)

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ORIGINAL ARTICLE

The role of medical education in smoking prevention: the prevalance of smoking and related factors in medical students, Canakkale

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Abstract

Objective: The aim of this study is to investigate the prevalence of smoking and related factors among medical students of Canakkale Onsekiz Mart University Medical School. The results of our research are expected to develop training about smoking prevention starting from our faculty and contribute to Global Health Professionals Survey data and discussions determined by WHO, CDC and Canadian Public Health Association.

Methods: This is a cross-sectional study conducted at Canakkale Onsekiz Mart University Faculty of Medicine. The questionnaire including demographic characteristics and status smoking of students was applied between December 2018 - January 2019. The data of the study was analyzed with the statistical package program SPSS 20.0.

Results: In this study, the number of medical students reached was 652. 52.6% of the students were female. 30.5% of the medical students were currently smoking. It was found that age (OR: 1.13 95% CI: 1.05-1.21), male gender (OR: 1.9 95% CI: 1.40-2.67) and boarding in high school (OR: 1.5 95% CI: 1.01-2.26) significantly increased the risk of smoking.

Conclusion: The prevalence of smoking was high among students of Canakkale Onsekiz Mart University Faculty of Medicine. The rate of smoking increased during medical education. The literature suggests that physicians who smoke cannot be effective in smoking prevention. In medical education, training about preventing the use of tobacco and tobacco products is insufficient. In addition, there should be gained to medical students with the knowledge and skills that can protect their own health and then advocate for anti-smoking campaigns in the community.

Keywords: Smoking, Smoking Prevention, Medical Students, Medical Education, Canakkale

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INTRODUCTION

The use of tobacco and tobacco products is the most important cause of preventable premature deaths. According to the World Health Organization (WHO), eight million people die due to tobacco use every year and tobacco exposure or smoking is one of the most important outbreaks of the century [1]. In Turkey, 28% of men and 7.8% of women in the 15-24 age group use cigarettes every day in 2016. This frequency increases to 49.6% and 16.6% in the 25-34 age group, respectively. When the reasons attributable to Disability Adjusted Life Years (DALY) per 100000 people in Turkey are considered, active and passive tobacco use comes first in 2017 (3034 DALY) [2]. Tobacco use is one of the most common preventable health problems both in the world and in our country.

The role of health professionals especially physicians who advocate for preventing the use of tobacco and tobacco products is critical worldwide. According to the Centers for Disease Control and Prevention (CDC), health professionals can reduce tobacco use through short and simple interventions [3,4]. With this aim, WHO, CDC and the Canadian Public Health Association (CPHA) developed the Global Health Professionals Survey (GHPS) to collect data on tobacco use and cessation counseling in WHO member states, and planned studies in medicine, dentistry, nursing and pharmacy students [4-6]. In 2005, the study conducted in ten countries reported that the prevalence of smoking among health students in seven countries was more than 20%. 5-37% of the students stated that they had received an education that could provide counseling on smoking. The researchers state that smoking of both healthcare workers and students has a negative impact on the health effects of smoking as well as smoking counseling [3].

Studies show that physicians start smoking during their medical education. According to GHPS, female health workers tend to smoke more than women in the general population. Factors such as the long and tough education process and stress are among the determinants of starting smoking during education. According to GHPS 2018 data, smoking among medical students varies from 12.3 to 36.0 percent in males and 2.9 to 25.2 percent in females. The prevalence of smoking is higher, especially in Europe [4]. Smoking prevalence among medical students in studies that were conducted in different regions of Turkey ranged from 12.5-35.0% [7-12].

According to the results of GHPS, it is observed that there is not enough education about smoking especially in African and Asian countries [3]. The National Core Education Program, published in 2014 by the Council of Higher Education in Turkey, has targets for counseling training within the scope of preventive medicine practices in addition to environmental diseases, symptoms and situations that develop after tobacco use. Although we do not have data on education about tobacco use at national level, personal experience suggests that the educational level in medical faculties is not sufficient. In our faculty, training for 'the harms of smoking and smoking cessation treatment' is provided as one hour of theoretical lecture in the fifth grade but no smoking prevention and counseling training is provided. In the unpublished study carried out in our faculty, the prevalence of smoking was 27.9% among the first grade students and 47.1% among the sixth grade students. Almost half of the students who smoke in the sixth grade

stated that they started smoking during their medical education.

The aim of this study is to investigate the prevalence of smoking and related factors among medical students of Canakkale Onsekiz Mart University The Faculty of Medicine. The results of our research are expected to develop training about smoking prevention starting from our faculty and contribute to Global Health Professionals Survey data and discussions determined by WHO, CDC and Canadian Public Health Association.

MATERİAL AND METHODS

Research Area and Population

This research was conducted in Canakkale Onsekiz Mart University Faculty of Medicine. The Faculty of Medicine started to educate in 2007. As from 2019, the faculty continues education with 916 students in all six grades (first grade: 207; second grade: 158; third grade: 135; fourth grade: 137; fifth grade; 136; sixth grade; 143) and 135 academicians. The sample was not calculated for this study and it was aimed to reach all students. In this study, the number of medical students reached was 652 (total participation 71.2%; 1st grade: 75.4%; 2nd grade: 73.4%; 3rd grade: 60.7%; 4th grade: 61.3%; 5th grade; 82.4%; 6th grade; 71.3%).

Type of Research

This study is a cross - sectional study researching the prevalence of smoking and related factors in Canakkale Onsekiz Mart University Faculty of Medicine.

Data Sources of Research

In this research, questionnaire form was used as a data source. The questionnaire consisted of 20 questions including demographic characteristics and status smoking of students.

Implementation of Research

The research was conducted by the academic staffs of the Department of Public Health and the Department of Psychiatry between December 2018 - January 2019. Questionnaires were applied under observation in classes and laboratories for first to third grades and in the departments that were training for fourth to sixth grades.

The Permissions About Research

Approval was obtained from the Canakkale Onsekiz Mart University Clinical Research Ethics Committee with 03.12.2018 date and 2019-21 decision number fort his study. Research permission was obtained from the Dean of the Faculty of Medicine at Canakkiz Mart University (decision date: 05.12.2018 / number: E.1800176989).

Statistical Analysis

The data of the study was analyzed with the SPSS 20.0 statistical package program. For presentation of descriptive data, frequency, percentage, mean, standard deviation, median, minimum and maximum values were used. Chi-square test was used to compare categorical data. Independent variables predicting smoking rate of students were evaluated by the Logistic Regression Analysis Backward Conditional Model. In the analysis, the dependent variable was smoking status (0=never used, 1=currently using-quitted). Independent variables were age (continuous variable), gender (0=female, 1=male), high school education type (0=day student, 1=boarder), family type (0=elementary family, 1=extended family, 2=divorced family) , with whom

they lived (0=with family, 1=with friends or in the dormitory, 2=alone), income status (0 = Income > Expense, 1 = Income = Expense, 2 = Income < Expense) and education status of parents (0=high school or university, 1=Primary school and lower). As a result of the six-stage analysis, independent variables of age, gender and high school education type remained in the model. The Odds Ratio was used for statistical evaluation and p<0.05 was accepted.

RESULTS

In this study, 652 students in the faculty of medicine were reached (71.2%). 52.6% of the students were female and 47.4% were male. The mean age was 21.3±2.3 years and the median age was 21.0 years (min-max: 17.0-33.0). Of the students, 156 (23.9%) were first, 116 (17.8%) were second, 82 (12.6%) were third, 84 (12.9%) were fourth, 112 (17.2%) were fifth and 102 (15.6%) were in the sixth grade. 18.9% of students were graduated from boarding high schools. During university education 15.2% of the students live with their families, 21.9% live with their friends at home, 26.5% live alone at home and 36.4% live in the dormitory. 84.5% stated that they had an elementary family and 6.1% stated that they had divorced families. The mother of 32.7% of the participants and the father of 47.9% of the participants graduated from university. When income status were queried, 52.0% stated that their income was equal to their expenses and 11.8% stated that their income was less than their expenses.

30.5% of the students studying at the Faculty of Medicine were still smoking. It was found that males smoke more than females (p<0.05). There was no significant difference between the grades in terms of smoking rate

(p>0.05). Although it was seen that children with divorced families smoked more cigarettes, it was not statistically significant (p>0.05) (Fig. 1). 60.8% of 199 smoking students stated that they have smoked at least once a day for more than six months.
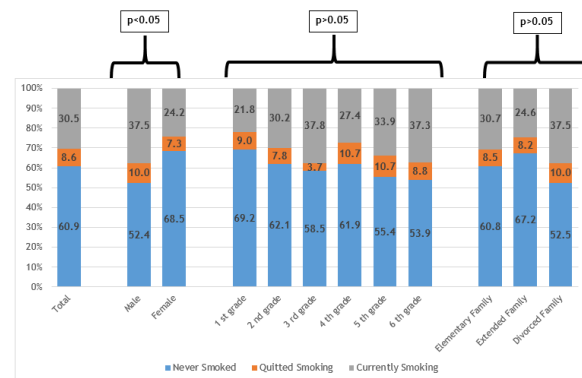
Figure 1 Relation between smoking and socio-demographical characteristics

p: Chi-Square Test

The mean of cigarette count smoked per day was 12.8±7.9, the median of cigarette count smoked per day was 12.0 (min-max: 1.0-56.0). The mean age of starting to smoke was 17.8 ± 2.5 and the median age was 18.0 (min-max: 5.0-25.0). 50.8% of the students stated that they did not want to quit smoking.

When the students were asked about the reasons for starting to smoke, the first three reasons were pleasure, stress and curiosity (23.7%, 15.3% and 13.2% respectively). 70.4% of the students who smoked stated that they knew the institution where they can get help when they want to quit smoking.

When the factors affecting the smoking status of students was examined with the logistic regression analysis, it was found that age (OR: 1.13 95% CI: 1.05-1.21), male gender (OR: 1.9 95% CI: 1.40-2.67) and studying in boarding high school (OR: 1.5 95% CI: 1.01-2.26) significantly increased the risk of smoking (Tab. 1).

Table 1. Investigation of risk factors affecting students' smoking rate by logistic regression analysis

Variables	B	Odds Ratio	95% CI	p
Constant	**-3,523**	**0.030**		*0.0001*
Age	0.125	1.134	1.05-1.21	*0.001*
Sex				
Female			1.0	
Male	0.660	1.934	1.40-2.67	*0.0001*
High school education type				
Day student			1.0	
Boarder	0.412	1.510	1.01-2.26	*0.045*

CI: Confidence Interval, p: Logistic regresyon analysis backward conditional model

DISCUSSION

The prevalence of smoking is still high in both physicians and medical students. On the other hand, many authors indicate that medical practitioners play a key role in smoking cessasion [4,13]. The scientific literature about smoking states that health workers play a critical role in the fight against smoking and are role models in social change. Training for health professionals can provide important opportunities with supporting smoking prevention programs. In the USA in 1992, the National Cancer Institute recommended that smoking prevention programs be a part of undergraduate medical education by 1995 [14,15]. In studies conducted in the USA, 70% of smokers stated that physician advice was important for quitting. Armstrong et al. emphasized that formal training on smoking in medical education had positive effects on the attitudes of physicians about smoking counseling [16].

There is plenty of research on medical students in Turkey, and the rate of smoking among students still varies between 12.5-35.0% in these studies [7-13,17-19]. İnandı et al researched tobacco use and passive exposure at 12 medical schools in Turkey. The study showed that 68% of medical students used tobacco or tobacco products at least once in their lifetime, and the prevalence of smoking was 29.0% for males and 11.0% for females [13]. In a study conducted in Duzce University Faculty of Medicine, influence of friend environment, pleasure and stress were from among the most important reasons for starting to smoke [7]. In a study conducted by Arslan et al. in Aydın, it was found that 24.5% of medical students in the first grade had smoked at any time in their life. The rate of students currently smoking was 18.1% and men were smoking more. Authors reported that the rate of smoking increased as the grade increased, and that the friendship environment was one of the factors that increased smoking [12].

30.0% of students of Canakkale Onsekiz Mart University Faculty of Medicine were current smokers and 8.0% had quitted smoking (Fig. 1). 21.8% of first grade students and 37.0% of sixth grade students were smoking. The rate of smokers in men was higher than women (Fig. 1). Age, male gender and boarding in high school were found as risk factors for smoking (Tab. 1). Approximately one-fifth of students had been just smoking when they started medical school. Smoking was quite high both at the age of starting to school and at the age of graduating from school. 21.0% of students at the age of starting medical education were currently smoking. This condition is similar to other faculties in our country. In addition,

according to the results of the Global Youth Tobacco Survey conducted by the Ministry of Health, 17.9% of young people between the ages of 13-15 used a tobacco product. 40.2% of this group tried tobacco products at least once. In Canakkale, the rate of using tobacco products in the similiar age group was 17.1% [20]. Studies on smoking show that approximately 20% of young people in Turkey start to smoke and almost 40% of them encounter tobacco and its products. This situation is similar for the students who started medical school. One-fifth of students who started medical school smoke. However, the increase in rate during education is another problem. Medical education is expected to contribute to smoking prevention, however, the frequency of smoking among students increases. The causes of this problem should be investigated, the solutions should be developed and the interventions should be planned.

Smoking status among physicians and medical students is one of the interesting areas also in the international literature. The reasons for this topic include the worldwide consumption of cigarettes and the burden of disease related smoking. The task expected from doctors in smoking prevention attracts attention to this occupational group. In a study conducted in Kyrgyzstan, the rate of smoking among medical students was 21.0%. 27% of students in first grade and 19% of students in sixth grade were smoking. Men smoke more than women [21]. In the study conducted by San-Pedro et al. in Spain, the rate of smoking was found 52.2% in physicians and 36.6% in medical students [22]. According to the results of Global Health Professional Students Survey, the highest prevalence of smoking among medical students was in Europe and in the USA (29.2%, 20.3%

respectively). The prevalance of smoking was higher in male students in all regions. In the same study, 70-86% of medical students accepted that physicians were role models for their patients and society [4].

Although there has been a high rate of smoking during medical education, experts on the subject mentioned that health professionals are role models in preventing the use of tobacco and tobacco products. It is one of the important expectations that medical students and healthcare professionals advocate not using tobacco and their products, especially with the training about smoking in the education period [4]. Smoking and related problems took place at different levels in the National Core Training Programme prepared in 2014 in Turkey. However, this document is not yet fully binding for medical faculty education. Each medical faculty prepares its own training program. Smoking-related curricula generally remain at the level of 'related diseases'. In Canakkale Onsekiz Mart University Faculty of Medicine, the subject of smoking is only included in the curricula of the Pulmonary Disease Department. The weight of courses aimed at individual and social struggle related to smoking in medical education should be increased. In the preparation of this program, the objectives contained in the National Core Education Program for Medical Education published in 2020 should be taken into account. A significant number of students already have started school by smoking, and it is seen that this number increases even more while the number is expected to decrease during education. Male gender and students boarded in high school constitute more risky groups about smoking. This is an expected result, because men smoke more than women

all over the world. In addition, it may be easier to get cigarettes for students who leave their families at an early age and boarding in high school. Studies also show that the influence of the friend environment makes these conditions even easier.

CONCLUSIONS

The prevalence of smoking is high among students of Canakkale Onsekiz Mart University Faculty of Medicine. This is similar to the frequency of smoking in the literature. In addition, the rate of smoking is increasing throughout education. This is a major problem that medical education increases smoking aside from the prevention of smoking. Medical education is known as long and difficult. Smoking is one of the most important health problems globally. Physicians play a key role in preventing this problem. The literature suggests that physicians who smoke cannot be effective in smoking prevention. There is insufficient training on tobacco and tobacco products within medical education. This makes smoking prevention difficult.

There is a need for qualitative studies investigating the reasons for not quitting smoking despite medical education among medical students. In addition, medical students should be brought the knowledge and skill that will be able to protect their own health and then advocate for anti-smoking campaigns in the society through educational programs that will be implemented from the first grade.

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ORIGINAL ARTICLE

Evaluation of Turkish validity and reliability of the Cancer Stigma Scale

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Abstract

Objective: In this study, it was aimed to evaluate the Turkish validity and reliability of the Cancer Stigma Scale (CASS) in women who applied for cancer screening.

Methods: After the translation and cultural adaptation phase of CASS was completed, the Turkish version (T-CASS) was applied to 500 women who applied for cancer screening between December 2, 2019 and January 26, 2020, by face-to-face interview technique. The reliability of T-CASS was evaluated with internal consistency analysis and test-retest analysis. Cronbach Alpha internal consistency coefficient was calculated to evaluate internal consistency. The validity of the T-CASS was evaluated by content validity (according to the Davis technique) and construct validity. The accuracy of the six sub-dimensional structures was tested with first and second level Confirmatory Factor Analysis (CFA).

Results: Cronbach's alpha coefficient for the T-CASS was 0.659. Test-retest total scores of the T-CASS showed "moderate" correlation (r=0.488, p<0.001). The content validity results showed that all items were suitable for language validity according to the Davis Technique. According to the results of first and second order CFA, fit indices demonstrated a very good model fit.

Conclusion: It was concluded that T-CASS is a "valid" and "moderately reliable" scale that can be used to measure cancer stigma in groups of women with similar sociodemographic characteristics.

Keywords: Attitude, Early Detection of Cancer, Scale, Stigma, Validity and Reliability

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INTRODUCTION

Today, cancer ranks second among the causes of death in the World.[1] It is predicted that one out of every five men and one out of every six women will develop cancer during their lifetime, and one out of every eight men and one in every eleven women will die of cancer worldwide.[2] In addition to cancer lethality, it adversely affects physical and mental health with loss of organs and limbs; it causes great harm to the economy of individuals and society with labor losses and high treatment costs.[3,4]

Characteristics such as race, nationality, belief, physical disability, and mental illness of individuals or groups have been seen as a stigma in many societies throughout history, and those individuals or groups have been evaluated as incomplete and defective by the society.[5,6] Since cancer is a disease with high mortality and morbidity, being diagnosed with cancer in society is considered as a situation that evokes death. The society believes that even if people diagnosed with cancer recover from such a fatal disease, the state of deficiency and inadequacy will continue physically and socially.[7,8] Seeing cancer as a stigma with this aspect results in stigmatization of cancer patients. This stigmatization process leads to a decrease in self-esteem, anxiety disorder and depression, not participating in cancer screenings, and even rejection of cancer treatment in order to avoid visible changes such as hair loss.[5,9] However, early diagnosis and adequate treatment play a key role in reducing cancer-related disability and increasing survival.[10] However, cancer stigma reduces the chance of early diagnosis by decreasing participation in screening activities and negatively affects compliance with cancer treatment.[5,11]

In the literature research, it was determined that the studies on cancer stigma are limited, and the stigma measurement tools in this field are generally aimed at determining the stigma level of people with cancer. It has been observed that the tools that measure the attitudes of healthy people and therefore the society towards cancer are limited.[11,12,13] Determining the cancer stigma levels when people are still healthy and revealing the factors associated with stigma are of great importance in terms of removing the stigma barrier in front of cancer screenings, increasing compliance with cancer treatment, and increasing the quality of life by protecting the mental and physical health of people. Therefore, in this study, it was aimed to evaluate the Turkish validity and reliability of the Cancer Stigma Scale (CASS), developed in England, in women who applied to screening center.

METHODS

Participants and Procedure

This study is a part of one of the authors' thesis research. The thesis research consists of two parts. The first is a methodological study evaluating the validity and reliability of the Cancer Stigma Scale; The second is a descriptive study in which the cancer stigma levels of the participants and associated factors were evaluated. In this article, the section evaluating the Turkish validity and reliability of the cancer stigma scale is presented.

Permission from the Ankara Provincial Health Directorate and Hacettepe University Non-Interventional Clinical Researches Ethics Board's approval (Land No: 2019/24-20), were obtained as well as participants'

informed consents.

Data were collected at Ahmet Andiçen Cancer Early Diagnosis and Treatment Center between 2 December 2019 and 26 January 2020. The data collection form was applied by the researcher to the people who applied for cancer screening by face-to-face interview method after screening.

In the literature, when calculating the sample size in validity-reliability studies, it is stated that 200 participants are "moderate", 300 participants are "good", 500 participants are "very good" and 1000 participants are "excellent".[14,15] In this study, it was planned to conduct the research with 500 participants. Initially, the study was planned to evaluate the validity and reliability of the CASS in both genders who had not been diagnosed with cancer before. For this purpose, the data collection form was applied to 527 people without any gender restriction. Since 10 out of 527 people were diagnosed with cancer before, 5 people did not answer all of the scale questions, and 11 people did not answer all the demographic, knowledge and/or perception questions, they were excluded from the analysis. Only one of the applicants for cancer screening at the time of data collection was male, and since this did not provide sufficient representation for the male gender, the data of the male participant was also excluded from the analysis. Thus, the research analyzes were carried out on the data of 500 female participants.

Study Instrument

Data Collection Form included questions about the sociodemographic characteristics of the participants and the Turkish version of CASS (T-CASS).

CASS was developed by Laura AV Marlow and Jane Wardle in England in 2014 to measure the stigma of cancer in the non patient population. The scale consists of six dimensions: Awkwardness, Severity, Avoidance, Policy Opposition, Personal Responsibility and Financial Discrimination. The number of items in each dimension varies between three and five, and there are 25 items in total. The scale consists of statements scored through a 7-point Likert method: 1 = disagree strongly, 2 = disagree moderately, 3 = Disagree slightly, 4 = Agree slightly, 5 = Agree moderately, 6 = Agree strongly, and 7 = Not sure. Items 10, 11, 21, 22, and 23 of the scale are reverse scored. The Cronbach Alpha internal consistency coefficient of the scale is 0.76-0.91. The scale does not have a cutoff point, and high scores indicate a high stigma level.[11,12]

Language Validity

In this study, firstly, the language validity of CASS was evaluated. In the first step, CASS was independently translated into Turkish by five English teachers. These five translations were evaluated by the researchers and the most appropriate single translation was decided for each scale item. In the second step, the most appropriate translation was evaluated independently by a group of five experts (an associate professor working in a community mental health field, an epidemiologist, a professor of psychiatry, a professor working in medical oncology, and an associate professor working in medical oncology) in terms of the original concept, suitability for Turkish culture and intelligibility. In the third step, the researchers made adjustments to the translation according to the suggestions of the experts. In the fourth step, the translation was evaluated by a Turkish teacher in terms of

grammar and intelligibility and took its final form in Turkish. In the fifth step, the Turkish scale was translated back into English by a new English teacher. The English translation obtained in the sixth step was compared with the original scale by the researchers and it was seen that the scale items were compatible with each other. Thus, the language validity phase of the scale was completed.

Statistical Analysis

Data was evaluated the statistical package program IBM SPSS 23, and AMOS v.23 program. The descriptive statistics were expressed as frequency, mean, median, standard deviation, 1st–3rd quartile, minimum-maximum values. Analytical method (Kolmogorov-Smirnov) and visual methods (histogram and probability graphs) were used to evaluate the conformity of continuous variables to the normal distribution.

Internal consistency analysis and test-retest analysis were performed to evaluate the reliability of the T-CASS. The Cronbach Alpha internal consistency coefficient was calculated to evaluate the internal consistency. For the test-retest reliability analysis of the T-CASS, the scale was reapplied to 100 people with known pseudonyms from 500 participants with an interval of 15-30 days, which is stated as the ideal time interval in the literatüre.[15] The correlation between both measurements was evaluated with Spearman's rho correlation coefficient.

The validity of the T-CASS was evaluated by testing its content validity and construct validity. The content validity of the scale was evaluated according to the "Davis technique" by the experts involved in the language validity phase. In the Davis technique, experts evaluate each item and give a four-point rating as "Appropriate", "The item needs some revision", "The item needs serious review" and "The item is not suitable". In this technique, the "content validity index" for the item is obtained by dividing the total number of experts who marked the "Appropriate" and "The item needs some revision" options by the total number of experts who evaluated the items. If this value is 0.80 and above, it means that the item is acceptable.[16,17]

During the evaluation of the Construct Validity of the T-CASS, Confirmatory Factor Analysis (CFA) was applied to the entire sample (n=500), since the structure of the CASS was known beforehand. In the literature, it is stated that there is no need to perform Explanatory Factor Analysis (EFA) while adapting the scale, since its latent structure was determined and verified during the development phase of the scale. It is stated that it is appropriate to evaluate the compatibility in the new culture with Confirmatory Factor Analysis (CFA) while adapting the model put forward during the development phase.[15,18]

RESULTS

Participant Characteristics

All of the 500 people (100.0%) participating in the research were women. The mean age of the participants in the study was 54.8 ±8.6, and the median age was 56. 22.0% of the participants were between the ages of 60-64, 31.0% had a university degree or higher.

Validity Analysis

In this study, in order to evaluate the validity of the T-CASS, firstly language validity, then content validity and construct validity were evaluated.

Language Validity

The stage of ensuring the Turkish language validity of the T-CASS is explained in the method section.

The Content Validity

As seen in Table 1. the x^2 value of the six-factor structure was 341.673, the degrees of freedom were 248, and p=<0.001. The six-factor structure showed "very good" fit when evaluated with x^2/sd, RMSEA, SRMR, AGFI, and "good" fit when evaluated with CFI, and GFI.

The content validity of the scale was evaluated according to the "Davis technique". According to the evaluations of the experts, the content validity index of 24 of the 25 items constituting the scale was 1.0 and one item was 0.8. If this value is 0.80 and above, it means that the item is acceptable.[16,17] This result showed that all items were suitable for language validity according to the Davis Technique.

The Construct Validity

Confirmatory Factor Analysis (CFA) was performed on all samples (n=500). Maximum likelihood method was applied in CFA. The path graph obtained as a result of the first level CFA is given in Figure 1 and the standard fit measures are given in Table 1.

Table 1. Goodness-of-fit values of the Turkish Cancer Stigma Scale (T-CASS) obtained as a result of the first level Confirmatory Factor Analysis (CFA)

Fit values	Weak fit (WF)	Good fit (GF)	Very Good Fit (VGF)	CASS fit values	T-CASS fit values	Compatibility Result of T-CASS
x^2		2df≤ x^2 ≤3df	0≤ x^2 ≤2df	379.63	341.673	VGF
x^2/df		≤5	≤3	1.465	1.378	VGF
RMSEA	≤0.10	≤0.08	≤0.05	0.052	0.028	VGF
SRMR		≤0.10	≤0.05		0.041	VGF
CFI	0.85≤CFI<0.90	0.90≤CFI<0.95	0.95≤CFI≤1	0.94	0.927	GF
GFI	0.85≤GFI<0.90	0.90≤GFI<0.95	0.95≤GFI≤1		0.949	GF
AGFI	0.80≤AGFI<0.85	0.85≤AGFI<0.90	0.90≤AGFI≤1		0.933	VGF

RMSEA: root mean square error of approximation footnotes; SRMR: standardized root mean square residual, CFI: comparative fix index; GFI: goodness of fit index; AGFI: adjusted goodness fit index
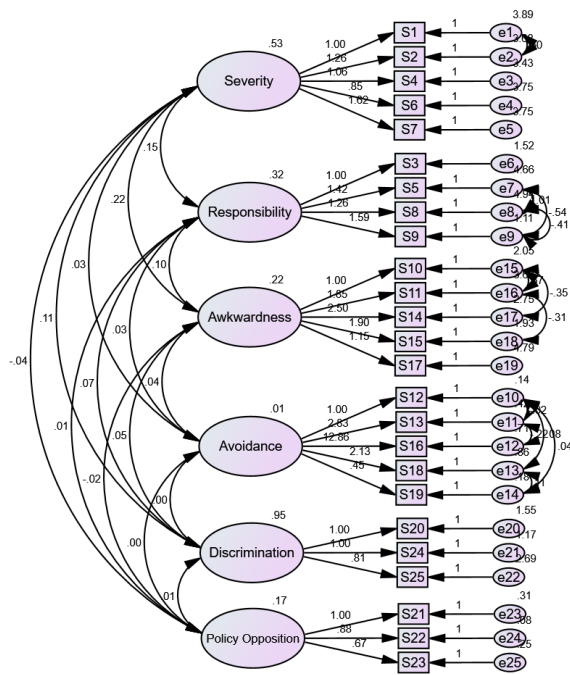
Figure 1. First Level Confirmatory Factor Analysis (CFA) Path Plot of the Turkish Cancer Stigma Scale (T-CASS)

In the literature, it is stated that when applying CFA to multifactorial scales, second-level multifactorial models should also be tested.[15] For this reason, the accuracy of the six sub-dimensional structures was tested with first and second level CFA and it was shown that the observed variables were gathered under more than one independent factor, and these factors were combined under a larger and inclusive factor. The path graph obtained as a result of the second level CFA for this six-factor model is given in Figure 2 and the standard fit measures are given in Table 2. In order to increase the model fit in both CFA analyzes, modifications were made between the items 1st and 2nd, 5th and 8th, 5th and 9th, 8th and 9th, 10th and 11th, 10th and 14th, 11th and 15th, 12th and 13th, 12th and 18th, 12th and 19th, 13th and 16th, 18th and 19th items. It was observed that the goodness of fit values increased after the modification.

As seen in Table 2. the x^2 value of the six-factor structure was 360.983, the degrees of freedom were 258, and p=<0.001. The six-factor structure showed "very good" fit when evaluated with x^2/sd, RMSEA, SRMR, AGFI fit indices, and "good" fit when evaluated with CFI and GFI fit indices.

Table 2. Goodness-of-fit values of the Turkish Cancer Stigma Scale (T-CASS) obtained as a result of the second level Confirmatory Factor Analysis (CFA)

Fit values	Weak fit (WF)	Good fit (GF)	Very Good Fit (VGF)	T-CASS fit values	Compatibility Result of T-CASS
x^2		$2df \le x^2 \le 3df$	$0 \le x^2 \le 2df$	360.983	VGF
x^2/df		≤ 5	≤ 3	1.399	VGF
RMSEA	≤ 0.10	≤ 0.08	≤ 0.05	0.028	VGF
SRMR		≤ 0.10	≤ 0.05	0.043	VGF
CFI	$0.85 \le CFI < 0.90$	$0.90 \le CFI < 0.95$	$0.95 \le CFI \le 1$	0.919	GF
GFI	$0.85 \le GFI < 0.90$	$0.90 \le GFI < 0.95$	$0.95 \le GFI \le 1$	0.945	GF
AGFI	$0.80 \le AGFI < 0.85$	$0.85 \le AGFI < 0.90$	$0.90 \le AGFI \le 1$	0.931	VGF

RMSEA: root mean square error of approximation footnotes; SRMR: standardized root mean square residual, CFI: comparative fix index; GFI: goodness of fit index; AGFI: adjusted goodness fit index
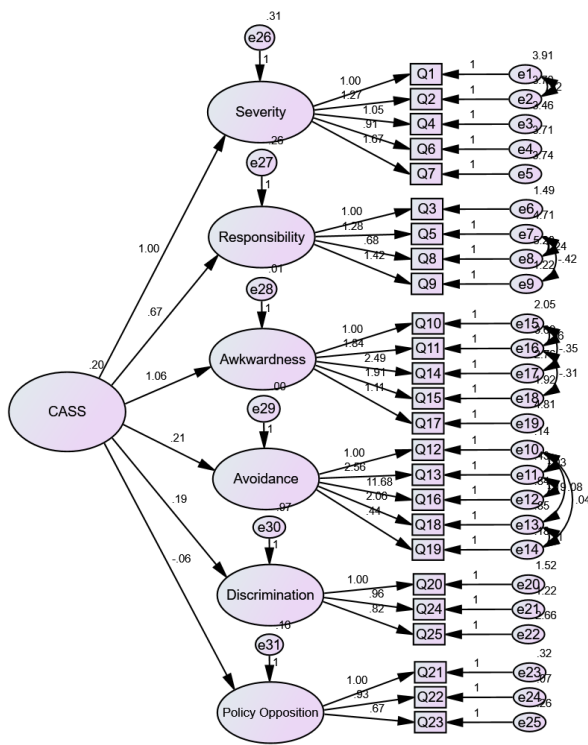
Figure 2. Second Level Confirmatory Factor Analysis (CFA) Path Plot of the Turkish Cancer Stigma Scale (T-CASS)

Reliability Analysis

In this study, internal consistency analysis and test-retest analysis were performed to evaluate the reliability of the T-CASS.

Internal Consistency Analysis

As seen in Table 3, item-total correlation values were examined to examine the item discrimination of the T-CASS and it was found that item-total correlations ranged between 0.142 and 0.543. In the scale development and adaptation process, item-total correlation values are required to be at least 0.20 in terms of distinguishing the measured feature. It is recommended that items below this value be removed from the scale. It is stated that items with item-total correlation values between 0.20-0.30 need to be corrected, items between 0.30-0.40 have good discrimination,

and items that are above 0.40 have very good discrimination.[19, 20]

Table 3. Item Analysis Results Based on Correlation of the Turkish Cancer Stigma Scale (T-CASS) (n=500)

Scale items	Scale point averages when the item is deleted	Scale variance when the item is deleted	Corrected item-total score correlation
Severity			
Item 1	10.38	26.581	0.297
Item 2	10.22	25.884	0.325
Item 4	10.39	27.492	0.282
Item 6	10.49	29.052	0.194
Item 7	9.77	25.587	0.292
Personal responsibility			
Item 3	7.85	16.658	0.262
Item 5	5.76	11.464	0.296
Item 8	6.63	11.484	0.282
Item 9	7.81	17.711	0.152
Awkwardness			
Item 10	10.63	20.446	0.352
Item 11	11.19	23.736	0.286
Item 14	8.79	21.903	0.194
Item 15	11.37	25.251	0.236
Item 17	10.21	20.701	0.314
Avoidance			
Item 12	5.24	5.560	0.320
Item 13	5.15	5.336	0.142
Item 16	4.49	2.415	0.283
Item 18	5.01	4.222	0.301
Item 19	5.24	5.638	0.242
Policy opposition			
Item 21	2.16	0.752	0.438
Item 22	2.23	1.035	0.543
Item 23	2.17	1.000	0.371
Financial discrimination			
Item 20	3.47	6.955	0.420
Item 24	3.58	7.446	0.427
Item 25	3.18	6.518	0.336

Accordingly, it was observed that the item total correlation values of two items (Item 21, Item

22) in the Policy opposition sub-dimension and two items (Item 20, Item 24) in the Financial Discrimination sub-dimension were above 0.40. The discrimination of these items was found to be very good. It was observed that the item total correlation values of one item in the Severity sub-dimension (Item 2), two items in the Awkwardness sub-dimension (Item 10, Item 17), two items in the Avoidance sub-dimension (Item 12, Item 18), one item in the Policy opposition sub-dimension (Item 23) and one item in the Financial Discrimination sub-dimension (Item 25) were between 0.30-0.40. It was found that the discrimination of these items was good. Three items in the Severity sub-dimension (Item 1, Item 4, Item 7), three items in the Personal Responsibility sub-dimension (Item 3, Item 5, Item 8), two items in the Awkwardness sub-dimension (Item 11, Item 15) and two items (Item 16, Item 19) in the Avoidance sub-dimension were seen that the item-total correlation values were between 0.20-0.30. It has been found that these items need to be corrected. The total item correlation values of an item in the Severity sub-dimension (Item 6), an item in the Personal Responsibility sub-dimension (Item 9), an item in the Awkwardness sub-dimension (Item 14), and an item in the Avoidance sub-dimension (Item 13) were below 0.20. Accordingly, it was found that these items were not distinctive. In scale development studies, items with low discrimination are corrected, while items with no discrimination are removed from the scale.[15,19] However, since our study is an adaptation study, removing items from the scale will mean that the new scale is different from the original scale. In addition, practical significance is suggested instead of statistical significance in the literatüre.[19] Therefore, it was decided not to remove these items from the scale.

In order to evaluate the internal consistency, the Cronbach Alpha internal consistency coefficient was calculated for the T-CASS and for each sub-dimension, and it is shown in Table 4. As can be seen, the Cronbach Alpha internal consistency coefficient for the T-CASS was 0.659. The calculated Chronbach Alpha value for the Awkwardness sub-dimension was 0.498, the Severity sub-dimension was 0.507, the Avoidance sub-dimension was 0.408, the Policy opposition sub-dimension was 0.625, the Personal Responsibility sub-dimension was 0.429, and the Financial Discrimination sub-dimension was 0.580. If the value range of the Cronbach's Alpha coefficient is $0.00 \leq \alpha < 0.40$, the scale is not reliable. If it's $0.40 \leq \alpha < 0.60$, the scale reliability is low; if it's $0.60 \leq \alpha < 0.80$, the scale is moderate reliable, and if it's $0.80 \leq \alpha < 1.00$, the scale is a highly reliable scale.[14,21]

Table 4. The Cronbach Alpha Values of Turkish Cancer Stigma Scale (T-CASS) and Each Sub-Dimension

T-CASS and Sub-Dimensions	Item counts	Cronbach Alpha Value
T-CASS	25	0.659
Awkwardness	5	0.498
Severity	5	0.507
Avoidance	5	0.408
Policy opposition	3	0.625
Personal responsibility	4	0.429
Financial discrimination	3	0.580

Accordingly, while the T-CASS (Cronbach Alpha =0.659) and the Policy opposition sub-dimension (Cronbach Alpha =0.625) were "moderate" reliable, the other sub-dimensions were "low" reliable.

Test-Retest Analysis

For the test-retest reliability analysis of the T-CASS, the scale was reapplied to 100 people among 500 participants with an interval of 15-30 days, which is stated as the ideal time interval in the literatüre.[15]

The correlation between the scores obtained as a result of the first application and the second application was evaluated. Correlation was evaluated with Spearman's rho correlation coefficient because the scores did not fit the normal distribution, it is shown in Table 5. According to this; the correlation coefficient between the total scores obtained as a result of the first and second application of the T-CASS was 0.488. Correlation coefficients of the T-CASS were calculated as 0.471 for the Awkwardness sub-dimension, 0.398 for the Severity sub-dimension, 0.262 for the Avoidance sub-dimension, 0.133 for the Policy opposition sub-dimension, 0.258 for the Personal Responsibility sub-dimension, and 0.281 for the Financial Discrimination sub-dimension.

Table 5. Correlation Analysis between the Scores of the Turkish Cancer Stigma Scale (T-CASS) and its Sub-Dimensions in the First and the Second Application

T-CASS and its Sub-Dimensions	r[1]	p
T-CASS	0.488	<0.001
Awkwardness	0.471	<0.001
Severity	0.398	<0.001
Avoidance	0.262	0.009
Policy opposition	0.133	0.188
Personal responsibility	0.258	0.010
Financial discrimination	0.281	0.005

According to Cohen, the correlation coefficient indicates "0.10-0.29=weak, 0.30-0.49=moderate and 0.50-1.0=strong" correlation.[22] Accordingly, the T-CASS,

Awkwardness and Severity sub-dimensions showed "moderate" correlation, while sub-dimensions of Avoidance, Policy opposition, Personal Responsibility and Financial Discrimination showed "weak" correlation. The p value was statistically significant in all sub-dimensions and the T-CASS, except for the Policy opposition sub-dimension.

DISCUSSION

In this study the Turkish validity and reliability of the CASS was evaluated in women who applied to screening center. Internal consistency analysis and test-retest analysis were performed to evaluate the reliability of the T-CASS. In order to evaluate its internal consistency, the Cronbach Alpha internal consistency coefficient was calculated for the T-CASS and for each of the six sub-dimensions. The Cronbach Alpha internal consistency coefficient for the T-CASS was 0.659, The Cronbach Alpha values of the sub-dimensions ranged from 0.408 to 0.625.

The sub-dimension Chronbach Alpha values of the Original CASS developed in England range from 0.73 to 0.87.[11] The Chronbach Alpha value of the Chinese version of CASS (C-CASS) is 0.88, and its sub-dimension values range from 0.70 to 0.89.[12] Chronbach Alpha values of the Japanese version of CASS (J-CASS) vary between 0.81-0.91.[23] The Cronbach Alpha value of the Turkish version of CASS (CASS-T), which was conducted in 2016, is 0.82, and its sub-dimensions range from 0.51 to 0.80.[24]

When the validity and reliability of the CASS is evaluated in different countries, it is seen that the Chronbach Alpha values are different from the original scale, while it rises in the Japanese society, it decreases in the Turkish society. It was thought that this situation was

caused by the different cultures in which the scale was developed and adapted. Many characteristics of societies such as their past lives, value judgments, social ties, health service delivery, health insurance and service utilization levels are different from each other, and this difference is reflected in their perceptions about cancer. All these lead to a change in the measurement skill, namely the reliability, of the measurement tool developed in one culture in the other culture.

Another factor affecting the level of reliability is thought to be the way the scale is applied. The scale was applied online in the English, Chinese and Japanese versions, and the participants were given a response time of up to two weeks.[11, 12, 23] In the Turkish version (CASS-T), the scale was distributed and collected after a while.[24] In our study (T-CASS), the scale was applied with face-to-face interview technique, and individuals were not given a time to think and evaluate. Having to answer the questions in a short time in front of the researcher may have prevented the participants from revealing their true feelings. It is thought that this method difference makes it difficult to comprehend the scale items and reduces the reliability value calculated in our study.

Education level and cognitive characteristics of the population to which the scale was applied also play a major role in the difference in reliability values. The English version of the scale was developed in university graduates, while in the Chinese version, almost all of the population consists of university graduates.[11, 12] The Turkish version was developed for university students.[24] In our study, only one-third of the population was university graduate. It is thought that as the education level decreases, the intelligibility of the scale

items and the reflectivity of the perception about cancer decrease. In addition, it is thought that the decrease in the education level also reduces the intelligibility of the Seven-Point Likert scale. In the literature, it is stated that the scales consisting of seven and eight answer options developed abroad often do not match with Turkish culture, and five answer options are more appropriate for Turkish culture.[15] It is emphasized that it is important to determine the number of options according to the participant profile.[25] In conclusion, it is thought that all the reasons mentioned above caused the Cronbach Alpha value of our study to be lower than the CASS-T and other versions.

In the test-retest reliability analysis of the T-CASS, the correlation between the first application total score of the T-CASS and the second application total score was evaluated. Accordingly, a moderate correlation was found in the T-CASS and in the sub-dimensions of Awkwardness, Severity, weak correlation was found in the sub-dimensions of Avoidance, Policy opposition, Personal Responsibility and Financial Discrimination. The p value of the T-CASS and all sub-dimensions except for the Policy opposition sub-dimension were statistically significant. A strong correlation was obtained in the sub-dimensions as a result of the test-retest result in the other versions.[11, 12, 24]

The fact that the scale has a seven-point Likert structure may have contributed to the lower correlation coefficients obtained from the test-retest result in our study compared to the other versions. In Likert-type questions, more than one option is presented between two extremes to determine the level of participation. As the number of options increases, the measured

range narrows. Namely; The slightest changes in the measured trait in the participants result in a decrease in the test-retest correlation values. In the test-retest application, the first T-CASS application was made when it came to screening, and the second application was made when it came to getting results. This may be related to the increase in awareness about cancer as a result of the cancer education given to individuals during the screening and the educational brochures given at the end of the screening. In other studies, there is no known cancer awareness training between the pretest and the posttest. It has been proven that awareness about cancer makes a difference in stigma scores.[24] In our study, it was thought that the difference in test-retest scores was caused by the awareness activities carried out after the screening.

In the evaluation of the validity of the T-CASS, the construct validity was evaluated after ensuring the language and content validity. At this stage, since the structure of the scale was known beforehand, Exploratory Factor Analysis (EFA) was not performed, but Confirmatory Factor Analysis (CFA) was performed. As a result of the first level CFA, the six-factor structure showed "very good fit" when evaluated with x^2/sd, RMSEA, AGFI fit indices, and "good fit" when evaluated with CFI, GFI, fit indices. The fit index values obtained in the study are similar to both the original CASS and the Chinese version adapted by Ye et al.[11, 12] It has been shown that the high reliability of the scale sub-dimensions in the original CASS and the Chinese version. Due to the low reliability of some sub-dimensions in our study, second-level CFA was performed to evaluate the situation of existing sub-dimensions under a single overarching dimension (Figure 2). Second-level CFA was

not performed in the original study and the other versions.[11, 12, 24] As a result of the second level CFA, the six-factor structure showed excellent fit when evaluated with x^2/sd, RMSEA, AGFI fit indices, and acceptable fit when evaluated with CFI, GFI, fit indices.

Strengths

Previous development (CASS mean age: 29.1) and adaptations of the CASS (CASS-T mean age: 21.35, C-CASS mean age: 32.4) have been conducted in a healthy young population at low risk of cancer. [11, 12, 24] However, the stigma of cancer should be investigated in the target population of cancer, since it reduces participation in screening and adherence to treatment. Our study has made an important contribution to science because it was conducted in the cancer screening target population (Our study mean age: 54.8).

While previous studies applied online surveys to university graduates, excluding people with low education level and low socioeconomic status who cannot access a computer or smart phone, our study reflects the society more by ensuring the participation of every education level and every socioeconomic level. [11, 12, 23, 24]

Our study contributed to science by showing that the reliability of the scales decreased when applied in different ways to participants in different cultures and different educational levels.

Limitations

The fact that the participants were only female is a limitation of our study.

Selecting the participants from those who applied to the screening center may mean that people with high stigma scores were excluded from the study, since the stigma has

been proven to reduce participation in the screenings.

The score obtained in the second application of the scale for test-retest analysis may have been affected by the cancer education activities carried out in the cancer screening center.

CONCLUSION

It was concluded that T-CASS is a "valid" and "moderately reliable" scale that can be used to measure cancer stigma in groups of women with similar sociodemographic characteristics. It is recommended to develop a measurement tool suitable for Turkish Culture that can be used to measure the cancer stigma level of both genders in healthy individuals.

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ORIGINAL ARTICLE

Effect of health responsibility and health literacy on gynecological cancer awareness of university working women

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Abstract

Objective: In this study, it was aimed to examine the effects of health responsibility and health literacy on gynecological cancer awareness of women working at university.

Methods: Relational screening model was used in this study. Data were collected from 409 women aged 20-65 working in university units in Turkey between February 2021 and May 2021. In data collection, socio-demographic characteristics, Gynecological Cancer Awareness Scale (GCAS), Turkish Health Literacy Scale (THLS-32) and Health Responsibility Subscale were used. Descriptive, comparative and multiple regression analyzes were conducted.

Results: The total mean score of GCAS was 158.65±16.01 and 8.3% of the participants had insufficient health literacy. A significant regression model, $F_{(df1=14, df2=394)} = 10.849$, $p < .001$, and 25% of the variance in the dependent variable ($R^2adjusted = .25$) was found to be explained by the independent variables. In the model, the variables that predict and contribute most to women's awareness of gynecological cancer are health responsibility ($\beta = .21$, $t_{(394)} = 4.35$, $p < .01$), and THLS-32 ($\beta = .20$, $t_{(394)} = 4.33$, $p < .01$).

Conclusions: It is suggested that especially health responsibility and health literacy levels should be taken into account while developing intervention programs for women's gynecological cancer awareness.

Keywords: Women's Health, Gynecological Cancer, Awareness, Health Literacy

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INTRODUCTION

The most common type of cancer encountered in women worldwide after breast cancer is gynecological cancer. According to Global Cancer Observatory's (GLOBOCAN) 2020 data, cervical cancer (6.5%), which is one of the gynecological cancers, is the fourth most common cancer type encountered in women, while cancer of the corpus uteri (4.5%) is ranked as the sixth.[1]

Research indicates that gynecological cancers constitute approximately 10.35% of cancer-related deaths and constitute an important part of cancer-related deaths in women.[2]

Examining these data, it is seen that the frequency of total cases of gynecological cancer in Turkey constitutes a considerable majority of the cases among other cancer types. Along with early diagnosis, cancer prevention plays a huge role in decreasing cancer-related mortality. The most important objective in the prevention of gynecological cancers is raising awareness of individuals regarding this issue.[3] Research shows that women's awareness of gynecological cancers and their knowledge levels are low.[4-6] However, through increasing levels of awareness of gynecological cancers (creating informing and educational programs on this subject), women are going to be able to not only define risks that cause cancer and exhibit behaviors of decreasing these risks, but also participate in early diagnosis and treatment.[7] In addition, as a result of the awareness created in individuals, behaviors related to health responsibility aimed at cancer screening may be developed. Health responsibility refers to individuals' having health protective and health promoting behaviors, taking care of their health, getting informed about health and being able to

seek professional help when necessary, with the purpose of maintaining well-being.[8] In the study, it has been expressed that information and reminders about participation in screening programs provided by healthcare personnel increase individuals' motivation to take on responsibilities about their health, hence increasing the participation in screenings such as for breast cancer or cervical cancer.[9]

Health literacy levels play a crucial role, as well, in increasing women's awareness of cancer. The health literacy level enables women to recognize their health problems, contact a health service at the right time, and receive treatment and monitoring in accordance with their conditions.[10] Health literacy is defined as the cognitive and social abilities necessary for individuals to obtain, understand and use healthcare information in order for them to be able to promote their health and maintain good health.[11]

Low levels of health literacy result in worse health conditions, lack of knowledge on medical care, decrease in understanding of medical information, lack of understanding and use of preventive services, worse health outcomes, and increasing hospitalization and healthcare costs.[12-14]

It is stated that individuals with low health literacy have lower rates of use of health services and participation in cancer screening programs.[15] Although Pap smear is a simple cytological test used in scanning and diagnosis of cervical cancer and precancerous lesions, very few women participate in this preventive program.[16] According to related studies, the low-level health literacy of individuals is seen as an obstacle to their participation in screening programs and their treatments.[17-19] In another study carried out among Chinese Amer-

icans, it is expressed that low health literacy of the participants decreases the participation in cancer screening.[14] In another research, it has been determined that women with low health literacy, compared to those with high health literacy, have a lower possibility of undergoing Pap smear.[20] It is indicated that women's general health literacy is low in Turkey, and the rate of participation in cancer screenings such as mammography and Pap smear is also very low.[21] Based on these data, it can be said that low health literacy is an extremely important problem that affects health, especially for women in Turkey.

In conclusion; the level of health literacy and health responsibility of women is of great importance in the protection and development of their health. These two concepts are thought to play a key role in the prevention of gynecological cancers and the implementation of preventive health services and screening programs. In order to promote awareness and early diagnosis of gynecological cancers, it is necessary to identify the factors that hinder and improve the implementation of interventions. When the studies on the subject in Turkey were examined, it was seen that the majority of the existing studies were aimed at examining women's knowledge, awareness and related factors about gynecological cancers.[7,22] None of the studies determined the effect of health responsibility and health literacy variables on gynecological cancer awareness. For these reasons, in this research; it was aimed to examine the effects of health responsibility and health literacy on gynecological cancer awareness of women working at university. The research questions to be addressed are: (i) What is the level of gynecological cancer awareness, health literacy and health responsibility among women? (ii) Does gynecological cancer awareness differ according to the sociodemographic characteristics of the participants? (iii) What are the predictors that affect gynecological cancer awareness in women?

METHODS

Design and Participants

In this study, the relational survey model, one of the quantitative research methods, was used. In this model, it is tried to explain in which direction (positive/negative) the change between the variables of the study, at what level and how, and to make predictions.

This study was conducted on women working in university units in Turkey between February 2021 and May 2021. The first planning phase of the research was considered cross-sectional and it was aimed to reach women working in all university units in Turkey. However, the Covid 19 pandemic in our country and even in the world has caused many people to die and become ill. It has been observed that this epidemic negatively affected the research process and therefore participation from many university institutions was much less than anticipated. However, the main reason why the research was desired to be carried out on women working in university units was easy accessibility and low cost to a large number of women. At the continuation point of the research, it was determined that the sample calculation would be appropriate in the unknown universe of the research. Thus, the sample of the study was calculated using the mean and standard deviation values obtained from a previous study on gynecological cancer awareness (average score of the Gynecological Cancer Awareness

Scale obtained from the previous study was 155.8±17.5).[3] In addition, the expected mean value of the study (160), power (95%), alpha and beta error values (0.05) were used to calculate the following formula (Figure 1).[23]

$$N = \frac{\sigma^2(z_{1-\beta} + z_{1-\alpha/2})^2}{(\mu_0 - \mu_1)^2}$$

$$N = \frac{(17,5^2(1.64 + 1.96)^2}{(155.8 - 160)^2}$$

$$N = 226$$

μ_0 = population mean

μ_1 = mean of study population

N = sample size of study population

σ = variance of study population

α = probability of type I error (usually 0.05)

β = probability of type II error (usually 0.2)

z = critical Z value for a given σ or β

Figure 1. Sample size calculation in universe with an unknown size.

According to this calculation, the sample size was determined as 226. Thus, 414 women who agreed to participate in the study were included in the study, among the women who were sent through university units and filled out the questionnaire. However, five participants were excluded from the study because they gave incomplete answers, and the study was completed with 409 participants. Women aged 20-65, Turkish speaking, literate and volunteers were included in the study. Women under the age of 20 and over the age of 65 were not included in the study due to the low probability of gynecological cancer.

In this study, purposive sampling method, which is one of the non-random sampling methods, was used as the sample selection. The reason for choosing this method; the low cost of the research adds speed and practicality to the research.

Data Collection Tools

Data were collected using women information form, Gynecological Cancer Awareness Scale (GCAS), Turkish Health Literacy Scale (THLS-32) and Health Responsibility Subscale. There are approximately 130 state universities in Turkey. These university units were informed about the research and application permission was requested. However, positive responses were received from very few universities for the implementation of the research. Research Invitation Letters were sent to the university units that responded positively through official channels. University units also sent this invitation letter to the women working in their own institution by e-mail. An Informed Consent Form and other data collection forms were sent to women who volunteered to participate in the study. Women were provided with information about the purpose of the study.

Women Information Form

The form included eight items about the women's sociodemographic characteristics, such as age, education level and income. Also, there were eleven questions about the women's obstetric, gynecologic and health behaviors.

Gynecological Cancer Awareness Scale (GCAS)

This scale was developed by Alp Dal and Ertem in 2017 for the purpose of examining the gynecological cancer awareness of women be-

tween the ages of 20 and 65. A 5-point Likert-type scale, GCAS consists of 41 items and 4 subscales. The Cronbach's alpha value of the scale is 0.944. The scale is evaluated based on total score and the minimum score that can be obtained from the scale is 41, while the maximum score is 205. As the score obtained by the women from this scale increases, their awareness increases, as well.[3]

Turkish Health Literacy Scale (THLS-32)

Reliability and validity of the scale was completed by Okyay et al. in 2016, based on European Health Literacy Scale (HLS-EU). THLS is a 32-item, 4-point Likert-type scale. It is composed of two health-related dimensions (1=Treatment and service, 2=Disease prevention/health promotion). Each item in the scale is evaluated by scoring between 0 and 4. The minimum score that can be obtained from the scale is 0 and the maximum score is 128. However, for easiness in calculation, the total score has been standardized as a value between 0 and 50, similarly to the HLS-EU study. Accordingly, index is calculated by the formula= (arithmetic mean-1) x [50/3]. As a result of this calculation, the scale is defined in 4 categories according to the score obtained, which follow as: 0-25: insufficient health literacy; >25-33: problematic/limited health literacy; >33-42: sufficient health literacy; >42-50: excellent health literacy, again similarly to the HLS-EU study. In this research, total mean score of THLS-32 was used. Increase in the scale score indicates increase in health literacy. The Cronbach's alpha value of the scale was determined as .92.[24]

Health Promoting Lifestyle Profile Ii/ Health Responsibility Subscale

The scale, developed by Walker et al. in 1987,

was reconstructed in 1996. It was adapted to Turkish by Bahar et al. in 2008. The 4-point Likert-type scale consists of 52 items and 6 subscales. However, only the "Health Responsibility" subscale was used in this research. A minimum score of 9 and a maximum score of 36 can be obtained from this subscale. Health responsibility is indicated to increase as the obtained score increases.[8]

Data Analysis

All analyses were performed using SPSS Windows 21.0 package. Numbers, percentages, mean±standard deviation and minimum-maximum values were used for descriptive variables. In order to determine whether data were normally distributed, kurtosis and skewness values were used and values between -2 and +2 were accepted as normally distributed.[25] Comparison of GCAS mean scores based on independent variables was conducted using *Pearson's correlation, independent samples t-test,* and *ANOVA test. Multiple regression analysis* (enter model) was run with the variables found out to be significant as a result of univariate analysis. In this context, all of the independent variables were included in the created regression model and it was aimed to examine the common effect of all predictor variables on the predicted variable. Tolerance, inflating factor of variance (VIF), and Durbin-Watson values were used to decide which independent variable to include in the model (to determine whether there is multicollinearity). The independent variables, VIF value <10, tolerance value <0.2, and Durbin-Watson value between 1.5-2.5 were included in the regression analysis.

RESULTS

The mean score of participants' ages is

38.48±8.47, the mean score of age at first marriage is 26.17±3.83, and the mean score of age at first pregnancy is 28.29±4.22. 20.8% of the participants stated that they had a miscarriage and 62.6% had at least one child.

The total mean scores that women obtained from GCAS is 158.65±16.01, health responsibility mean score is 22.06±4.68 and THLS-32 mean score is 92.41±13.71. In addition, it was determined that 8.3% of the women had insufficient health literacy, while 38.9% had problematic-limited health literacy (Table 1).

age *(r*=0.108*, p*=0.029*)* (Table 2).

A statistically significant difference was found between GCAS mean scores and women's educational background, occupation, family history of gynecological cancers, having gynecological diseases, having regular physical examinations, Pap smear screening behavior, having knowledge about HPV vaccine, having knowledge about KETEM (Early Cancer Diagnosis, Screening and Education Centre), having knowledge about gynecological cancers and their early diagnosis (*p*<.05). On the oth-

Table 1 GCAS, Health Responsibility Subscale and THLS-32 score distribution (n=409)

GCAS and Subscales	X̄ ±SD	Min-max
GCAS Total Score	158.65±16.01	103-205
Awareness of early diagnosis and knowledge in gynecological cancers	17.95±2.03	4-20
Awareness of gynecological cancer risks	28.00±5.36	10-45
Awareness of prevention of gynecological cancers	22.36±3.67	9-30
Awareness of routine medical examinations and serious illness perception in gynecological cancers	90.43±10.86	48-110
HPLP II/health responsibility subscale		
Health responsibility subscale	22.06±4.68	10-36
THLS-32 and subscale		
THLS-32 total score	92.41±13.71	49-120
Treatment and service subscale	50.75±7.59	28-64
disease prevention and health promotion subscale	47.65±7.94	20-64
THLS-32 categorical score distribution	**n**	**%**
Insufficient health literacy (0-25 points)	34	8.3
Problematic – limited health literacy (>25-33 points)	159	38.9
Sufficient health literacy (>33-42 points)	139	34.0
Excellent health literacy (>42-50 points)	77	18.8

Abbreviations: GCAS, Gynecological cancer awareness scale; THLS-32, Turkish health literacy scale.

A positive and moderately significant relationship for the total mean score obtained from GCAS was found with THLS-32 and health responsibility mean scores respectively (*r=0.312; r=376, p*<0.01), while a positive weak significant relationship was found between GCAS mean score and mean score of

er hand, no statistically significant difference was found between GCAS mean scores and marital status, perception of income, smoking behavior, alcohol consumption, nutrition or having gone through menopause (*p*>.05) (Table 3).

Table 2. Correlations Among Women's Means Scores of GCAS, THLS-32, Health Responsibility Subscale and Age (n=409)

Correlation analysis findings	GCAS	THLS-32	Health responsibility subscale	Age
GCAS	1			
THLS-32	.312**	1		
Health responsibility subscale	.376**	.339**	1	
Age	.108***	-.035*	-0.024*	1

*p> .05 ** p< .01 *** p< .05

Table 3. Comparison of GCAS Mean Score and Certain Variables (n=409)

Characteristics	n	%	GCAS Mean Score X̄ ±SD	Test value	p
Marital status					
Married	298	72.9	159.28±16.37	1.305*	.193
Single	111	27.1	156.96±14.94		
Educational status					
Primary school	12	2.9	149.25±21.37		
Middle school	3	0.7	142.33±18.55	3.520**	**.015**
High school	13	3.2	151.69±12.80		
University and above	381	93.2	159.31±15.74		
Self-rated economic status					
Income>expense	41	10.0	156.09±16.89		
Income = expense	224	54.8	159.08±16.47	0.605**	.547
Income<expense	144	35.2	158.70±15.03		
Occupation					
Public official	164	40.8	156.78±15.62		
Academician	191	47.4	159.12±15.37	3.336**	**.019**
Healthcare personnel	41	8.6	165.14±18.32		
Housekeeping personnel	13	3.2	154.92±18.13		
Smoking behavior					
Yes	68	16.6	158.33±15.61		
No	305	74.6	159.03±16.40	0.583**	.559
Quitted	36	8.8	156.02±13.26		
Alcohol consumption					
Yes	83	20.3	157.67±15.44	-0.624*	.533
No	326	79.7	158.90±16.16		
Proper and balanced nutrition					
Yes	329	80.4	158.69±15.61	0.112*	.911
No	80	19.6	158.47±17.65		
Family history of gynecological disease					
Yes	54	13.2	163.12±17.10	2.215*	**.027**
No	355	86.8	157.97±15.75		

Table 3.(Continued) Comparison of GCAS Mean Score and Certain Variables (n=409)

Characteristics	n	%	GCAS Mean Score X̄ ±SD	Test value	p
Existence of gynecological disease					
Yes	55	13.4	163.30±14.91	2.329*	**.020**
No	354	86.6	157.93±16.07		
Having gone through menopause					
Yes	55	13.4	162.07±17.20	-1.705*	.089
No	354	86.6	158.24±15.77		
Regular gynecological examination					
Yes	159	38.9	163.47±15.39	4.999*	**.001**
No	250	61.1	155.58±15.66		
Pap smear screening behavior					
Yes	260	63.6	160.16±15.66	2.543*	**0.011**
No	149	36.4	156.01±16.31		
Having knowledge about HPV vaccine					
Having knowledge about KETEM[a]					
Yes	258	63.1	161.17±16.00	4.232*	.001
No	151	36.9	154.35±15.12		
Having knowledge about gynecological cancers					
Yes	285	69.7	161.67±15.76	6.032*	.001
No	124	30.3	151.70±14.37		
Having knowledge about early diagnosis in gynecological cancers					
Yes	279	68.2	161.43±15.95	5.317*	**.001**
No	130	31.8	152.68±14.47		

a Early Cancer Diagnosis, Screening, and Education Centre; *Independent samples t test; ** ANOVA

Likewise, no statistically significant relationship was detected between GCAS scores of women and frequency of physical activity (F=1.043; p=0.373), number of pregnancies (F=1.235; p=0.292), number of miscarriages (F=0.854; p=0.512), having a child (t=0.171; p=0.864) and where they obtain information about gynecological cancers.

A significant regression model, $F(df1=14, df2=394)=10.849$, $p< .001$, and 25% of the variance in the dependent variable ($R^2 adjusted = .25$) was found to be explained by the independent variables. Accordingly, Health responsibility ($β= .21$, $t(394)= 4.35$, $p< .01$), THLS-32 ($β= .20$, $t(394)= 4.33$, $p< .01$), Having knowledge about HPV vaccine ($β= .11$, $t(394)= 2.28$, $p< .023$), Existence of gynecological disease ($β= .09$, t(394)= 2.09, p=.037) predicts variables positively and significantly (Table 4).

Table 4. Multiple regression model of women's awareness of gynecological cancers (n = 409)

Independent Variables	Unstandardized Coefficients		Standardized Coefficients			
	B	**Std. Error**	**β**	**t**	**p**	**VIF**
Health responsibility	.736	.16	.216	4.354	.001	1.340
THLS-32	.235	.05	.202	4.335	.001	1.181
Age	.157	.09	.083	1.732	.084	1.258
Regular gynecological examination						
Yes	2.536	1.65	.077	1.532	.126	1.390
No[R]						
Family history of gynecological disease						
Yes	2.234	2.13	.047	1.048	.295	1.111
No[R]						
Having knowledge about HPV vaccine						
Yes	3.704	1.61	.115	2.287	.023	1.374
No[R]						
Pap smear screening behavior						
Yes	-.929	1.75	-.028	-.530	.597	1.520
No[R]						
Having knowledge about KETEM						
Yes	2.680	1.56	.081	1.718	.087	1.210
No[R]						
Having knowledge about gynecological cancers						
Yes	4.003	2.14	.115	1.871	.062	2.065
No[R]						
Existence of gynecological disease						
Yes	4.383	2.09	.094	2.095	.037	1.088
No[R]						
Having knowledge about early diagnosis in gynecological cancers						
Yes	-.953	2.13	-.028	-.446	.656	2.113
No[R]						
Educational status						
Middle school						
High school	-15.63	9.12	.083	-1.714	.087	1.294
University and above	-.447	5.75	.005	-.078	.938	2.175
Primary school[R]	4.629	4.23	.073	1.092	.275	2.444

Abbreviations: R, reference; Std.Eror, standard error; t, significance test; VIF, Variance inflation factors.

DISCUSSION

Result of the study have shown that women's awareness of gynecological cancer (158.65±16.01) is above average (Considering that she scored a minimum of 41 and a maximum of 205 points from the scale). This finding is consistent with the results of most studies in Turkey.[3,5] It is considered that the fact that education received by the majority of the women is university-level and above may have had an influence on the results.

It was seen that in the model established in line with the purpose of the research, the variable which predicted women's awareness of gynecological cancer and had the greatest contribution was health responsibility. Health responsibility is individuals' fulfilling their duty of developing health protective and promoting behaviors in order to keep their physical, psychological and social well-being. It includes the concepts of taking care of one's health, undergoing medical check-up on time, getting information about health and seeking professional help when necessary.[26] Awareness of gynecological cancers can enable the improvement of women's responsibility behaviors for these concepts. In the study, it was determined that women recognized clinical breast examination, breast self-examination and mammography; however, it was health responsibility that was effective in turning this knowledge into behavior.[27] Another study demonstrated that gynecological cancer prevention scores of the individuals had a positive impact on their health responsibility scores. Health responsibility provides the individual with the opportunity of starting and maintaining the health promoting behavior.[22] At this point, it is a prospective result that health responsibility, one of the health protectives, preserving and promoting behaviors, is the most important variable that predicts awareness of gynecological cancer.

In the current study, approximately half of the women had insufficient and limited health literacy (47.2%). 68% of the women in the study carried out in Iran had insufficient and limited health literacy,[28] while in the United Kingdom, 13.5% had insufficient and 25.5% had limited health literacy.[29] In a previous study carried out in Turkey, on the other hand, it was expressed that 38.1% had insufficient and 42.6% had limited health literacy.[30] The finding of the present research shows similarities with the finding in the UK, while it differs from the results of other studies. It is considered that the reason might be related to the sample population of the study, different tools measuring the level of health literacy, or educational level of the participant women. It is a fact that general literacy level underlies health literacy. As the education level increases, reading and comprehension skills of individuals improve, as well, which is an important factor for health literacy.[16]

The present research has shown that health literacy level is a crucial predictor in increasing women's awareness of gynecological cancers. It has been established that health literacy is one of the factors that directly affect women's health. Accordingly, low levels of health literacy limit women's ability to determine cancer symptoms, make decisions about their health, adhere to treatment, participate in screening methods, and seek timely professional help. In this case, early diagnosis of cancer and treatment options are highly affected.[31]The

study has demonstrated that since women with a low level of health literacy participate less in screening services, more than half of them have never had Pap smear.[16] It is reported that this situation causes delay in cancer diagnosis and in recent years, health literacy skills also affect many areas of health.[16] Many studies have confirmed this.[30,32] Additionally, Boxell et al. (2012), in their interventional study on obstacles in the way of awareness of gynecological cancer symptoms and receiving medical help, found out that after the intervention, women's awareness of symptoms increased and obstacles to seeking medical help decreased (p <.001).[29] However, for individuals with lower levels of health literacy, awareness of gynecological cancer symptoms was found lower both before and after the intervention, and no significant difference was detected between obstacles to seeking medical help. The research revealed that benefits gained after the intervention were less in women with lower levels of health literacy. Besides, it is stated that differing health literacy levels among women contribute to disparities in healthcare.[29] Similar to the result of the current study, other studies have also put forward that health literacy has an important impact on awareness of gynecological cancers.[16,29]

In the current study, women's having knowledge about HPV vaccine and whether they have any gynecological disease are the other two important variables that predict awareness of gynecological cancer. To what extent HPV vaccine is recognized by the public is an important issue for women's health in primary prevention of cervical cancer, which is one of the gynecological cancers. In the study, it was shown that the incidence of cervical cancer and the mortality rate were significantly reduced thanks to the HPV vaccine.[33]

In addition, clinical trial results have shown that HPV vaccines are very safe and very effective in preventing HPV infections and precancerous lesions. Therefore, it is important for women to be informed about the HPV vaccine.[34] In a study on American women carried out by Blake et al. (2015), percentage of those with knowledge about HPV infection and vaccine was determined to be 68%.[35] In a study conducted in Turkey, 33.1% of women were determined to have knowledge about HPV vaccine[36] Besides, no statistically significant difference was detected in this study between GCAS total median value and variables of women's knowledge about HPV vaccine and existence of a gynecological disease.[5] In the present research, having knowledge about HPV vaccine increased GCAS and it is assumed that the level of women's educational and health literacy levels is effective in increasing their awareness of gynecological cancers. When related studies are examined, it is seen that the majority of women in the research conducted by Gözüyeşil et al. (2020) are primary school graduates, while participants of our study are mostly university graduates or have an educational level above.[5] As previously mentioned, general literacy has a strong relationship with health literacy. Considering the low educational levels of the women in the related study, and thus their low levels of health literacy, it can be remarked that even if they had knowledge the HPV vaccine, the level of their awareness of gynecological cancers did not increase due to an insufficiency of cognitive and social skills which determine the ability and motivation to understand and use this knowledge in health promoting and pre-

serving ways. Additionally, the women in our study group having any gynecological disease are believed to have taken the responsibility of obtaining information about their diseases, as well as understanding and applying this information, and the awareness of gynecological cancer increased as a result of responsibility behaviors.

Limitations

Our study had some limitations. First, due to the design of the study, causal relationships could not be determined. Secondly, although the study aimed to reach women working in all universities in Turkey, only a few participants were reached from a university. Therefore, the results cannot be generalized to all women nationwide. Thirdly, purposeful sampling method, which is one of the non-probabilistic sampling methods, was used in the determination of the participants in the research in order to speed and practicality to the research. The decision of the researcher in the selection of the participants according to his own predictions and knowledge can be considered as the disadvantage of this method. In addition, the generalizability of this sampling method is lower than the researches in which probability sampling methods are used.

CONCLUSIONS

In the present research, the variables of health responsibility and health literacy in particular, existence of a gynecological disease, and having knowledge about HPV vaccine were determined as the variables that significantly predicted the awareness of gynecological cancers. Improving health responsibility and raising health literacy levels are key concepts in empowering women and eliminating disparities in healthcare. In this context, under

the leadership of public health experts, it is recommended to plan health education programs to improve women's health responsibility and health literacy in order to increase knowledge and awareness about the risk factors and symptoms of gynecological cancers. These trainings should be planned in a way that women can easily understand and access, taking into account their education and health literacy levels.

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ORIGINAL ARTICLE

COVID-19 vaccine hesitancy and negative attitudes perceived by individuals who do not accept COVID-19 vaccines: A qualitative study

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Abstract

Objective: It has been noted that in different parts of the world there are a considerable number of people who have a negative attitude to coronavirus vaccines. Therefore, the possible causes of hesitancy and rejection towards COVID-19 vaccine have been found to be worth investigating. In this process, where fierce discussions have been raised, perceptions of marginalization of unvaccinated individuals were also evaluated.

Methods: Study data were collected between November, 2021 and February, 2022. Participants were reached via social media. Within the scope of the study, semi-structured interviews were conducted with 14 participants. Interviews were conducted online or face-to-face. The data were analyzed by the method of inductive thematic analysis.

Result: As a result of the analysis, it was found that the participants thought COVID-19 vaccines unnecessary, ineffective and/or risky. A number of participants have stated that COVID-19 vaccines may be part of larger goals. However, some participants reported that they felt pressure from their social environment and perceived negative attitudes.

Conclusion: Considering vaccines unnecessary, ineffective and risky results in refusal to be vaccinated. It is seen that some of the participants have perceived of marginalization. It is recommended to provide accurate information about the disease and vaccination, to be transparent and to show an empathetic approach to these individuals.

Keywords: Vaccine Hesitancy, Vaccine Refusal, Vaccine Acceptance, COVID-19 Vaccines, Qualitative Study

INTRODUCTION

Coronavirus (COVID-19) cases have affected the whole world over time after they first appeared in December 2019[1.] Vaccine development studies have yielded their results over time, and WHO-approved, effective and safe vaccines against the COVID-19 virus have been made available.[2] However, after the introduction of the developed vaccines, discussions about the safety, effectiveness and necessity of vaccines arose around the world, and it was found that there were individuals who were hesitant to get COVID-19 vaccines or refused to get vaccinated.

Vaccination is the most effective method known to provide collective immunity. Vaccines have been used in the fight against many infectious agents that humanity has faced, and positive results have been obtained.[3] However, there seem to be concerns about the safety and effectiveness of vaccines. This situation, together with the rejection of COVID-19 vaccines, creates an obstacle to the provision of community immunity and paves the way for a global health crisis.[4]

WHO defines "vaccine hesitancy" as a delay in accepting or refusing the administration of certain vaccines despite the availability of vaccination services. "Vaccine refusal" is considered to be the case of not receiving any vaccine at all. Vaccine hesitation is explained as a concept that varies according to time, place and vaccine, affected by factors such as trust (not trusting the vaccine or the provider), complacency (not perceiving the need for a vaccine, not valuing the vaccine). As a result, anti-vaccination, hesitation or refusal express a dynamic process as concepts that should not be considered alone.[2]

Literature studies reveal that factors such as gender, age, education level, ethnicity, socioeconomic level affect the intention to be vaccinated.[5,6] In addition, there are studies showing that various variables such as COVID-19 risk perception, trust in COVID-19 vaccine, knowledge level about COVID-19, trust in the government and pharmaceutical companies, religious belief and political opinion play a role in vaccine acceptance.[7-9] It is believed that the role of conspiracy theories generated about the COVID-19 virus and its vaccines also affects the intention to get vaccinated.[10,11] Discussions that started after the development of COVID 19 vaccines continue fiercely in many parts of the world. In particular, it is observed that people are polarized on social media platforms, being almost pro- and anti-vaccine.[12,13] In order to ensure herd immunity, governments in different parts of the world have provided for various degrees of sanctions against individuals who have not been vaccinated and have implemented some of these sanctions. This situation has caused various reactions in individuals who have not been vaccinated. It is also a matter of curiosity how individuals who have not received the COVID-19 vaccine have been affected by these fierce discussions. In this context, when the relevant literature is examined, it is seen that the possible stigma towards individuals who have not been vaccinated is discussed and it remains unclear how unvaccinated individuals are affected by this process.[14,15] As a result, it seems that there are an underestimated number of people who do not want to get COVID-19 vaccinations, and the issue of COVID-19 vaccine hesitancy remains relevant. For this reason, it is thought that it is important why unvaccinated individuals do not get their COVID-19 vaccines despite all the diffi-

culties that they may face in everyday life and despite the vaccine incentive policies implemented by governments. It is observed that the studies examining the attitudes towards COVID-19 vaccination in the literature were conducted mainly by quantitative method.[16-18] However, qualitative studies conducted on this issue may reveal in detail the variables that play a role in the negative attitudes of individuals towards vaccination. In addition, how individuals who have not been vaccinated are affected by this polarizing process will fill an important gap in the literature. As a result, this qualitative study aims to understand the reasons for the negative attitudes of individuals who are hesitant about getting the COVID-19 vaccine or who refuse to get the vaccine, and to reveal how they are affected by this process in which there are vaccine discussions.

METHODS

Study Design

The study was conducted according to the case study pattern of the qualitative research method. The case study, which is one of the patterns of the qualitative research method, focuses on questions such as "how" and "why", and deeply examines the phenomenon or event that the researcher cannot control within the framework of their own natural life.[19] Considering that it is suitable for the purpose of the study, the case study pattern was used.

Recruitment

Ethics Committee Permission was obtained from the Erciyes University Social and Human Sciences Ethics Committee (Date: 28.09.2021, Number: 394). Throughout the study, the criteria of the Helsinki Declaration were taken into account. Purposive sampling is used in

qualitative studies that do not have the concern of generalizing the research results to the globe.[20] In this study, criterion sampling, which is one of the types of purposeful sampling, was used. In the criterion sampling, people who meet the criteria determined in accordance with the purpose of the study are included in the study.[21] Inclusion criteria were determined as (a) being at least 18 years old, (b) not having had the COVID-19 vaccine yet, (c) being hesitant about getting the COVID-19 vaccine, or (d) refusing to get the COVID-19 vaccine. Exclusion criteria were (a) being vaccinated against COVID-19, and (b) having any psychiatric disorder that would prevent them from understanding the questions and impair their ability to assess reality.

In order to reach the participants, the announcement message was sent by the first researcher to anti-vaccine groups especially via social media platforms (Twitter, Instagram and Facebook) and an e-mail address was added for communication. First, 19 people wanted to receive information about the study by e-mail. However, 14 people indicated that they would like to participate in the study. Volunteers who contacted with their e-mail addresses were informed about the purpose of the research and how to do it, and they were given the opportunity to ask questions about the study. The participants were informed that they could skip the interview questions, pause the interview at any point, or withdraw from the interview. Verbal consent was obtained from the participants who participated online and their consent was recorded with a voice recorder. Written consent was obtained from those who participated face-to-face. Looking at the characteristics of the participants, it is seen that eight of them are women. The ages

of the participants are in the range of 24-45. Eight of the participants are undergraduate, one doctorate, one graduate, two high school graduates and two primary school graduates.

Data Collection Tool

A semi-structured interview form developed to collect data was used. The questions created by the researchers for the semi-structured interview were examined by four nurse academicians and revised in accordance with the recommendations.

Collection of Data

The data collection process carried out within the scope of the study covers the dates of November, 2021- February, 2022. In line with the preferences of the volunteers, five participants were interviewed face-to-face, and 9 participants were interviewed using Zoom application by the first researcher, who is a nurse academic. Face-to-face interviews were conducted in the participants' homes, in quiet rooms where only the researcher and participant were present. Two of the participants who participated online were connected to the Zoom application. An audio recording was taken during the interviews in accordance with the permission of all participants. The interviews lasted between 15 and 50 minutes. During the interview, the researcher took notes of what each participant said and repeated it to the participant. Then, each participant was asked if there was an answer they wanted to correct or a sentence they wanted to add. The data collection process was continued until the theoretical saturation was reached, and the şinterviews with 14 participants were concluded when it was seen that there were repetitive answers.

Analysis of the Data

The interviews recorded were slowed down and carefully listened to and transcribed by the first researcher. The audio recordings and transcripts were checked by the second researcher.[20] For the analysis, the inductive thematic analysis method was adopted by following the six steps specified by Braun and Clarke (2006). Inductive analysis is a data coding process without trying to fit the data into a predetermined coding framework or the researcher's analytical biases. Such a thematic analysis is carried out entirely based on data.[22] The analytical process started with reading the transcriptions and re-reading them until the dataset was mastered. Then, all the sub-themes and sentences supporting the sub-themes were noted down and possible themes were created within the framework of the sub-themes. The themes are simplified until a theme map that is consistent with the data set is created. The analyzes were conducted independently by two researchers, and then the two researchers compared the emerging sub-themes and themes. As a result of the interviews conducted, the two researchers reached a consensus on the sub-themes and themes and the final theme map was created.

RESULTS

Nine main themes were identified after the data analysis was conducted within the scope of the study. The findings supporting these main themes and themes are given below (Table 1).

Table 1. Themes and Sub-Themes

Themes	Sub-Themes
The exaggerated virus	Like the flu
	It's not scary
The virus as a fiction	The game of pharmaceutical companies
	Contradictions
	Artificial virus
Covid-19 vaccine as an unnecessary practice	Strengthening immunity
	Trusting the body
	Non-exposure to sanctions
Covid-19 vaccine as an ineffective practice	Those who have been vaccinated get sick
	Failure to stop the spread
Covid-19 vaccination as a risky practice	Side effects
	mRNA Technology
	Its content is ambiguous
	Scientists who are not vaccinated
	Fast production
Covid-19 vaccination as part of major goals	Fiction
	Fast production
	Conflicting messages
	Commercial purposes
	Distrust towards the government
	Distrust towards organizations
	Distrust towards vaccine companies
	Bias in science
	Non-production of vaccines for other diseases
Marginalizing attitudes	Workplace pressure
	State pressure
	Exclusion
Non-otherizing attitudes	Lack of pressure
	Lack of a negative attitude
	Advices given
Emotional reactions to negative attitudes	Worrying
	Ignoring
	Being isolated
	Anger-resentment

Opinions About the COVID-19 Virus

When we look at the opinions of the participants on the COVID-19 virus, it is seen that they think the effect of the virus is exaggerated and that the virus is actually no different from the flu.

In general, I think it is exaggerated. I think we have been guided and manipulated a bit…

(Participant 1)

In addition, there are opinions of the participants that the COVID-19 virus is a fiction. Participants expressed their opinions about the virus being fiction, for different reasons. Seven of the participants declared that this virus is an artificial virus and therefore stated that it is fiction.

I think it's an artificial virus. Even if it came out naturally, I think it was spread artificially. (Participant 3)

It is seen that the participants have opinions that the COVID-19 virus is a game of pharmaceutical companies. Participant 7 stated that the contradictions experienced during the pandemic process arouse suspicion.

I think it's like swine flu, bird flu and stuff like that. Animals were affected in them. But it turned out that they were a fake, a game of pharmaceutical companies. (Participant 5)

The disclosure of the COVID -19 process, the fact that we have come to this day from people dressed as white astronauts in China at first, to people who fell on the ground, contains many contradictions (Participant7)

The Reasons for Not Getting the COVID-19 Vaccine

4 main themes were determined for the reasons of the participants not to have the COVID-19 vaccine: (1) COVID-19 vaccine as Part of Greater Purposes, (2) COVID-19 Vaccine as an Unnecessary Practice, (3) COVID-19 Vaccine as an Ineffective Practice and (4) COVID-19 Vaccine as a Risky Practice.

COVID-19 Vaccination as Part of Major Goals

It is seen that the opinions of the participants

regarding the COVID-19 vaccines are an important justification for not getting vaccinated. It is noteworthy that the participants emphasize that, in general, COVID-19 vaccines serve great purposes.

Since the virus emerged with vaccines, I did not find these vaccine rumors to be very true. It was already one of the things that caused suspicion. (Participant 3)

There are five participants who stated that the COVID-19 virus, and therefore the COVID-19 vaccine, is part of a fiction.

How can people trust something that is found as an elixir in the continuation of a disease whose origin is already dubious. (Participant 6)

It has been stated by five participants that the conflicting messages given about COVID-19 vaccines are also a reason not to trust the vaccine.

Supposedly, two doses were enough. They've moved on to the third one now. (Participant 9)

It is seen that the participants' distrust of vaccine companies, government and organizations is also a reason for not getting vaccinated. Participant views that science may be biased and that what science says about vaccines may be questionable have drawn attention. In addition, there are participant opinions that there is no vaccine for other infectious diseases, but the presence of the COVID-19 vaccine is doubtful.

There has never been such an organization when an action was to be taken for the benefit of humanity… But it is doubtful that there is an international awareness that people are very important for this vaccine, we need to vaccinate them, we should not lose anyone. (Parti-

cipant 3).

Where we are looking for scientificness, we have to say who is doing this work in the background. When you look behind some approved studies, there are pharmaceutical companies. (Participant 6)

Many people die because of other disease, too. I wonder why they couldn't find the HIV vaccine. (Participant 5)

COVID-19 Vaccine as an Unnecessary Practice

Some of the participants stated on different grounds that it is unnecessary to get vaccinated. Participant 3, who said that they were not subject to any sanction for not getting vaccinated, said the following on this subject:

I didn't get the vaccine because we didn't lose anything. But if I had suffered a loss, I would have had to. (Participant 3)

Participant 6, who stated that they preferred to strengthen their own immunity rather than get *vaccinated, expressed their opinion as follows:*

If immunity is what will protect me, then I develop it using other methods, not a method that I do not trust. (Participant 6)

Some of the participants said that they trusted their own body, so they did not need the vaccine. The 11th participant expressed her ideas as follows:

I don't need a vaccine. I think that the virulence potential of the virus is low, at least in young people at our age. (Participant 11)

COVID-19 Vaccine as an Ineffective Practice

The participants presented their opinion that the COVID-19 vaccine is ineffective. They sta-

ted their reasoning in this regard is that people who are vaccinated also get sick and that the vaccine does not stop the spread of the virus.

I think it is not effective. My mother was vaccinated and survived the virus twice. (Participant 12)

I think that even if the vaccine is working, it cannot stop the spread of a virus that spreads so quickly. (Participant 10)

COVID-19 Vaccination as a Risky Practice

The fact that the participants interviewed within the scope of the study found the COVID-19 vaccine risky was also an important reason for not vaccinating. There are opinions that mRNA vaccines, which is a new technology, are unsafe, the side effects and content of the vaccine are uncertain, and rapid production of the vaccine is risky. According to some participants, the presence of scientists who are not vaccinated supports the idea that vaccines can be risky.

We are talking about a method that is applied for the first time. It is produced by RNA technology and we don't know it. (Participant 6)

What is being done, now phase 1 study phase 2 study phase 3 study they call it. The fact is that some of them also received emergency use approval. Phase 3 is being tested on humans. (Participant 14).

I do not get myself shot with the vaccine whose content is not known. (Participant 2)

After a maximum of five years, the side effects of this vaccine will appear. (Participant 5)

Why haven't doctors been vaccinated. (Participant 10)

Attitudes Towards Individuals Who Have Not Been Vaccinated

While individuals who did not get vaccinated stated that they were subjected to pressure by the state, they also reported that they felt pressured by workplace managers and employees.

When we go to a cinema or a theater, or when I travel, I don't find it right to express this to the bus driver, the municipal toll booth or a second person with the HEPP code application. I think my constitutional right has been violated. (Participant 7)

I've been under a lot of pressure at work. They even threatened me with my job here. (Participant 14)

Still, a colleague of mine is even telling me that it's stupid that I haven't been vaccinated right now. (Participant 13)

Three participants (Participant 5, Participant 6, Participant 8) stated that they had not been subjected to any pressure.

I don't care if the people around me are pressuring me. And I haven't seen any pressure. Even if I see it, I will already make my statement. (Participant 8)

Participants who encountered negative attitudes spoke of feelings such as exclusion, indifference, anger. Although some participants took negative attitudes, they stated that they did not mind this situation.

For example, our name is "anti-vaccine". Whatever anti-vaccine means. There isn't a vaccine out there. We're against what doesn't exist, so... they're making fun of us saying "they've seen the big picture". They polarize, they dissociate. We are anti-vaccines, they are pro-science. We

are bad, they are nice people. (Participant 4)

They upset us. Our friends here (at work) looked at the place like beasts. They take a few steps back, when you enter some environments, they ask "are you unvaccinated, ugh" they act as if we are beasts. (Participant 14)

The situation doesn't look good. At the moment, the situation has calmed down a bit, we don't actually hear much, but I am hearing very interesting things from Austria, for example. Frankly, we are afraid, we are worried, in case something like that one day you can't go there, you can't go out, you can't do this or that... (Participant 6)

I am very angry indeed. I can't make sense of some things. I don't understand why you're vaccinated. I am not asking you this. (Participant 10)

DISCUSSION

This study examined the opinions of individuals with negative attitudes about COVID-19 vaccines regarding the pandemic process and vaccines. The opinions of the participants that the virus is actually a fiction and that the COVID-19 vaccines are a part of this fiction drew attention. There are participants who stated that the pandemic process is a game of pharmaceutical companies, that this virus is an artificial virus and that the contradictions in the pandemic process arouse suspicion. Similarly, in the study conducted by Wonodi et al. (2022), participants' views on the fact that the COVID-19 virus is not real and that politicians gain economic benefits from the process were presented.[23] The positive relationship between having skeptical thoughts about the COVID-19 pandemic process and negative attitudes towards vaccines has been supported by relevant literature studies.[24] Oleksy In addi-

tion, the participants stated that their reasons for not getting vaccinated is that they do not trust the government, pharmaceutical companies and organizations, and that the vaccine is a part of commercial purposes.[25] When the relevant literature is examined, it is seen that there are similar results. In the study conducted by Moscardino et al. (2022), it was found that there is a positive relationship between having a fair government perception and vaccine acceptance.[26] In the study by Heyerdahl et al.(2022), it was stated that distrust of the authorities negatively affected the acceptance of the vaccine, while in the study of Dzieciolowska et al.(2021), it was stated as the distrust of the vaccine companies.[27,28] Sturgis The opinions of the participants that there may be bias in science are also noteworthy. In the study of Sturgis et al. (2021), in which they discussed the survey data conducted with a very large sample in 126 countries, it was stated that there is a positive relationship between trust in science and trust in vaccines.[29]

Participants stated that the effect of the virus was exaggerated. When evaluated within the framework of the Health Belief Model (HBM), perceived seriousness is effective in shaping a health behavior.[30] As a matter of fact, related literature studies reveal that high perceived severity level against virus infection is associated with the intention to vaccinate.[31,32]

Participants find the vaccine application unnecessary. The finding of seeing vaccination as unnecessary, especially because they trust their own body, can be evaluated within the framework of HBM. According to HBM, when the risk perception for a disease increases, the probability of doing the health behavior increases. Related literature studies also support this finding.[33,34] It is seen that one of the reasons for seeing vaccines unnecessary is the belief that strengthening immunity with different methods will be effective against the virus. Hornsey and colleagues (2020) found that vaccine hesitancy was highly correlated with distrust of conventional medicine and weakly correlated with trust in alternative medicine.[35] Hornsey It is thought that individuals' distrust of traditional medicine may be a reason to turn to alternative medicine. As a matter of fact, some participants stated that their trust in modern medicine was shaken and they used methods such as cupping and herbal supplements. The participants also stated that they considered the vaccination unnecessary as they have not been subject to any sanctions in their workplace or social environment. This finding can be explained with the concept of negative reinforcement within the framework of Behavioral Theory. Negative reinforcement refers to the negative stimuli that cause a behavior.[36] In this sense, the fact that some unvaccinated participants were not exposed to a negative stimulus because they were not vaccinated in their daily lives seems to be effective in seeing vaccination unnecessary.

The participants also expressed their opinion that the vaccines developed were ineffective. This finding is supported by relevant literature studies stating that individuals who trust the effect of the vaccine think positively about being vaccinated.[37] When viewed within the framework of HBM, the high perceived usefulness of a behavior for its possible consequences increases the probability of doing that behavior.[38]

It was found that the participants' consideration of finding vaccination risky also negatively affected their intention to get vaccinated.

Considering the reasons put forward for finding the vaccines to be risky, individuals stated that they did not trust the content of the vaccines and mRNA technology, and that they were afraid of the side effects of the vaccine. In the relevant literature, conclusions similar to the findings of this study are observed. In a study conducted with physicians by Sirikalyanpaiboon et al. (2021), it was stated that fear of side effects was an important factor in vaccine hesitancy.[39.] The relevant literature also shows that perceptions about which vaccine has more side effects are effective in choosing COVID-19 vaccine options. Schwarzinger et al. (2021), stated in their study that the Chinese vaccine is riskier in terms of side effects and therefore there is hesitancy about the vaccine.[40] Ofei-Dodoo et al. (2021), on the other hand, stated that mistrust in mRNA technology plays a role in vaccine hesitancy.[41] In many previous studies, as in this study, it has been revealed that one of the most important factors in distrust against vaccines is rapid production.[42] Participants also emphasized that the presence of unvaccinated scientists and healthcare professionals reduces trust in the vaccine.

It is seen that some participants perceive marginalization attitudes. Speaking about otherizing attitudes, the participants stated that they were pressured and excluded from their places of work and the state. It is seen that the participants describe different emotions in the face of the reactions they sense. While some participants stated that they did not care about negative reactions, others stated that they got angry, worried and felt excluded in the face of negative reactions they sense. Fierce debates between individuals who have and haven't had the COVID-19 vaccine can turn into accusatory and stigmatizing statements. Although there are studies on childhood vaccines and stigma in the relevant literature, there seems to be a significant lack of literature on the stigma perceived by individuals who do not have COVID-19 vaccines. A limited number of literature studies on other vaccines have presented the perceptions of unvaccinated individuals and parents of unvaccinated children that they are subject to exclusion and marginalization.[43]

Strengths and Weaknesses of the Study

Looking at the limited aspects of the current study, it is seen that individuals who have not been vaccinated have hesitation about participating in the study. Some people who responded to social media announcements expressed their opinion that the purpose of the study was to explore ways to force them to get vaccinated. On the other hand, there were concerns about the impartial presentation of the findings in the individuals participating in the study. Only individuals using social media were included in this study. This situation prevented the inclusion of individuals who do not use social media for different reasons such as age, education, and economic reasons. It is believed that the strong aspect of the current study is its detailed consideration of the opinions of individuals with negative attitudes towards COVID-19 vaccines. In this way, along with the analysis of the findings, a large number of themes and sub-themes have emerged.

CONCLUSION

It has been found that the idea that vaccines are unnecessary, ineffective and risky is an important factor in rejecting COVID 19 vaccines. It is seen that individuals have the idea that personal and institutional interests are

taken into account, not the benefit of society, in vaccination work. The results of this study are important to understand the negative attitude towards COVID-19 vaccines. Humanity may encounter other infectious diseases as well. That's why it's important to understand anti-vaccination. A study examining the perceived social response of individuals who have not received the COVID-19 vaccine has not been found in the relevant literature. In this sense, it is thought that this study indicates an important deficiency in the literature. It is seen that the perceived social reaction in individuals who do not have vaccination can lead to some negative emotions. For this reason, it is thought that especially qualitative studies that can be done on this subject may be useful.

In line with the results of the study, it is seen that it is necessary to be transparent about vaccine development studies and to provide accurate information about the necessity and effect of the vaccine. Awareness should be raised about the possible negative consequences of vaccine refusal. In order to prevent information pollution about the side effects of vaccines, scientific data should be communicated to the public through the media and social media. The public should be educated for media and social media literacy. Instead of marginalizing individuals who refuse vaccinations, an empathetic approach should be shown.

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ORIGINAL ARTICLE

The impact of healthy lifestyle behaviors on productivity at work: A factory example

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Abstract

Objectives: This study aimed to investigate the impact of healthy lifestyle behaviors, such as regular physical activity, adequate and balanced nutrition, and non-tobacco use, on employee productivity in the workplace. Additionally, the study sought to explore the association between various factors influencing healthy lifestyle behaviors and productivity among workers.

Methods: The study adopted a cross-sectional design and involved 227 workers from a factory. Data collection was carried out using a socio-demographic characteristics form, the "Healthy Lifestyle Behaviors Scale-II," and the "Endikot Work Productivity Scale." The participation rate was 90%.

Results: The majority of the participants (33.5%) fell within the age group of 26-35 years. Additionally, 52% were male, and 52.9% held a Bachelor's Degree. The mean score for the Healthy Lifestyle Behaviors Scale was 127.0±18.0, while the mean score for the Endikot Work Productivity Scale was 23.3±15.1. A negative and weak correlation was observed between healthy lifestyle behaviors and work productivity. Moreover, female workers demonstrated higher productivity scores (25.38±13.96) compared to their male counterparts (p<0.05).

Conclusion: The findings of this study suggest that improved healthy lifestyle behaviors among employees lead to increased productivity in the workplace. Furthermore, married individuals and men exhibited higher productivity levels, while women displayed lower productivity

Keywords: Healthy Lifestyle Behavior, Worker, Work Productivity

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INTRODUCTION

Health has been defined differently for many years. Before it was defined only as the state of physical integrity and well-being, now it is expressed as the state of being well in all aspects, such as physically, socially, biologically and psychologically.[1] Lifestyle is a way of life in which individuals have control over the decisions they make. Healthy lifestyle is expressed as individuals acting by regulating behaviors that affect their health such as regular exercise, consuming five servings of fruits and vegetables per day.[2] Individuals with a healthy lifestyle can increase their immunity levels and cope with stress appropriately.[3] There is a wealth of studies relating lifestyle health risk factors to worker productivity, as well as evaluations of interventions to improve certain health risks among workers.[4,5] The compromised performance and absenteeism of employees that have unhealthy habits and that were addicted to tobacco and alcohol lead to overall loss of productivity at the workplace.[6] Productivity loss at the workplace represents an additional impact measure of healthy behaviors among employees. Such as physical inactivity, poor nutrition, extensive alcohol consumption and smoking have been cited as factors impacting employee productivity at the workplaces. World Health Organization (WHO) declared that the cause of 70-80% of deaths in developed countries and 40-50% in underdeveloped countries were diseases that occur due to lifestyle.[7] Relatively benign and self-limited conditions like cold or influenza may also impair on-the-job productivity. Along with all this, having a healthy lifestyle has much benefits. Increased work efficiency and working with high motivation are also

positive outcomes of adopting a healthy lifestyle.[6]

The concept of occupational health is to protect the health of employees by adopting healthy lifestyle behaviors and to keep them away from workplace risks and hazards.[8] The International Labor Organization (ILO) and the WHO had expressed the sensitivity about protecting the health of employees', reducing exposure to chemicals, and working in suitable conditions for their psychosocial and psychological health.[9] Nowadays, for many health professionals, the primary focus of worker health improvement efforts has been on direct health care costs to a company or society, including inpatient hospitalizations, outpatient medical care, and the costs of medications to treat acute and chronic medical conditions. Instead of that; eating healthy foods, having a regular exercise programme, not using tobacco increase social adaptation and interpersonal relationships while ensuring job compliance and satisfaction. With this increase, productivity related with the job increases as well. These outcomes are called health promotion. And it is a process which changes lifestyles and increases control of employees over their health. Indicators of this process are defined as health responsibility, physical activity, nutrition, spiritual development, interpersonal relationships and stress management in literature.[10] As well as working hours, psychosocial factors, physical and chemical risks lead to chronic illnesses and can become barriers to a healthy life.[11] Improvements in stress and mental and emotional well-being are also valuable for improving employee satisfaction, productivity, and overall vitality[12]. As health risk factors are modified, worker productivity has been found to increase or decrease accordingly. The first

prerequisite of health promotion is a healthy lifestyle and healthy workplace.[13] Lifestyle behaviors and workplace wellness initiatives have the same underlying philosophy, that many physical and mental conditions can be prevented or treated through healthy lifestyle changes.

Health professionals at the workplace can play a key role in the health and productivity of workers by aiding employees' health risk reduction. It is essential to know risk factors to protect occupational health. In our study, it was aimed to determine the impact of healthy lifestyle behaviors on productivity of workers and to investigate the association between effective factors on healthy lifestyle behaviors and productivity.

METHODS

Type, Population and Sample of the Study

This was a cross-sectional study. It was carried out between March and April 2022. Participants were 227 employees working in a public factory in a province of Turkiye, only those who understood the study purpose and voluntarily participated in the study were invited. They were informed about the study, and their informed consents were obtained online. There was a total of 250 workers and 23 of them were the part that were not at work at the time of the research or did not want to participate. No sampling method was used in the study; it was planned to reach all of the workers. The participation rate was 90%. The factory that present study was conducted is in the dangerous class within the scope of occupational safety and that the laws and regulations regarding occupational health and safety are regularly implemented and that the data of the employees are archived and followed up regularly in this context. Factory has many sections such as electronic, mechanical, welding, forge and carpentry. Although these employees all worked at similar workstation settings, their duties varied, depending on the department in which they worked. All employees in the workplace have fixed working hours, such as 7.30 in the morning and 5.30 in the evening in the week. No one works at the weekend or on other parts of the day. It is common for employees to work frequently within the same hours.

Data Collection

Socio-demographic Characteristics Form

Form consisted of age, gender, marital status, education, chronic diseases, smoking, working experience at the workplace, information about applying to any health institution within the last 6 months, consulting unit on health-related issues.

Healthy Lifestyle Behaviors Scale-II (HLSBS-II)

The scale was formed by Walker et al. (1996) [14] and adapted to Turkish by Bahar et al. (2008).[15] It is composed of 52 items in 6 sub-groups including health responsibility, physical activity, nutrition, spiritual development, interpersonal relationships and stress management (Table.1). The Cronbach's Alpha coefficient of the original scale, varied between .92 and .64-.80 for six sub-factors. All items of the scale were affirmative statements. It is a four-point Likert scale ranging from 1 to 4 (1 corresponds to never, 2 sometimes, 3 usually and 4 regularly). High scores indicate high level of health behaviors.

Table-1 HLSBS-II Scale and Sub-Dimensions

S. N.	HLSBS-II Sub-dimensions	Substance Numbers
1	Health Responsibility	3,9,15,21,27,33,39,45,51
2	Physical Activity	4,10,16,22,28,34,40,46
3	Nutrition	2,8,14,20,26,32,38,44,50
4	Spiritual Development	6,12,18,24,30,36,42,48,52
5	Interpersonal Relationships	1,7,13,19,25,31,37,43,49
6	Stress Management	5,11,17,23,29,35,41,47

Endicott Work Productivity Scale (EWPS)

The scale formed by Endicott and Nee (1997)[16] and adapted to Turkish by Inanc et al. (2004).[17] It measures the productivity of employees. Also, responses to the questions in the scale are used to calculate productivity impairment, absenteeism, presenteeism and overall work impairment because of health. It is a five-point Likert scale ranging from 0 to 4 "Never (0), Rarely (1), Sometimes (2), Often (3), Almost Always (4). The lowest scores obtained from the scale is 0, and the highest score is 100. Higher scores indicate low work efficiency.

Data Analyses

SPSS (Statistics Program for Social Sciences) Windows Version 20.00 package program was used to evaluate the data. As a result of the obtained KS(z) analysis, data showed normal distribution (p=0.000). Cronbach's Alpha reliability and Kolmogorov Smirnov normality tests, Independent t test, one-way Anova Test and Pearson correlation analyzes were performed. The mean scores of the scales, total scores and sub-dimensions were examined. Analyses have not been conducted by separating the workers according to the workplaces.The dependent variable of the study was the productivity of workers.

RESULTS

Sociodemographic Characteristics of the Respondents

The study population can be described as women (48%) and men (%52) with an average age group of 26-35 years (33.5%). 54.6% were married, and 52.9% had Bachelor's Degree. 62.6% had a chronic disease and 48.9% did not use tobacco. Results indicated that employees who applied to any health institution within the last 6 months was 52%, the family physician was the choice on the rate 55.9% for consulting on health-related issues. Data on socio-demographic characteristics were presented in Table-2.

Table-2. Sociodemographic Characteristics of the Respondents

Age	n	%
18-25	22	9.7
26-35	76	33.5
36-45	73	32.2
46 and up	56	24.7
Gender		
Female	109	48
Male	118	52
Marital Status		
Married	124	54.6
Single	103	45.4
Education		
High School	36	15.9
Bachelor's Degree	120	52.9
Post Graduate	71	31.3
Work experience		
1-5 years	78	34.4
6-10 years	73	32.2
11 years and up	76	33.5
Chronic Disease		
Yes	85	37.4
No	142	62.6
Tobacco Use		
Yes	116	51.1
No	111	48.9
Applying to any health institution within the last 6 months		
Yes	118	52.0
No	109	48.0
Consulting on health-related issues		
Internet/Social Media	58	25.6
Close Friends	42	18.5
Family Psychian/ Health Employee	127	55.9
Total	**227**	**100.0**

Analyses of HLSBS-II and EWPS

In the study the highest score was ''Spiritual Development'' (23.7±4.0) and the lowest was ''Physical Activity'' (15.0±3.7). The total score of the HLSBS-II was 127.0±18.0, the Cronbach's Alpha coefficient of 52 items was found as 0.91. The mean score of the EWPS was 23.3±15.0. Accordingly, the workers had high productivity. The Cronbach's Alpha coefficient of the EWPS was found as 0.94.

Findings Regarding the Comparison of HLSBS-II and EWPS with Effective Factors

A statistically significant difference was found between "Spiritual Development" and age ($p < 0.05$). As age increased, the score of spiritual development dimension increased too. A statistically significant difference was also found between chronic disease, the status of applying to a health institution within the last 6 months, the duration of work at the workplace and application in health-related issues ($p < 0.05$). There was no significant difference between gender, marital status, education, tobacco use and HLSBS-II ($p > 0.05$).

A statistically significant difference was found between gender, marital status, chronic disease, tobacco use and EWPS ($p < 0.05$). Results from analyses were presented in Table-3.

Table-3. Comparison of HLSBS-II and EWPS with Effective Factors

Effective Factor	Health Responsibility ort±ss	Physical Activity ort±ss	Nutrition ort±ss	Spiritual Development ort±ss	Interpersonal Relationships ort±ss	Stress Management ort±ss	Mean Score of HLSBS ort±ss	Mean Score of EWPC ort±ss
Age								
18-25	18.7±3.7	14.7±3.0	17.0±2.8	**23.0±3.6**	23.0±3.0	17.2±2.0	124.3±10.8	22.5±12.4
26-35	18.7±4.0	14.8±3.7	17.7±3.3	**22.8±4.1**	21.8±4.1	17.0±4.1	124.4±20.0	16.4±1.8
36-45	19.0±3.5	14.6±4.3	18.5±3.7	**24.0±4.2**	23.0±3.5	17.4±3.5	127.5±19.2	15.1±1.7
46 and up	20.3±3.7	15.8±3.1	18.3±2.7	**25.0±3.2**	23.2±3.0	18.2±2.6	132.5±14.8	14.1±1.8
F	2.246	1.166	1.754	**3.284**	1.984	-1.286	2.462	0.225
p	0.084	0.324	0.157	**0.022***	0.117	0.280	0.063	0.879
Gender								
Female	19.5±3.6	14.7±3.7	18.3±3.5	23.5±4.0	22.8±3.4	17.2±3.3	127.4±17.5	**25.3±14.0**
Male	18.8±4.0	15.2±3.7	17.8±3.1	23.8±4.0	22.5±3.7	17.7±3.5	127.3±18.5	**21.4±15.8**
t	1.365	-1.145	1.145	-0.611	0.589	-1.169	1.977	**1.977**
p	0.173	0.253	0.253	0.542	0.556	0.244	0.957	**0.049***
Marital Status								
Married	18.8±4.1	15.0±4.2	18.1±3.6	24.0±4.2	23.0±4.0	17.5±3.7	127.8±20.2	**20.8±15.3**
Single	19.5±3.3	15.0±3.0	18.0±3.0	23.3±3.5	22.3±3.2	17.3±3.0	126.8±15.0	**26.2±14.1**
t	-1.313	-0.145	0.499	1.225	1.249	0.430	0.416	**-2.714**
p	0.191	0.885	0.618	0.222	0.213	0.668	0.678	**0.007***
Education								
High School	18.4±3.3	14.2±3.1	17.3±2.5	24.5±4.2	22.5±4.4	17.4±3.4	126.0±16.4	19.7±15.0
Bachelor's Degree	19.1±3.0	15.4±3.8	18.0±3.3	23.3±3.9	22.5±3.6	17.8±3.2	127.6±18.6	23.8±15.4
Post graduate	19.5±4.0	14.6±3.8	18.7±3.5	24.0±4.0	23.0±3.2	16.8±3.7	127.6±17.8	24.3±14.4
F	1.092	1.680	2.271	1.400	0.277	1.782	0.138	1.216
p	0.332	0.189	0.106	0.249	0.758	0.171	0.871	0.298
Work experience								
1-5 years	**18.1±3.7**	**14.0±3.7**	**17.1±3.3**	**22.2±4.4**	**21.7±4.0**	16.8±3.8	**121.2±19.5**	24.2±16.5
6-10 years	**20.0±3.2**	**15.7±2.8**	**18.5±3.0**	**24.4±3.0**	**23.0±2.7**	17.7±2.8	**130.6±13.2**	24.6±13.8
11year and up	**19.4±4.1**	**15.3±4.3**	**18.6±3.4**	**24.5±4.0**	**23.1±3.8**	18.0±3.5	**130.6±18.8**	21.1±14.5
F	**4.729**	**4.641**	**5.046**	**8.196**	**3.550**	2.519	**7.399**	1.232
p	**0.010***	**0.011***	**0.007***	**0.000***	**0.030***	0.083	**0.001***	0.294
Chronic Disease								
Yes	**20.0±3.1**	14.8±2.5	18.2±2.5	23.8±3.0	22.8±3.1	17.5±2.3	128.7±12.2	**27.2±13.2**
No	**18.6±4.0**	15.1±4.3	18.0±3.7	23.6±4.4	22.5±3.9	17.4±3.9	126.5±20.7	**21.0±15.6**
t	**2.715**	-0.631	0.688	0.394	0.524	0.066	0.994	**3.054**
p	**0.007***	0.529	0.492	0.694	0.601	0.948	0.321	**0.003***
Tobacco Use								
Yes	19.3±3.6	15.0±3.4	17.8±3.1	23.7±3.8	22.9±3.5	17.3±3.1	127.3±16.5	**25.2±15.1**
No	19.0±4.0	15.0±4.1	18.2±3.5	23.7±4.1	22.4±3.7	17.6±3.7	127.4±19.5	**21.3±14.7**
t	0.592	-0.156	-0.943	0.010	1.027	-0.663	-0.072	**1.925**
p	0.555	0.876	0.347	0.992	0.306	0.508	0.943	**0.050***
Applied to any health institution in last 6 months								
Yes	19.0±4.0	**14.5±4.0**	17.9±3.7	23.6±4.4	22.5±4.0	**17.0±3.6**	125.7±20.0	23.2±14.6
No	19.3±3.5	**15.5±3.4**	18.2±2.8	23.8±3.5	22.8±3.2	**18.0±3.1**	129.2±15.5	23.3±15.5
t	-0.747	**-2.164**	-0.732	3.152	-0.670	**-2.271**	-1.489	-0.056
p	0.456	**0.032***	0.465	0.077	0.504	**0.024***	0.138	0.955
Consulting unit on health-related issues								
Internet/Social Media	**18.7±3.2**	14.3±3.3	17.9±2.8	23.0±3.7	22.0±2.7	16.9±2.7	124.1±13.9	**26.4±14.7**
Close Friends	**20.5±3.6**	15.3±3.2	18.0±2.8	24.3±2.9	23.2±3.2	17.6±2.8	130.6±15.0	**27.3±14.4**
FamilyPsychi./ HealthEmp.	**19.0±4.0**	15.2±4.1	18.1±3.7	23.8±4.3	22.7±4.2	17.7±3.8	127.8±20.3	**20.5±14.9**
F	**3.333**	1.369	0.028	1.331	1.404	1.103	1.655	**5.010**
p	**0.037***	0.256	0.972	0.266	0.248	0.334	0.193	**0.007***

F:One Way Anova Test,t:Independent t test,*p <.05 statistical significance.

Findings Regarding the Comparison of HLSBS-II and EWPS

In the current study, a negative and weak correlation was found between healthy lifestyle behaviors and productivity of workers ($r=-0.208$; $p=0.002$). As the scores of healthy lifestyle behaviors increased, the scores of the productivity decreased. The high scores from the productivity scale indicated low work efficiency; in present study as healthy lifestyle behaviors increased, workers' productivity at work increased too. The findings between two scales and sub-dimensions were presented in Table-4. A statistically negative and weak correlation was found between productivity and the Physical Activity, Spiritual Development, Interpersonal Relationships and Stress Management ($p<0.05$).

Table-4. Findings Related to the Correlation Between HLSBS-II Sub-Dimensions and the EWPS

HLSBS-II Sub-dimensions	The Mean Score of EWPS	
	r	**p**
Health Responsibility	0,786	-0,018
Physical Activity	**-0.176**	**0.008***
Nutrition	-0.087	0.191
Spiritual Development	**-0.291**	**0.000***
Interpersonal Relationships	**-0.155**	**0.019***
Stress Managements	**-0.249**	**0.000***
Mean Score of HLSBS-II	**-0.208**	**0.002***

*p<0.05 Pearson Correlation Analysis

DISCUSSION

Healthy nutrition, regular physical activity, harmonious relationships with the social environment, anger control and stress management, staying away from harmful chemicals are the basis of healthy lifestyle behaviors. Promoting healthy lifestyle at the workplace by discouraging sugar-sweetened beverages, encouraging conscious calorie reduction, promoting physical activities: such as walking, using stairs, taking active breaks, reducing tobacco addiction even making a tobacco-free hiring policy, learning simple de-stressing (relaxation) exercises and developing channels for venting emotions and sharing feelings at home/with friends are the global recommendations of WHO[18]. Such behaviors provide positive improvement for individuals. These also increase work performance in as well. [18] In our study the impact of healthy lifestyle behaviors on productivity of workers were evaluated. As seen in the statistics above; there was a negative and weak correlation between healthy lifestyle behaviors and productivity. Even if it is a weak correlation, we evaluated that healthy behaviors of employees affected work productivity. In the literature there are sample studies with the outcome that while healthy lifestyle behaviors of workers increase their productivity increase as well, also number of work related accidents decrease.[19,20] There are studies supporting our findings that regular physical activity affect work performance positively.[21] As stated in a study that occupational accidents/injuries arise from both accidents and diseases[22]. And diseases arise from unhealthy habits.[22] Current occupational health approach is a wide-scaled discipline including healthy lifestyle, worker safety and job satisfaction.[23] Such finding which is consistent with the literature may be explained with the high motivation of employees to work physically

and mentally.

Workers had the highest score of spiritual development followed by interpersonal relationships and health responsibility which is consistent with the findings reported by Simsekoglu and Mayda (2016), Ozkan and Yilmaz (2008).[1,24] It can be noted that individuals' spiritual beliefs, personal relationships, behaviors and attitudes towards taking responsibility for health are effective on healthy behaviors.

The physical activity scores of the participants were low which was consistent with the findings reported by Ozkan&Yilmaz (2008), French et al. (2007), Fleming et al.(2007), Artazcoz et al.(2007).[24-27] Contrary to these findings, Bolton et al. (2009) and Prodaniuk et al. (2004) found that physical activity was at a good level in both working and voluntarily retired individuals.[28,29] Being physically active for a lifetime has benefits such as preventing chronic diseases and inflammation, reducing the mechanical load on the body, and relieving pain.[30] It is also stated that moderate-intensity exercise for 45 minutes a day, excluding daily work is effective on preventing obesity.[31] It can be explained that long working hours and poor working conditions have a negative impact on healthy lifestyle behaviors.

In present study, increasing age was found to be accounting for high spiritual development scores. This finding was consistent with the findings reported by Esin and Aktas (2012).[5] Contrary to this, Kauvonen et al. (2006) found that age had a negative impact on health behaviors.[32] It can be explained that as age progresses, the tendency to acquire conscious health behaviors increase.

In our study; the working experiences affected health behaviors. Behaviors of taking health responsibilities and physical activity of those who worked at the workplace for 6-10 years were higher than the others. The nutrition, spiritual development and interpersonal relations scores of those worked for 11 years and over were higher than the others. Accordingly, workers experienced 11 years in factory or have a healthier diet, had higher spiritual beliefs and better interpersonal relationships. This finding was supported in part by findings linking worker experience to healthy behaviors.[8] It could be attributed to self-confidence and work experience in the same workplace for many years.

In our study, health responsibility scores of employees with chronic diseases were high. In other words, workers with chronic diseases could easily undertake their own health responsibilities. It was considered as an expected finding that individuals with chronic diseases should take responsibility for their own health in order to prevent the progression of their diseases and avoid further complications by following the recommendations of the physician, and to have a high level of knowledge, attitudes and behaviors in this regard. Among the workers included in the study, those who did not apply to a health institution within 6 months engage in more physical activity and manage stress better than others. In this case, it could be interpreted that regular physical activity was effective in preventing acute or chronic diseases. And it could be stated that employees with low stress levels and high levels of coping with stress didn't need to apply to a health institution frequently. These findings are unique to our study.

Employees whose first unit of consulting on

health issues was the internet had the lowest health responsibility scores. Accordingly, those who got information from the internet instead of consulting a physician on health issues did not take on their self health responsibilities. No existing literature has explored on this issue. So this finding is also considered unique to our study.

The healthy behaviors affected workers' productivity. As stated in the ILO Occupational Health and Safety Regulation, employees were obliged to support the work of the workplace health unit, participate in health examinations, information and training programs and cooperate when necessary[9]. It is a fact that balanced nutrition, exercise and not using tobacco increase health and well-being. The more employees adapt to this reality, the easier their activities and adaptation to work would be, and their job satisfaction and productivity would increase at the same rate.[33] In our study, gender, marital status, chronic disease and smoking, and consulting unit on health issues affected productivity at work. Accordingly, female workers experienced more productivity loss than their male counterparts. Also single ones, those with chronic diseases, smokers had low productivity. Overall, studies varied in terms of content. The study of Ozdemir and Ozdemir (2021), in which male and married one's productivity were high, was in line with our findings.[34] Also, workers who had high physical activity scores, spiritual development and good interpersonal relationships had high productivity. This finding of our study was consistent with the findings reported by Katz et al. (2014)[12]. And it can be explained that females working in factory needed more support on job satisfaction. Additionally, in our study the productivity of

the employees were not evaluated as specific to the department they work as in some other studies in literature.[8,35] This situation prevented us from making an assessment according to the risk class and productivity of workers who present healthy lifestyle behaviors and work in different departments. In terms of occupational health, it is important to evaluate worker productivity according to the department and risk class, which creates a limitation in our study. This limitation stemmed from the restricted permission that we received from the management of the factory. They did not let us to further evaluate individual departments.

CONCLUSION

In our study; age, working time, presence of chronic disease, status of applying to a health institution within 6 months, and the place of consulting on health issues impacted healthy lifestyle behaviors. Also gender, marital status, presence of chronic disease, tobacco use and consultancy unit on health issues affected the productivity. In addition, as the healthy lifestyle behaviors of the employees increased, their productivity increased. Given that the results of this investigation indicate a significant association between health behaviors and productivity outcomes, continued research that examines the impact of innovative interventions that affect health behaviors and consider productivity indicators as primary outcomes seems needed. And to carry out correlational studies evaluating the relationships with different factors that may be effective. Also, interventional studies to be carried out in line with such factors were recommended. Such as explaining the importance of having healthy behaviors with case examples to the young

ages and the ones that did not have chronic diseases and training on the awareness of tobacco use, embracing the importance to get help from the professionals when there is a health concern to the ones whose first unit of consulting on health issues was the internet. In addition, in the lights of the findings, it is recommended to carry out studies with different sample groups in which productivity at work is evaluated according to gender.

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ORIGINAL ARTICLE

Incidence of the exposure to blood and blood products and its relationship with the medical education accreditation among last grade medical students in Turkey

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Abstract

Objective: The primary aim of this study was to investigate the blood contact and needle-stick injury rates of final-year (year-6) medical students receiving their education and training at medical schools in different regions of Turkey and to analyse the relationships between blood contact and needle-stick injury and the personal variables of students and accreditation certifications of medical schools.

Methods: In this retrospective cohort study, self-reporting questionnaires were completed anonymously by consenting final-year medical students. The study population (n=7900) included all final-year medical students attending the 76 medical schools of Turkey. Of the 76 medical schools, 13 were selected by stratified random sampling, according to their accreditation certification and geographical location, which resulted in 2786 final-year medical students being contacted for participation. Comparisons between groups were analysed using Cox proportional hazards regression.

Results: Blood contact to intact skin was 75.2%, mucosal contact was 20.0%, percutaneous contact was 35.4%, and contaminated blood contact was 27.0% of medical students.The average percutaneous time-to-contact was 8.95±0.09 months, with the percutaneous contact rate approaching 50% in the 12th month of the hazard analysis. Percutaneous contact was significantly higher in students who received no formal occupational health and safety training (HR:1.29;95%CI:1.11-1.50) and who attended non-accredited medical schools (HR:1.45;95%CI:1.26-1.66). Percutaneous contact increased significantly in medical students with increasing invasive medical procedure applying scores (HR:1.06;95%CI:1.04-1.09).

Conclusion: The final year of medical education and training is a high-risk period for percutaneous contact, with the evidence suggesting that the high risks could be mediated by implementing appropriate occupational health and safety education and training.

Keywords: Blood Contact, Needle-Stick Injury, Medical Students, Accreditation, Occupational Health and Safety

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INTRODUCTION

The occupation of healthcare workers (HCWs) places them at high risk of blood(and body fluid) contact and blood-borne infection in the workplace, with high rates of contact generally reported among HCW. In two studiespreviously conducted in Turkey reported that, 50.1% and 56.0% of participants had contactin one-year working periods.[1,2] while in another study, 35% in a six-month period and 64% in a work-life period among HCW had contact.[3] Similar high rates were reported in a work-life study conducted among HCW in China, with 56.5% reporting blood or body fluid contact to the eyes and 84.7% reporting needle-stick injuries .[4]

The evidence from studies investigating HCW also indicates that the majority of blood contacts involve exposure to contaminated blood and blood products. In a study investigating blood contact among nurses, approximately two-thirds of needle-stick injuries were reported to be with contaminated needles.[5] Although it varied across the 14 world regions investigated, occupational HBV, HCV, and HIV infections were estimated to account for 37%, 39%, and 4.4% of infections contracted by HCW .[6] Globally, it was estimated that more than three million HCW experienced a contaminated percutaneous contact each year in the workplace, resulting in approximately 16,000 HCV, 66,000 HBV, and 1,000 HIV infections and 1100 deaths .[6] Occupational exposures to sharp-objects injuries are a major source of preventable blood-borne infections among HCW and, therefore, a major cause of disability and death.

Medical students who train in the same workplace and perform the same invasive medical procedures as other HCW, therefore, have to beassumed to have the same sharp-object injury and blood-borne infection risks.This assumption is supported by the evidence from studies conducted among medical students worldwide. In Iran, 39.3% of medical students reported sharp-object injuries, with 45.3% occurring as the result of needle-sticks.[7] In Canada, 25.0% of medical students reported that they had at least one needle-stick injury during their education and training at medical school.[8] In New York, 22% of 3rd and 4th year medical students reported needle-stick injuries.[9] In Germany, 21.4% of medical students reported percutaneous contacts (PC) every year.[10] In the two independent studies conducted in Turkey, 56.7%and 25.3%of medical students had contaminated needle-stick injuries in their medical education lives and 18.8% of medical students had needle stick injuries in last six months of medical education.[11,12]

Blood contact and infection risks among medical students during their education and training should receive the same health and safety considerations as that of other HCW. This is especially pertinent in medical students because they lack manual dexterity, experiencein personal protective equipment (PPE) use during invasive medical procedures, and knowledge and understanding of post-contact procedures. Moreover, because medical students are often younger than other HCW, their life-consequences after contracting a blood-borne infectious disease may be far greater than that of other HCW.

A comprehensive investigation and analysis of the education and training conditions and blood contact and infection risks of medical students, therefore, will reveal the scope and prevalence of these events. In addition, the

investigation and analysis may reveal whether there is a need to revise the occupational health and safety standards at hospitals affiliated to medical school to include the training of medical students and to include formal occupational health and safety training early in the curriculum of medical students.

Although similar studies have previously been conducted among medical students at Turkish medicals schools ,[13,14] in the present a much larger sample size will be investigated, with participating medical students attending medical schools in different regions of Turkey. The present study, therefore, will provide more accurate blood contact and needle-stick injury rates and a better understanding of the variables associated with these events. The present study will also investigate the impact medical school accreditation certification has on these events.

The primary aim of this study was to investigate the blood contact and needle-stick injury rates of final-year (year-6) medical students receiving their education and training at medical schools in different regions of Turkey and to analyse the relationships between blood contact and needle-stick injury and the personal variables of students and accreditation certifications of medical schools.

METHODS

Type of Study

In this retrospective cohort study, data was collected fromself-reporting questionnaires administered to final-year medical students from 01 to 30 May 2017, with the 12-month exposure reporting period extending from the start to the finish of the2017 academic year ofmedical schools in Turkey.

Subjects; Participation and Representativeness

The study population (n=7900) was comprised of all final-year students attending medical schools (n=76) in Turkey. Medical schools were first classified into seven groups according to geographical regions. Then they were checked if they are accredited. In order to evaluate if the accreditation of medical education effect the exposure, it was decided to select one accredited and one non-accredited faculty from each geographical region. In order to avoid over-representation of faculties with a small number of students in the findings, it was considered to select the faculties with the highest quota from each geographical region as an example. However, since none of the medical faculties in the Eastern and Southeastern Anatolia regions are accredited, non-accredited faculties from these regions had to be selected. While deciding on quotas of faculties, it was considered the number of students of the schools in 2010, since the entrance of final-year (year-6) medical students to the faculty would be approximately six years ago. Of the 76, 13 medical schools were selected according to accreditation certification and geographical region by stratified random sampling.

This medical school sampling provided 2786 final-year medical students, who were all contacted for participation. Of the 2786 medical students contacted, 451 did not consent to participate(n=203) and/or did not acknowledge contact(n=248). Subgroup analysis of those who did not agree to participate in the study showed that they were excluded as random.The student response and participation rate was 83.8%, with 84.5% of medical students from accredited medical schools and

83.4% from non-accredited medical schools choosing to participate.

Dependent and Independent Variables

The dependent variable was percutaneous contact and the timing of the contact. The independent variables were the personal characteristics, occupational health and safety knowledge, invasive medical procedure skills, and blood-borne disease knowledge of final-year medical students, as well as, the accreditation certification of medical schools they attended.

Measures; Terms and Criteria

Percutaneous contact: were stinging and / or injuries caused by medical instruments such as dirty / used injector tips, scalpels, etc. This variable was analysed according to the student's recorded statement, with the accuracy of the variable unable to be confirmed. The timing of percutaneous contact was analysed as the time (in months) from the start of classes to the date of percutaneous contact, with contacts occurring before the start of final year classes not included in the analysis. When calculating the number of people with percutaneous contact, the first event that people encountered and the timing of it were taken into account. Survival analysis, which also took this timing into account, was used in the analysis. In the presentation of the findings, repetitive contacts of the same student, such as the second or third contact, were not included.

Personal characteristics: were gender, place of residence,school achievement, and invasive medical procedure application score.

Student accommodation: were staying with family,in dormitories,in rental houses with

friendsand in rental houses without friends.

School achievement: student achievement was analysed according to two independent questions; how do you rate your medical school achievements (1) those who express their medical school achievement as "above the class average" were grouped as "those who express themselves more successfully" and those who express themselves as "the same or below the average" were grouped as "those who express themselves less successfully" and (2) did you repeat a semester at any time during your medical school education and training (with those repeating at least one semester regarded as relatively unsuccessful).

Invasive medical procedure application score: medical students were provided with a list of 5 invasive medical procedures and asked to score themselves for each invasive medical procedure performed in their final year as follows;(0 points) never performed the invasive procedure, (1 point) performed the invasive procedure 1 to 3 times, and (2 points) performed the invasive procedure 4 or more times. The scores from each of the 5 invasive medical procedures were totalled, with the cumulative score for each student recorded as the student's "invasive medical procedure application score". This variable was included in the Cox proportional hazards regressionas a continuous variable and in the univariate analysis as a median of the group score.

Usage of protective measures status: the medical students were asked whether they used PPE when performing invasive medical procedures with students grouped according to their response into two groups; "frequent user" and "infrequent user".

The level of knowledge on blood-borne diseases: the medical students were asked 13 questions from prescribed literature on the subject .[15,16,17,18]The knowledge of medical students was rated and grouped according to the number of correct answers given. The median score for the medical students was 10, with a student having a score of ≥10 rated as having "good knowledge" and a student having a score of <10 rated as having "poor knowledge".

Trainings received on the subject: the medical students were asked if they were educated on the following three health and safety subjects: "invasive medical procedures and/or needle-stick injuries", "health of HCW", and "occupational rules, regulation, and hazards in hospitals".

Accreditation status of the medical school: The medical schools of Turkey are evaluated for accreditation according to a number of different standards, [19,20] with medical schools required to implement and maintain these standards in the education and training of medical students according to their accreditation certification. In the present study, the medical school sample was selected by stratified method according to accreditation.

Reporting the blood contact: the medical students were asked whether they reported their blood contact to the occupational health and safety (OHS) unit of the hospital affiliated to the medical school. Admissions or reports to other medical service providers (i.e., outpatient clinics, emergency service centres, and examination of serological testing) were not accepted.

Data Collection

Data collection was performed by 52 examiners, with four examiners stationed at each of the 13 selected medical schools.The four examiners reported to one study coordinator at the medical school, with the coordinator collecting and sendingcompleted questionnaires to the primary study centre.An informed consent form to participate in the study was attached to the questionnaire given to the medical students. Participating medical students were asked to complete the consents and questionnaires anonymously. Thequestionnaire took participants approximately 15 minutes to complete and reported on contact exposures experienced in their 2017 academic year.

Data Analysis and Statistics

The data were evaluated using the SPSS 25.0 (Statistical Package for Social Sciences) package program. Descriptive analyses are presented in numbers and percentages. Comparisons between groups were analysed by using Cox proportional hazards regression analysis, with cumulative hazard ratios for percutaneous contact calculated. Forward conditional regression was performed, with the probability for stepwise entry into the final model selected as 0.05. In addition to the beta coefficient and standard error of the variables remaining in the model, the multivariate findings were presented with statistical significance, estimated relative risk and 95% confidence interval (CI).Chi-square test was used to compare students' characteristics according to the accreditation certification of the medical schools they attended.

RESULTS

Table 1 summarizes the demographic characteristics of the participants, their medical school achievement, their level of knowledge

on blood-borne diseases, their invasive medical procedure application score, their use of PPE during invasive medical procedures, and their education in occupational health and safety subjects. Of the participants, 70.7% were in the 10th month of their final year of education and training, 66.9% had no education and training in the subject of occupational health and safety, and only 46.6% had used PPE in all invasive medical procedures.

Table 1: Participations' characteristics

	n	%
Gender		
Female	1122	48.1
Male	1213	51.9
Internship time		
9 months and below	684	29.3
10 months and over	1651	70.7
School achievement*		
express themselves more successfully	698	29.9
express themselves less successfully	1637	70.1
Repeating a semester		
who does not repeat any semester at all	1815	77.7
who repeats a semester at least	520	22.3
Student accommodation: those…		
staying with family	589	25.2
dormitory residents	338	14.5
who rent a house with their friends	898	38.5
who rent a house alone	510	21.8
Knowledge on blood-borne diseases**		
have a better knowledge (10 point+)	1102	47.2
have a poorer knowledge (0-9 point)	1233	52.8
Invasive medical procedure application score** *		
5 point or less	1016	43.5
6 point or higher	1319	56.5
Usage of protective measures		
frequent protection user	1088	46.6
less frequent user ****	1247	53.4
Education on "invasive medical procedures and/or needle-stick injuries"		
Uneducated	635	27.2
Educated	1700	72.8
Education on "health workers' health"		
Uneducated	1538	65.9
Educated	797	34.1
Education on "working conditions, rules and risks in the hospital"		
Uneducated	1561	66.9
Educated	774	33.1
Total	**2335**	**100.0**

*self-expression of the students. **knowledge was measured by 13 question

***calculated according to; application about "taking a blood sample", "suture", "intravenous intervention", intramuscular or intravenous injection". ****less frequent user was those who don't use the protective materials in each intervention without any exception.

Types of exposures to blood or blood products experienced by participants in their last year were intact skin contact (75.2%), mucosal contact (20.0%), and percutaneous contact (35.4%). The prevalence of contaminated needle-stick injuries was 27.0%. Of the participants, 45.3% had not been vaccinated with sufficient doses in order to be immune to hepatitis B (Table 2).

Table 2: Contact types of participants on date of data collection and their immunization status

	n	%
Contact with intact skin		
Yes	1756	75.2
No	579	24.8
Mucosal contact		
Yes	466	20.0
No	1869	80.0
Percutaneous contact		
Yes	826	35.4
No	1509	64.6
Needle-stick injury		
Yes	631	27.0
No	1704	73.0
Immunization status for Hep B		
Natural immunity	73	3.1
Immunized with vaccine (3+doses)	1204	51.6
Not immunized (vaccinated 0-2 doses)	1058	45.3
Checking for Hep C with serological test		
Those who were checked	1427	61.1
Not checked	908	38.9

Table 3 shows the reporting-behaviour after percutaneous contact of students, according to the reasons for not reporting provided. Reporting rate of percutaneous contact among those who were exposed was only 13.0%. The most common reasons given for not reporting contact were, "knew the blood was not contaminated", "had no knowledge of the reporting system" and "the injury was superficial".

The average percutaneous contact time was 8.95 ± 0.09 months in the final year of education and training of participating medical students, calculated using the survival analysis technique (Figure 1). In the hazard analyses it was observed that the percutaneous contact rate approached 50% at the end of final year of medical education and training (12th month).
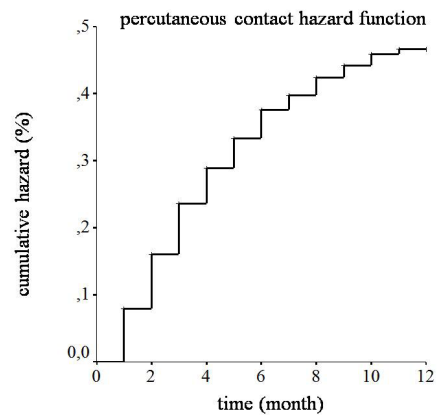

Figure 1: Cumulative hazard function for percutaneous contact by months

In the hazard analysis, adjusting for the timing of contact, the risk of percutaneous contact was significantly (HR 1.29: 95% CI: 1.11-1.50) higher in those who received no education and training on needle-stick injury. Risk was found to be significantly (HR 1.45; 95% CI: 1.26-1.66) higher in those educated at non-accredited medical schools. In addition, with each point increase in the invasive medical procedure application score the risk of percutaneous contact increased significantly (HR 1.06; 95% CI: 1.04-1.09) (Table 4).

Table 3: Students' reporting behaviour after percutaneous contact and reasons of not reporting.

Reporting behaviour	n	%
Those who reported *	107	13.0
Those who didn't report	719	87.0
Total	**826**	**100.0**
Reasons of not reporting percutaneous contact as stated by students (n=719)	**n**	**%****
I was sure that the patients' blood does not have any infection	371	51.6
I was unaware of the occupational accidents reporting system	145	20.2
Injury was superficial	115	16.0
I had no enough time to report	38	5.3
I thought that reporting costs too much time	36	5.0
I embarrassed from my friends	7	1.0
I was afraid of positive test results	7	1.0

*counted only reporting to Occupational Health and Safety (OHS) Unit
**percentages were calculated as according to those who didn't report the contact

Table 4: Factors effect the percutaneous contact (results of Cox regression)

Variables*	B±SE**	HR*** (95%CI)	p
†Those who uneducated on "invasive medical procedures and/or needle-stick injuries"[a]	0.255±0.075	1.29 (1.11-1.50)	0.001
†Invasive medical procedure application score	0.062±0.013	1.06 (1.04-1.09)	<0.001
†Those who were in the unaccredited medical school[b]	0.371±0.070	1.45 (1.26-1.66)	<0.001

*Variables included to analyse were:
Dependent variable; "percutaneous contact"
Independent variables; gender, student accommodation, school achievement, repeating a semester, education on "invasive medical procedures and/or needle-stick injuries", "health workers' health", and "working conditions, rules and risks in the hospital", usage of protective measures, invasive medical procedure application score, Hep B immunization status, knowledge on blood-borne diseases, whether the faculty is accredited
**B±SE: Cox regression coefficient and its standard error; ***HR: Hazard Ratio,
† referencecategories; a: those who educated, b: accredited school

Hazard analysis of percutaneous contact rates, adjusting for accreditation certification or education and training, were found to be statistically significant with Cox regression analysis as shown in Figure 2 and Figure 3.
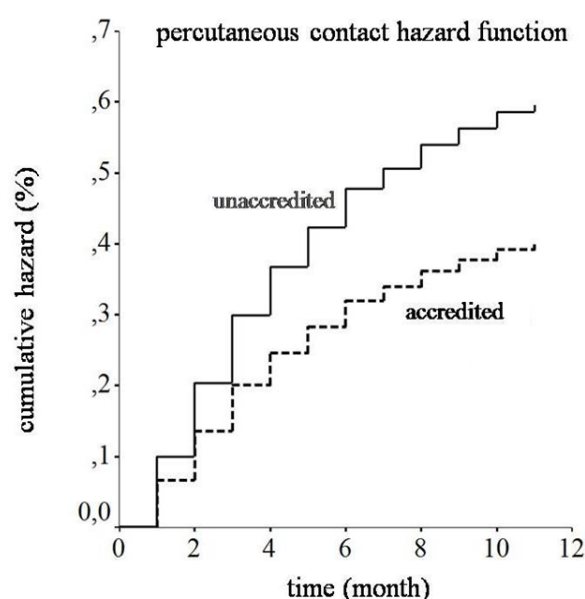

**Figure 2:** Comparison according to accreditation status about percutaneous contact
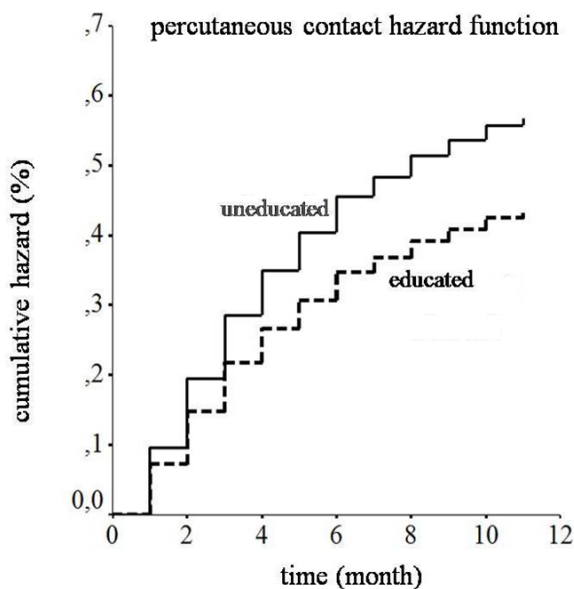
Figure 3: Comparison according to education status about percutaneous contact

The characteristics of participants, according to the accreditation status of the medical school attended, are compared. Participants at accredited medical schools reported higher rates of receiving education and training on "needle-stick injuries" (75.8%), "health of health workers" (37.8%), and "occupational rules, regulation and hazards in hospitals" (44.1%) than those at non-accredited medical schools (in order of 67.7%, 27.8% and 14.5%) (p<0.05). The Hepatitis B immunity rate was higher among the participants at accredited medical schools (56.5%) than among the participants at non-accredited medical schools (51.6%) (p<0.05). Participants at accredited medical schools reported that they performed fewer invasive medical procedures (46.4%) than participants at non-accredited medical schools (38.6%) (p<0.05).

DISCUSSION

The medical student sample analysed in the present study fully represents final-year medical students attending Turkish medical schools in 2017. The outcomes obtained, therefore, accurately reflect the prevailing blood contact and needle-stick injury risks among final-year medical students. Moreover, rather than contradicting, as envisioned at the design of the study, the outcomes of the present study corroborate the outcomes of previous studies. Contrary to the present study, medical students were often not the primary focus in previous studies, with study samples including general HCW, graduated doctors, nurses, and medical students. The more focussed and comprehensive investigation performed in the present study, therefore, strengthens the value of its evidence and significantly improves the understanding of blood contact and needle-stick injury relationships with the attributes of final-year medical students and the accreditation certification of medical schools.

While the percutaneous contact rate (35.4%) obtained from the reports of final-year medical students in the present study was high, it was not dissimilar to the percutaneous contact rates found among HCW in previous studies.[4,5,21,22,23,24] This, therefore, suggests that needle-stick and sharp-object injury risks of medical students were more similar to those of other HCW groups than previously thought. In two studies investigating medical students only, needle-stick and sharp object injury rates of 39.3% and 28.0% were reported in Iran and the US (Maryland, 4th year medical students), respectively .[7,25] Higher exposure rates, however, were expected to be found in the present study, as only final-year medical students were included in the analyses. In the final year of medical education and training, medical students generally perform more invasive medical procedures. Kessler et al reported that the most likely year of contact was the internship year of medical students,[26] with a contact rate of only 24.2% reported

by 5th year German medical students.[27]While the contact rate in the present study (35.4%) was only slightly lower than that of the Iran study,[7]the rate was half (62.7%) that reported by final-year medical students at Akdeniz University Medical School in an earlier study.[12] The large absolute rate difference between the two studieswas probably the result of one or more of the following: the introduction and implementation of an occupational health and safety education and training program in the undergraduate curriculum following the earlier study, a decrease in the frequency of final-year medical students performing invasive medical procedures, and a difference in exposure reporting period (i.e., the average duration of an internship).

The outcomes of the present study confirm that final-year medical students who had undergone appropriate blood contact and needle-stick injury education and training had significantly lower blood contact and sharp-object injury risks, which may be the main reason for the decrease in these rates observed between the past and present study.

The consequence of most concern following percutaneous contactis the contraction of an infectious disease as the result of blood-borne disease transmission. Based upon the percutaneous contactratefound among final-year medical students (n=7900) in Turkey ,[28] the estimated total number of percutaneous contactsin a 12 month period among final-year medical students was expected to be 2686 and based upon infectious disease transmission rates observed worldwide,the estimated numbers of the different types of infectious disease transmissions were expected to be 15 HCV, 59 HBV and 1 HIV.[6] While the projected estimates of percutaneous contactsand infec-

tious disease transmissions are a concern, the possibility of underestimation due to variability in exposure reporting period of some of the medical students participating in the study increases the seriousness of the probability of contacts among final-year medical students. The contracting of a blood-borne infectious may result in death or in significant long-term quality-of-life problems. The fact that these disease transmissions are preventable and occur during medical students' education and training makes addressing the conditions that increase the risks of blood contact and needle-stick injury all the more pressing. It is also important to take in consideration that blood contactsand sharp-object injuries will continue to occur after graduation.[4,29,30] The observation that occupational health and safety education and training reducesexposure risks certainly points to the importance of developing and implementing appropriate occupational health and safety education and training programs for inclusion in undergraduate curricula. Providing medical students with effective education and training will not only reduce their blood contact risks during their undergraduate years but also during their post-graduate years and in their professional careers.

The identification of accreditation certification as an independent variable that significantly impacts blood contact and needle-stick injury risksof final-year medical students was another important observation made in the present study. The evidence suggests that the quality of education and training received and lower numbers of invasive medical procedures performed at accredited medical schools result in significantly lower contact exposure risks among final-year medical students. The large absolute rate difference

between the two groups, however, cannot simply be explained by the latter two variables. This, therefore, suggests the need for a cultural change at non-accredited medical schools, with consistent norms, values, and standards in the education and training of medical students and accreditation certification implemented at all medical schools. Most importantly, occupational health and safety education and training needs to be included in undergraduate curricula and the norms, standards, and procedures related to blood contact exposure, reporting, follow-up, and education and training needs to be included in accreditation certification. Meeting and maintaining consistent standards across all medical schools will most effectively protect the health and safety of medical students during their education and training.

The low contact reporting rate (13%) was another important observation made in the present study. While Kassa et al [31] and a multi-centre study [29] reported blood contact reporting rates of 37% and 48% among HCW, respectively, the reporting rates among medical students were reported to be much lower. Kessler et al estimated the reporting rate among medical students to be 14.3% .[26] Kuruüzüm et al reported a 15.4% rate among medical students, which was lower than in any other of the HCW groups included in the study.[13] Bernard et al reported that 43% of medical students never reported blood contact, with only 39% reportingcontact correctly and only 12.5% following correct post-contact procedures.[25] Resistance to blood contact reporting has not only been found to be an issue among medical students but also among HCW. Moreover, in a study among HCW, the introduction of appropriate (and mostly simple) interven-

tionswas found to improve blood contact reporting.[32] Medical students, therefore, should participate in the"occupational health and safety services" provided by hospitals, which should include these interventions.

Limitations

Data was retrospectively collected from final-year medical students who attended medical schools selected by cross-sectional sampling. The data collection date was chosen as the month of June, as the academic year of most medical schools ended in June. However, not all students had a 12month exposure period at data collection, because some students started their final year in different months and some medical schools operated on a different calendar year.These inconsistencies could have resulted in an underestimation of contact rates reported; however, using the survival technique to analyse data may have helped to overcome this limitation. In the Cox proportional hazards regression analysis (Figure 1) the percutaneous contact rate at 12 months was 50% as compared to 35.4% obtained from the descriptive statistical analysis (Table 2). In the present study only final-year medical students participated in the reporting, therefore, the outcomes cannot be generalized to all medical students. Moreover, the large sample size investigatesmeans that blood contact rates and needle-stick injury rates may more accurately reflect the population rates than in previous studies.Participants in previous studies were also very often heterogeneous and not fully representative of the population .[7,13,14]

While performing Cox regression analysis and survival calculations, the denominator changes after each event as required by the analysis. However, in reality, the risk of repeated percu-

taneous injury to the same student remains. Defining the cases as "first event" and recurrent events that may continue in the same case were not included in the calculation. Therefore, the contact frequencies presented in our findings are the number of people who encounter contact, and the number of percutaneous contact events (accidents) is much higher than these numbers

CONCLUSION

The final year of medical education and training is a high-risk period in terms of blood contact and needle-stick injury, with the evidence suggesting that appropriate education and training programs could effectively mediate these risks. In addition, the accreditation status of medical schools was found to be a significant independent variable in contact risk. The low reporting rate of contact among the medical students is a serious concern that requires appropriate intervention measures.

Suggestions

It should be compulsory for final-year medical students to comply with the occupational health and safety standards set by hospitals affiliated to medical schools and essential for medical schools to actively monitor contacts and to include effective occupational health and safety education and training programs to undergraduate curriculums. In addition, revised norms, standards and procedures related to blood contact exposure, reporting, follow-up, and education and training should be included in accreditation certifications.

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SYSTEMATIC REVIEW AND META-ANALYSIS

What do we know about some popular methods of complementary and alternative medicine: An overview of Cochrane systematic reviews

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Abstract

Objective: This study aims to investigate the level of evidence on the effectiveness and safety of 14 complementary and alternative medicine (CAM) methods that were legalized in Turkiye (Turkey).

Methods: A systematic literature search was conducted in the Cochrane Systematic Review Database for acupuncture, apitherapy, hypnotherapy, leech therapy, homeopathy, cupping therapy, chiropractic, prolotherapy, osteopathy, maggot therapy, mesotherapy, music therapy, reflexology, ozone therapy. After screening, 178 studies were included in the qualitative synthesis. Evidence quality was classified as 'high/moderate/low'. AMSTAR-2 was used to evaluate the quality of systematic reviews. This study was registered to PROSPERO(CRD42019127509).

Results: There are 16 low (LQE) and four moderate-quality evidence (MQE) of effectivity for various conditions were found for acupuncture, while it has no effectivity on 13 conditions. There are six LQE and one MQE on its safety. One study found high-quality evidence of the effectivity of apitherapy concluded honey accelerates healing of burn wounds. Thirteen LQE and three MQE showed the effectiveness of music therapy, while one study reported it as ineffective. Four studies found LQE showing hypnotherapy might be effective in some conditions, and one study found it was ineffective. Regarding osteopathy, one study found MQE, and one study found LQE. One study reported LQE for the effectiveness of chiropractic. The only evidence for the effectivity of homeopathy is of low quality and four studies have shown that it is not effective.

Conclusions: Since there is insufficient evidence, 14 CAM methods legalised in Turkiye should not be used in routine medical practice. Future researches aiming to produce high-quality evidence are needed.

Keywords: Complementary Medicine, Alternative Medicine, Effectivity, Safety, Systematic Review

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INTRODUCTION

Definitions

Today an important consideration in healthcare is the increasing popularity of various approaches to disease treatment referred to as 'complementary', 'alternative', 'traditional', or 'holistic' medicine, to distinguish them from 'conventional' or 'modern' medicine based on scientific knowledge. The definitions of those approaches, the applications they cover, and their indications may differ according to geography, local culture, and national regulations; there are no universal standards governing their use. When a non-mainstream practice is used together with conventional medicine, it is categorized as "complementary". When a non-mainstream practice is used instead of conventional medicine, it is considered to be "alternative".[1] According to another definition, treatments applied by complementary medicine have little in common other than their exclusion from the mainstream. They tend to be embedded in primary care systems of medicine (including traditional Chinese medicine and Ayurvedic medicine, which have unique diagnostic criteria, diverse therapeutic options, and discrete therapies - including shark cartilage, bee pollen, ozone therapy, and almost everything in between).[2] Moreover, the scope of definitions can also vary depending on the context. For example, acupuncture can be used as a complementary treatment for infertility, while it is often used as an alternative to physiotherapy in cases of low back pain.[3] In this study, the term "complementary and alternative medicine" (CAM) was chosen mainly because it covers all practices aforementioned, including the traditional ones.

Usage

According to the WHO, "Given the unique health challenges of the 21st century, interest in CAM is undergoing a revival".[4] In addition, because such practices are being used for purposes such as reducing healthcare costs or creating a new way of dealing with chronic diseases, CAM is becoming legal in many countries.[5, 6] According to the American National Health Statistics reports, 34% of those over the age of 18 have used some method of complementary medicine. The most commonly used modalities are vitamin and non-mineral nutritional supplements, breathing exercises, yoga, Tai Chi, Qi Gong, chiropractic, and osteopathic practices.[7] It has been reported that 1 out of every 5 people aged four and over is using complementary methods, and out-of-pocket spending is about USD 30 billion annually. This constitutes 1% of total health expenditures, 9% of mobile health expenditures, and 30% of conventional doctor visits expenditures.[8] The prevalence of CAM use in the European Union was reported as 0.3-86%, with the most frequently used CAM applications being herbal medicine, homeopathy, chiropractic, acupuncture, and reflexology.[9] In a national study in Australia, the percentage of people using any vitamin support, massage therapy, meditation, herbal medicine, aromatherapy, chiropractic, yoga, naturopathy, acupuncture, energy healing, homeopathy, qi gong, martial arts, tai chi, osteopathy, reflexology, and Chinese medicine diet therapy was found to be 68.9%.[10] In the same research, the proportion of adherents to any kind of CAM practitioner was 44.1%, which corresponds to about 69.2 million people. According to a national study in Canada, 12.4% of people over the age of 12 visited a CAM practitioner at least once

a year.[11] The most commonly used CAM methods are massage therapy, acupuncture, homeopathy, chiropractic, herbal medicine, reflexology, and spiritual healing, respectively.

CAM usage in Turkiye (formerly Turkey) should also not be underestimated. According to a study conducted nationwide, CAM usage in Turkiye is 60.5%.[12] These modalities are more frequently used by women and people over the age of 35; however, levels of education and income did not affect CAM usage. Research carried out at the local level found that CAM is used by 22-61% of oncology patients [13-23], 13-52% of dermatology patients [24-26], 58% in lumbar disc hernia cases [27], 47% of rheumatoid arthritis patients [28], 22% of psychiatric patients [29], 72% of chronic obstructive pulmonary disease cases [30], 63% of asthma patients [30], 25% of chronic kidney failure cases [31], 35-41% of diabetes mellitus patients [32, 33], 31% of patients with allergic diseases [34], and 82% of infertility cases.[35]

Regulations

Regulations regarding CAM methods -which cover a wide range of modalities including plants, yoga, leeches, body manipulations, and even 'astral travel' - are not standardized in most countries of the world. For instance, permitted CAM practices, and the professions of people who may use those methods, differ significantly by the state in the United States.[36] In the European Union, 18 of 29 countries have specific regulations, and these differ among countries due to the diversity of cultures and traditions.[37]

In Turkiye, 15 CAM methods (Acupuncture, Apitherapy, Phytotherapy, Hypnosis, Leech application, Homeopathy, Chiropractic, Cup practice, Maggot therapy, Mesotherapy, Prolotherapy, Osteopathy, Ozone application, Reflexology, and Music Therapy) were legalized in 2014 by the Regulation on Traditional and Complementary Medicine Practices and permitted to be used for over 200 indications.[38] Some of those indications are medical diagnoses while others are symptoms or merely complaints such as "acute and chronic neck and low back pain" or "Recurrent head, neck, back and lower back pains" (Listed in Annex 3 of the Regulation).

Aim of the study

To be able to apply a medical modality to the human body, sufficient scientific evidence is required to ensure that the expected benefit from that method will be higher than the possible risks. The use of CAM methods is increasing worldwide, however, the scientific validity of those applications is still a subject of considerable debate as there has not been an adequate investigation into the sufficiency of evidence for the safety and effectiveness of CAM modalities .[2] Our knowledge of the extent to which these practices are beneficial or pose risks is limited. Another factor that complicates the problem is that scientific skepticism might be left aside and such practices are declared quackery completely. Therefore, answering the question "what do we know about the safety and effectiveness of CAM methods?" has vital importance for public health. This study is structured in the context of that question. This study is structured in the context of that question, and aims to explore whether there is sufficient evidence on the popular CAM methods.

METHODS

This review includes 14 CAM methods *(Acupuncture, Apitherapy, Hypnotherapy, Leech therapy, Homeopathy, Cupping therapy,*

Chiropractic, Prolotherapy, Osteopathy, Maggot therapy, Mesotherapy, Music therapy, Reflexology, and Ozone therapy) which were legally permitted in Turkiye since 2014 and are also increasingly popular in the world. Phytotherapy methods were excluded from the study since the evidence base of the herbal medicine is more solid and frequently compellingly positive.[2]

Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were followed during the process.[39] The review protocol was registered at the International Prospective Register of Systematic Reviews PROSPERO (CRD42019127509).

Search Strategy

We conducted literature searches in the Cochrane Database of Systematic Reviews to identify all the systematic reviews (SRs) about the included CAM methods for any health condition. Searches for SRs and meta-analyses were conducted between 20 December 2021 - 28 February 2022. The keywords were "acupuncture OR acupuncture therapy OR acupuncture points OR needle OR electro-acupuncture OR auricular acupuncture OR warm-acupuncture OR dry needling OR trigger-point therapy OR moxibustion", "apitherapy OR bee venom OR honey OR apipuncture", "hypnotherapy OR hypnosis OR trance", "leeches OR leeching OR leech therapy OR hirudo medicinalis OR leech", "homeopathy OR homeopathic OR homeopathic OR homeopathy OR homeopathic medicines OR homeopath", "chiropractic OR spinal manipulation", "dry cupping OR wet cupping OR cupping therapy", "prolotherapy OR regenerative injection therapy OR intraarticular injections",

"osteopathy OR osteopathic manipulative treatment OR OMT OR osteopathic medicine OR osteopath", "maggot therapy OR maggot debridement therapy OR larval therapy OR larval debridement therapy", "mesotherapy OR intradermal therapy OR intradermotherapy", "musico-therapy OR musico-therapies OR music OR music therapy OR music therapies", "reflexology OR reflex therapy OR reflexo-therapy", "ozone-therapy OR ozonetherapy OR ozone OR ozone therapy".

Inclusion and Exclusion Criteria

The SRs evaluating the effectiveness and/or safety of the selected CAM methods were included in the study. Interventions were compared to placebo, no treatment, or another intervention/drug. There were no date restrictions, but we have included the SRs in English only. The SRs (with or without meta-analysis) that involved any type of human and/or animal trials were included. Cochrane protocols, trials, editorials, special collections, clinical answers, non-systematic reviews, and withdrawn reviews were excluded.

Study Selection

Abstracts and full texts were reviewed by two authors. We were able to collect 811 studies in the beginning. After exclusions, 178 studies were enrolled for review, as shown in the PRISMA flowchart (Fig.1).
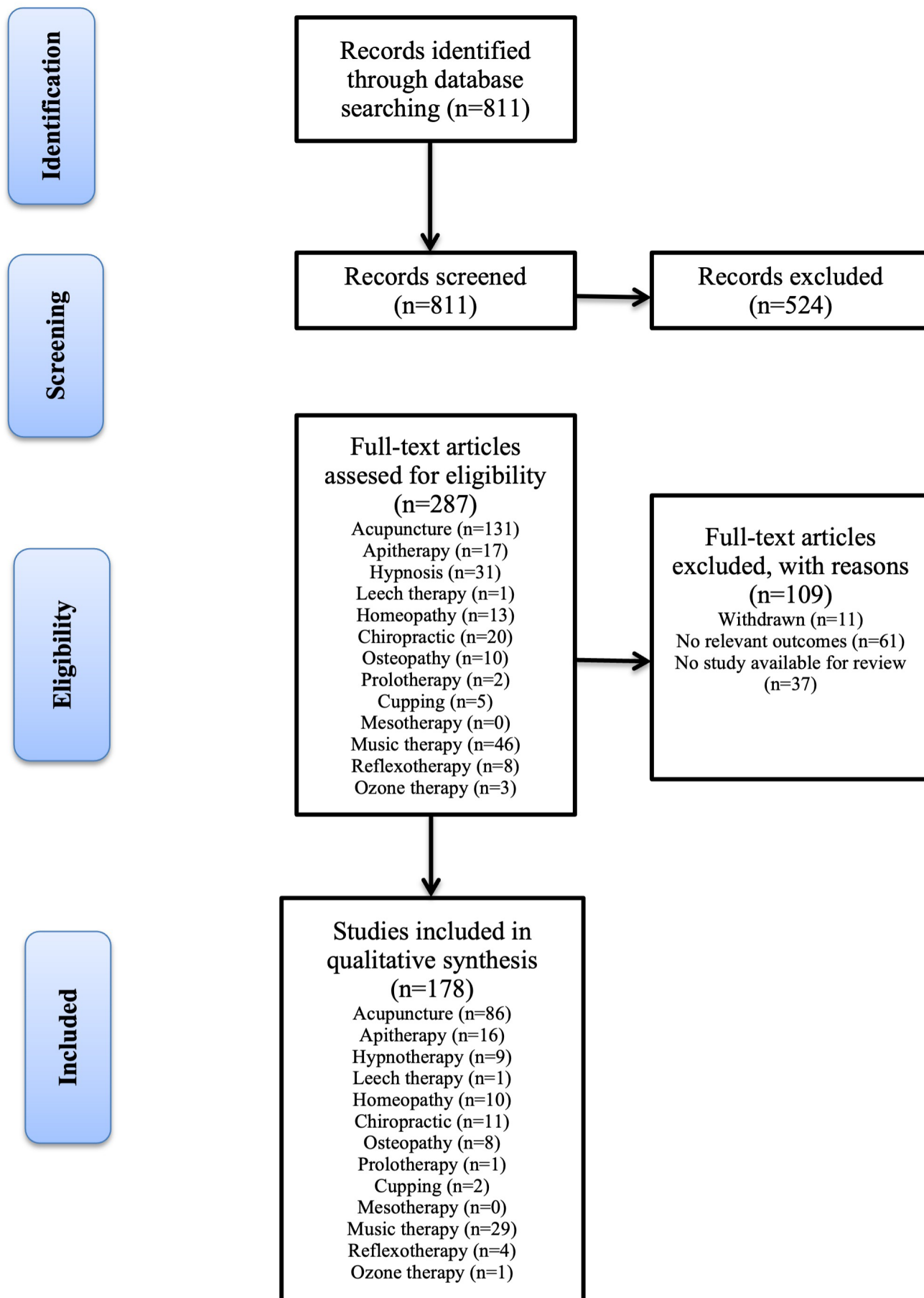
Fig.1 PRISMA flow diagram of the study

Data extraction

Included characteristics of the studies during the process were the year of publication, the total number of the participants, the total number of the included trials, health condition, type of intervention, controls, reported quality of the evidence (QoE), main outcomes of the safety and effectiveness. Extractions were made by one author (PET) and were verified for accuracy by the other author (MMC).

Quality Assessment of the Evidence Levels

In this review, findings were represented with evidence levels that were reported in each study enrolled. QoEs were evaluated by the GRADE (Grades of Recommendation, Assessment, Development, and Evaluation) approach. The GRADE system has four quality levels:[40]

- High: Randomized trials; or double-upgraded observational studies.

- Moderate: Downgraded randomized trials; or upgraded observational studies.

- Low: Double-downgraded randomized trials; or observational studies.

- Very low: Triple-downgraded randomized trials; or downgraded observational studies; or case series/case reports.

With the GRADE approach, researchers can lower the level of randomized controlled trials or increase the level of observational studies due to some characteristics of studies (Table 1).[40]

QoE and strength of recommendations were set by the GRADE Working Group as below:[41]

- High = Further research is very unlikely to change our confidence in the estimate of effect.

- Moderate = Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.

- Low = Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.

- Very low = Any estimate of effect is very uncertain.

We classified the very low and low QoEs as 'low quality'; in total, we had three QoE groups. To determine whether a CAM method can be applied effectively and safely, we took into consideration the recommendations above, and the level of "High-quality" was accepted

Table 1. Factors that can increase/decrease the quality level of a body of evidence

Increasing factors	Decreasing factors
Large magnitude of effect	*Limitations in the design and implementation of available studies suggesting high likelihood of bias*
All plausible confounding would reduce a demonstrated effect or suggest a spurious effect when results show no effect	*Indirectness of evidence (indirect population, intervention, control, outcomes)*
Dose-response gradient	*Unexplained heterogeneity or inconsistency of results (including problems with subgroup analyses)*
	Imprecision of results (wide confidence intervals)
	High probability of publication bias

as the requirement for clinical usage.

Quality Assessment of The Included SRs

We assessed the quality of the SRs with the Assessment of the Methodological Quality of Systematic Reviews (AMSTAR-2) tool. AMSTAR was developed to evaluate SRs of randomized trials. AMSTAR-2, as the revised form of AMSTAR, retains 10 of the original domains. AMSTAR-2 is a 16-item tool that rates overall confidence in the results of the review as high, moderate, low, critically low, and not intended to generate an overall score.[42]

Data Analysis

This study is a qualitative systematic review that includes summarizing the outcomes of the individual SRs and presenting them using separate tables for each therapy method. Performing a quantitative analysis was not applicable.

RESULTS

Acupuncture

Among 86 studies concerning acupuncture modalities, 4 reported moderate-quality evidence (MQE) and 19 reported low-quality evidence (LQE) for acupuncture practices' possible effectivity (Supplement Table at the end of the article). There were MQE for the effectivity of acupuncture in episodic migraine prevention [43], tension-type headache prevention [44], changing the presentation of an unborn baby in the breech position [45], and decreasing prostatitis symptoms [46]. LQEs involved premenstrual syndrome symptoms [47], pain management during labour [48], preventing nausea and vomiting in women undergoing regional anaesthesia for cesarean section [49], fatigue, depression, sleep disturbance, uremic pruritus in haemodialysis patients [50], chronic

nonspecific low back pain [51], acute hordeolum [52], acute traumatic brain injury management [53], acute stroke [54], depression [55], schizophrenia [55], stroke rehabilitation [56], fibromyalgia [57], nocturnal enuresis [58], endometriosis [59], taste disturbances [60], recurrent urinary tract infection prevention [61], chemotherapy or radiotherapy side effects in cancer patients [62], fatigue in inflammatory bowel disease [63], anaesthesia induction in children [64], and postoperative nausea and vomiting prevention [65]. Twelve studies have shown there could be a possible effect from acupuncture treatment, but these studies were not clear about evidence quality. The remaining studies were not able to draw an exact conclusion.

It has been shown that acupuncture has no effect on assisted reproduction [66], autism spectrum disorders [67], epilepsy [68], hypertension [69], stress urinary incontinence [70], cocaine dependence [71], dry mouth [72], hyperemesis gravidarum [73], hot flashes in women with a history of breast cancer [74], chronic pain in people with spinal cord injury [75], carpal tunnel syndrome [76], labour induction [77], and cancer pain [78].

There were no studies that showed acupuncture as unsafe. But evidence about safety was limited; six studies had LQE, and only one study had MQE on safety. The MQE study examined the use of acupuncture for episodic migraine prevention [43]. Studies that reported LQE regarding safety involved the use of acupuncture for premenstrual syndrome symptoms [46], acute stroke [53], hip osteoarthritis [79], schizophrenia [55], stroke rehabilitation [56], and fibromyalgia [57].

Apitherapy

In total 16 studies about apitherapy were included in this study. One study had high-

quality evidence (HQE), two had MQE, and three had LQE about the effectiveness of apitherapy practices. HQE was presented in connection to 'honey healing burns more quickly than non-antibacterial treatments'.[80] There were MQEs for honey's effectiveness in relieving cough symptoms [81] and healing surgical wounds with honey-soaked gauze [82]. Low-quality evidence involved honey healing burns more quickly than silver sulfadiazine [83], bee venom reducing acne scars [84], and honey preventing oral mucositis for patients receiving cancer treatment.[85] Five studies showed there was no significant effect of apitherapy treatments and the remaining studies were not able to create clear conclusions. There was no evidence to support the effectiveness of honey for short-term wound healing [83], preventing infectious complications in haemodialysis patients with central venous catheters [86], healing venous leg ulcers [87], reducing infection rates, pain, or healing time of ingrowing toenails [88], and reducing exudate, malodor, and wound pain of fungating wounds.[89]

Some studies reported results about safety, but the evidence level was not clear. In one study, it was reported that systemic adverse reactions occurred in approximately 3 out of 20 patients treated with bee venom.[90]

Music Therapy

Among 29 studies, three reported MQE, and 14 reported LQE on the effectiveness of music therapies. Six studies showed there might be effects from music interventions but didn't classify the quality of evidence, and five studies were not clear about the conclusions. One study did not find any significant effect of music therapy on the condition of 'Auditory integration training for autism spectrum disorders'.[91] Studies with MQE involved insomnia [92], improving social interaction and communication in children with autism spectrum disorder [93], schizophrenia and schizophrenia-like disorders.[94] Studies with LQE evaluated reducing anxiety in women undergoing colposcopy [95], improving maternal and infant outcomes during caesarean section [96], stress and anxiety reduction in coronary heart disease patients [97], acquired brain injury [98], improving psychological and physical outcomes in cancer patients [99], anxiety management in mechanically ventilated patients [100], preoperative anxiety [101], depression [102], dementia [103], alleviating pain during orthodontic treatment [104], sleep promotion in the intensive care unit [105], post-caesarean pain [106], pain management in labour [107], and chronic obstructive pulmonary disease [108].

There was no study that reported music interventions as unsafe. Some studies mentioned safety but didn't have any information regarding evidence quality. One study reported LQE about the safety of music therapies.[108]

Hypnotherapy

There were nine included studies about hypnotherapy. Four of them reported LQE and another four studies reported evidence without suggesting quality. One study revealed that there was no significant effect and other studies were uncertain about the effectivity. LQE results included nocturnal enuresis in children [58], antipsychotic-induced tardive dyskinesia [109], needle-related procedural pain and distress in children [110], reducing pain in the short term in children and adolescents presenting with recurrent abdominal pain [111]. There was no effect from hypnotherapy in

reducing chronic pain in people with spinal cord injury.[75]

Some studies mentioned the safety of hypnotherapy, but no study presented evidence on this subject.

Osteopathy

Among the eight studies, one reported MQE, and another reported LQE about the effectiveness of osteopathic practices. The MQE study was about low-back and pelvic pain during pregnancy [112] and the LQE study was about pneumonia in adults [113]. Five studies showed there was no evidence to suggest osteopathy is effective for dysmenorrhea [114], asthma [115], abdominal pain in Crohn's disease and inflammatory bowel disease [116], chronic low-back pain [117], and acute low-back pain [118]. The other study didn't yield any clear results.

Chiropractic

Among the 11 studies included, one study reported LQE about the effectiveness of chiropractic practices. Four studies revealed there was no significant effect and one study reported possible effectiveness without evidence quality information. The LQE study was about nocturnal enuresis in children.[58] No significant effect was demonstrated for asthma [115], chronic low-back pain [117], acute low-back pain [118], and dysmenorrhea [114]. Some studies mentioned the safety of chiropractic practices, but there was no information on evidence quality.

Homeopathy

Among 10 studies, one study was able to show the effectiveness of homeopathy with LQE. Another study reported possible effectivity with no information on the quality of evidence. Four studies showed there was no significant effect from homeopathic

treatments, and the others were not able to draw any clear conclusions. The LQE study involved homeopathic Calcarea carbonica for cutaneous molluscum contagiosum treatment.[119] The studies that reported homeopathic practices as 'having no effects' were about preventing and treating acute respiratory tract infections in children [120], chronic asthma [121], labour induction [122], and hot flashes in women with a history of breast cancer.[123] There was only one certain piece of evidence about the safety of homeopathy, and it was a study with low-quality of evidence.[120]

Prolotherapy

One study was available for prolotherapy practices. The study was about chronic low-back pain, and it did not draw an exact conclusion about its effectiveness and safety.[124]

Cupping

There were two studies included in this review study, and both were unable to show any significant effect of cupping practices. Study subjects included acne vulgaris [125], and reducing respiratory morbidity in infants requiring ventilatory support [126] Also, these studies did not present any clear evidence about safety, while one of them reported there were mild adverse reactions to wet cupping.[84]

Leech Therapy

We were able to collect one study only, and it was about lateral elbow pain treatment.[127] That review included one study that reported a significant difference between groups (leech vs. NSAID) favouring leeches in total pain score. Also, there were significantly fewer skin reactions in the topical NSAID group. The quality of the evidence is unknown.

Maggot Therapy

There was only one study included in the review, and it was about debridement of diabetic foot ulcers. It found that one small trial suggested that larvae were better in wound area reduction compared to hydrogel.[128] There was no data about safety.

Reflexology

Four studies about this subject were suitable for the review. One study showed that reflexology has no benefit for fatigue in rheumatoid arthritis.[129] Other studies did not have any exact conclusions. No exact evidence about the safety of reflexology was represented.

Mesotherapy

There was no study available on this subject in the Cochrane Database of Systematic Reviews.

Ozone Therapy

There was one study reporting that ozone therapy could be effective in the treatment of foot ulcers in people with diabetes, but the quality of evidence is unknown.[130]

DISCUSSION

Every medical intervention carries a risk of harm. Given these risks, to be able to take any action on the human body, the expected benefit must be greater than the possible harm. This crucial understanding is emphasized by the ethical principles of *Non-maleficence* (First do no harm!) and *Beneficence* (Duty to be useful). This evaluation can be made most reliably by using scientific knowledge. Additionally, the quality of evidence, which is dependent on the type of method used to produce scientific knowledge, is also important. Within the current evidence-based medicine approach, an intervention should not be performed if it

has been shown that it is not effective *or* safe because the probability of harm is greater in such cases. An intervention should also not be performed if sufficient evidence on its safety and effectiveness does not exist because the expected benefit / possible harm assessment cannot be made. It means that we may be putting the patient and/or public health at great risk, an unacceptable practice due to the primary ethical principles of scientific medicine and the right to health.

Based on the understanding summarized above, this study aimed to investigate current evidence on the effectiveness and safety of 14 legalized CAM methods in Turkiye for indications listed in the related Regulation. To that end, we carried out a systematic review in the Cochrane Database of Systematic Reviews and found that there is no study with HQE or MQE in the Database on both the effectiveness and safety of the CAM methods investigated. In sum, the current evidence in the Cochrane Database on safety and effectiveness is not enough to justify the application of those 14 CAM modalities for treating any disease or symptom.

However, these modalities have been legalized in Turkiye with the "Regulation on Traditional and Complementary Medicine Practices" issued by the Ministry of Health in 2014. One of the criteria considered when deciding which methods to legalize was how many publications on that method were available in PubMed and the Cochrane Library.[131] However, considering the number of the publications alone is not scientifically appropriate, and, as our study shows, the evidence in Cochrane is not sufficient to support the use of these methods. Similarly, in concordance with the findings of this study, an analysis of the

comprehensive book on 685 CAM methods/ condition pairings found that only 7.4% of them were based on sound evidence.[132] It was emphasized that even that percentage might be a gross over-estimation for a range of reasons; for example, several of the included modalities, such as exercise, massage, diet, group behaviour therapy, stress management, or fiber intake, could easily be classified as conventional interventions rather than CAM. In addition, it was stated that CAMBRELLA, a large-scale project carried out on the use of CAM in 39 European Union countries, was consulted in the preparatory studies of the Regulation. However, CAMBRELLA found in its final report that research on CAM methods has several problems: "A literature review including 170 scientific papers identified the following key issues in CAM research: practical problems in CAM research (e.g. randomization, blinding), use of quantitative and qualitative research methods, research strategies/priorities, and issues related to specific modalities of CAM."[133] Another criterion taken into account by the Ministry of Health when creating the Regulation was FDA approval for that method.[131] Yet the FDA did not approve some of the CAM methods legislated in Turkiye. Indeed, the FDA has issued many warnings for homeopathy, for example, and has stated that "Homeopathic products have not been approved by the FDA for any use and may not meet modern standards for safety, effectiveness, and quality".[134] In addition, the Science and Technology Committee of the UK Parliament House of Commons concluded that "there was no credible evidence of efficacy for homeopathy".[135] Nevertheless, those CAM methods were legalized in Turkiye despite the lack of evidence and lack of governmental approvals mentioned above. Under these circumstances, it can be safely claimed that these policies legalizing 14 CAM modalities create a non-negligible risk to public health. Therefore, due to insufficient evidence on effectivity and safety, the mentioned CAM methods should not be applied unless further studies would show their both effectiveness and safety. Additionally, it should be remembered that the ethical principles of the profession, and the regulation of professional codes of ethics both national (The Statute of Medical Deontology) and international (World Medical Association Declaration of Geneva), supersede the "Regulation on Traditional and Complementary Medicine Practices" since professional ethics must always be antecedent to legal regulations.

Cochrane reviews are reported to have lower bias than non-Cochrane reviews [136-138], hence we choose to incorporate them. Our widespread search for every practice led to involving every condition that was indexed in the Cochrane Database of Systematic Reviews; this is the main strength of this study. However, screening only one database creates a limitation, making it possible that we overlooked some evidence about several practices. Further studies with broader search strategies are necessary for a more robust comparison and more solid evidence on the effectiveness and safety of the CAM methods studied.

In conclusion, this systematic review has demonstrated that the level of evidence regarding the effectiveness and safety of Acupuncture, Apitherapy, Hypnotherapy, Leech therapy, Homeopathy, Cupping therapy, Chiropractic, Prolotherapy, Osteopathy, Maggot therapy, Mesotherapy, Music therapy, Reflexology, and Ozone therapy is insufficient

to be able to use them in daily medical practice. According to the GRADE system, further research is very unlikely to change the confidence in the estimate of effectiveness, which will only appreciably improve with high-quality evidence.[41] Therefore, further studies aiming to produce high-quality evidence are needed to be able to make risk-benefit assessments scientifically and to validate the use of these modalities clinically.

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Supplementary Table Characteristic of the included studies

Authors, year	N; total included trials	Indication	Intervention	Controls	Quality of Evidence	Main Outcomes	Adverse Events	AMSTAR-2
Smith, 2020	3960; 28	Pain management during labour	Acupuncture or acupressure	Placebo, no treatment or other non-pharmacological forms of pain management in labour	Low-Moderate	Acupuncture may make little or no difference to the intensity of pain felt by women when compared with sham acupuncture. Acupuncture may increase satisfaction with pain relief compared to sham acupuncture and probably reduces the use of pharmacological analgesia. Acupressure probably slightly reduces the intensity of pain during labour	N/A	Low

						compared with the combined control.		
Mu, 2020	8270; 33	Chronic nonspecific low back pain	Acupuncture	Sham intervention, no treatment, and usual care	Low	Acupuncture may not play a more clinically meaningful role than sham in relieving pain immediately after treatment or in improving quality of life in the short term, and acupuncture possibly did not improve back function compared to sham in the immediate term. However, acupuncture was more effective than no treatment in improving pain and	Pain, bruising, hematoma, bleeding, worsening of LBP, and pain other than LBP	Moderate

						function in the immediate term.		
Farrell, 2020	21; 1	Fatigue in inflammatory bowel disease	Electroacupuncture	Control and sham electroacupuncture	Low	The evidence suggests electroacupuncture may result in a large reduction in fatigue compared to control and sham electroacupuncture	No adverse events were reported	Moderate
Griffiths, 2021	1221; 9	Preventing nausea and vomiting in women undergoing regional anaesthesia for caesarean section	Acupressure/acupuncture	Placebo	Low	Acupressure may reduce intraoperative vomiting but it is uncertain whether it reduces postoperative nausea or postoperative vomiting	Uncertain	Moderate
Armour et al., 2018	277; 5	Premenstrual syndrome (PMS)	Acupuncture and acupressure	Sham acupuncture, no treatment	Low	Acupuncture may reduce mood-related and physical symptoms of PMS and improve	Limited evidence for safety of acupuncture and	Moderate

						quality of life (QOL) compared to sham acupuncture Very limited evidence about acupuncture vs. no treatment Acupressure may reduce the severity of PMS and improve QOL compared to sham acupressure	no data for acupressure	
Cheong et al., 2013	4544;20	Reproduction assistment	Acupuncture	Placebo needles, no treatment	Low	No benefit for improvement of live birth rate, ongoing or clinical pregnancy rate	No significant side effects	High
Kim et al.,2016	1787;24	Chronic kidney disease	Acupuncture, acupressure, ear acupressure, transcutaneous electrical	Routine care	Very low	Manual acupressure increases fatigue, depression, sleep disturbance and uraemic pruritus in haemodialysis patients	No serious adverse events	Moderate

			acupuncture point stimulation, far-infrared radiation on acupuncture points and indirect moxibustion					
Cheng et al., 2017	531;6	Acute hordeolum	Acupuncture	Sham acupuncture, no treatment, other active treatments	Low	Acupuncture plus conventional treatments may be more beneficial for resolution or relief of acute hordeolum compared withy conventional treatments only	Limited/ no data	Moderate
Wong et al., 2013	294;4	Traumatic brain injury	Acupuncture	No treatment, placebo, sham	Low	After acute TBI and in the rehabilitation phase acupuncture might improve overall func-	No serious adverse events	Moderate

				acupuncture		tional outcome and motor and speech functions		
Xu et al., 2018	3946; 33	Acute stroke	Acupuncture	Open control or sham acupuncture	Very low - low	The effects of acupuncture in reducing death or dependency or improving neurological and movement scores at the end of follow-up, as seen in trials comparing acupuncture with any control, were not seen in trials comparing acupuncture with the more reliable control of sham acupuncture.	Minor adverse events	Moderate

Cheuk et al.., 2011	390; 10	Autism spectrum disorders (ASD)	Needle acupuncture, needle acupuncture plus conventional treatment, acupressure plus conventional treatment	Sham acupuncture, conventional treatment	N/A	No difference in the primary outcome of core autistic features. There was no evidence that acupuncture was effective for the secondary outcome of communication and linguistic ability	Bleeding, crying due to fear or pain, irritability, sleep disturbance and increased hyperactivity.	Moderate
Smith et al., 2018	7104; 64	Depression	Acupuncture	No treatment, wait list, treatment as usual, control acupuncture, medication	Low	Acupuncture may moderately reduce the severity of depression by end of treatment (SMD -0.66, 95% CI -1.06 to -0.25). There was a small reduction in the severity of depression of 1.69 points on the Hamilton Depression Rating Scale	No differences between groups	Moderate

| | | | | | | by end of treatment (95% CI -3.33 to -0.05). Acupuncture may confer small benefit in reducing the severity of depression by end of treatment (SMD -0.23, 95% CI -0.40 to -0.05). It may be beneficial in reducing the severity of depression by end of treatment (SMD -1.15, 95% CI -1.63 to -0.66). | | |
| Cheuk and Wong, 2014 | 1538; 17 | Epilepsy | Acupuncture | No treatment, placebo treatment,sham treatment or Anti-epilectic drugs | Moderate | Needle acupuncture plus Chinese herbs compared to chinese herbs and needle acupuncture compared to phenytoin was not effective in reducing seizure frequency; compared with | No serious adverse events | Moderate |

						valproate, needle acupuncture plus valproate was not effective in achieving freedom from seizure. Compared with antiepileptic drugs, catgut implantation at acupoints plus antiepileptic drugs was not effective in achieving seizure freedom.		
Yang et al., 2018	1744; 22	Hypertension	Acupuncture	No treatment, sham acupuncture or minimal acupuncture,	Low	There is no evidence for the sustained blood pressure (BP) lowering effect of acupuncture that is required for the management of chronically elevated BP.	Pain sensation during needle insertion and small spot-bleeding, hypertensive emergency	Moderate

				antihypertensive drugs				
Shen et al., 2014	2875; 30	Schizophrenia	Acupuncture manipulation, moxibustion, electroacupuncture, acupoint injection, laser acupuncture, acupoint catgut treatment and electric acupuncture convulsive therapy	Anti-psychotic drugs, Traditional Chinese Medicine drugs, Electroconvulsive therapy	Low	Acupuncture plus standard antipsychotic treatment vs. standard antipsychotic treatment was better in mental health findings and time in hospital. Relapse was less in acupuncture plus low dose antipsychotics compared to standard dose antipsychotic drugs	Adverse effects were less in acupuncture groups	Moderate
Wang et al., 2013	60; 1	Stress urinary incontinence	Electroacupuncture	Midodrine hydrochloride	Low	Cure rates were low and not statistically significantly different in acupuncture group.	No adverse events in the acupuncture group	Moderate

Yang et al., 2016	2257; 31	Stroke rehabilitation	Traditional or contemporary acupuncture	Placebo acupuncture, sham acupuncture, or other conventional treatment.	Low	Acupuncture had beneficial effects on the improvement of dependency, global neurological deficiency, cognitive function, depression, swallowing function, swallowing function.	No serious adverse events	Moderate
Linde et al., 2018	4985;22	Prevention of episodic migraine	Acupuncture	No acupuncture, sham acupuncture, prophylactic drug treatment	Moderate	Acupuncture was associated with a moderate reduction of headachefrequency over no acupuncture after treatment (four trials, 2199participants; standardised mean difference (SMD) -0.56; 95% CI-0.65 to -0.48). Both after treatment (12 trials, 1646	Compared to drug prophylaxis fewer participantsdropped out due adverse effects or reported adverse effects.	Moderate

						participants) and at follow-up (10 trials, 1534 participants), acupuncture was associatedwith asmall but statistically significant frequency reduction over sham. Acupuncture reduced migraine frequency significantly more than drug prophylaxis after treatment.		
Linde et al. 2016	2349; 12	Prevention of tension-type headache	Acupuncture	Routine care or treatment of acute headaches, sham acupuncture, physiother	Moderate	The proportion of participants experiencing at least 50% reduction of headache frequency was much higher in groups receiving acupuncture than in control groups. Among	Three trials reported the number of participants reporting adverse effects: 29 of 174 (17%) with acupuncture versus 12 of 103	Moderate

				apy, massage or exercise		participants receiving acupuncture, 205 of 391 (51%) had at least 50% reduction of headache frequency compared to 133 of 312 (43%) in the sham group after treatment.	with sham (12%; odds ratio (OR) 1.3; 95% CI 0.60 to 2.7; low quality evidence)	
Deare et al., 2013	395; 9	Fibromyalgia	Electro-acupuncture (EA) and manual acupuncture (MA)	Sham/fake/placebo acupuncture, other types of placebo control, non-acupuncture treatment, different styles of acupunctur	Low-Moderate	Low quality evidence from one study showed EA improved symptoms with no adverse events at one month following treatment. Moderate quality evidence from six studies indicated that EA or MA was no better than sham acupuncture. Moderate quality evidence from one study showed that adjunct acupuncture	No serious adverse events	High

				e or other treatment		therapy reduced pain compared with standard therapy alone (antidepressants and exercise). Low quality evidence from one study showed a short-term benefit of acupuncture over antidepressants in pain relief. Four studies reported no differences between acupuncture and control or other treatments.		
Gates 2006	1433; 7	Cocaine dependence	Auricular acupuncture	Sham acupuncture or no acupuncture	Low	No differences between acupuncture and sham acupuncture were found for attrition RR 1.05 (95% CI 0.89 to 1.23) or no	Not reported by any study	Moderate

						acupuncture: RR 1.06 (95%CI 0.90 to 1.2)		
Coyle 2012	1346; 8	Breech presentation	Moxibustion alone or in combination with acupuncture or postural techniques	No treatment, acupuncture, only moxibustion, only postural technique	Moderate	Moxibustion was not found to reduce the number of non-cephalic presentations at birth compared with no treatment (P = 0.45). Moxibustion resulted in decreased use of oxytocin before or during labour for womenwho had vaginal deliveries compared with no treatment (RR= 0.28, 95% CI= 0.13 to 0.60). Moxibustion was found to result in fewer non-cephalic presentations at birth compared with acupuncture (RR 0.25,	Unpleasant odour (with or withoutthroat irritation), nausea and abdominal pain from contractions	Moderate

						95% CI 0.09 to 0.72). When combined with acupuncture, moxibustion resulted in fewer non-cephalic presentations at birth (RR 0.73, 95% CI 0.57 to 0.94), and fewer births by caesarean section (RR 0.79, 95% CI 0.64 to 0.98).		
Huang et al., 2011	2334; 24	Nocturnal enuresis	Acupuncture	No treatment or placebo or another treatment	Low	Acupuncture had better results than sham control acupuncture (RR for failure or relapse aCer stopping treatment 0.67, 95% CI 0.48 to 0.94) in a trial.	No data	Moderate
Brown et al., 2014	67; 1	Endometriosis	Acupuncture	Chinese herbal medicine	Low	Auricular acupuncture was significantly more effective at reducing pain associated with	No data	Overview of systematic reviews

						endometriosis than Chinese herbal medicine (RR 3.04, 95% CI 1.65 to 5.62,		
Nagraj et al., 2017	37; 1	Taste disturbances	Acupuncture	Sham acupuncture	Low	The acupuncture group showed improvement in taste discrimination (MD 2.80, 95% CI -1.18 to 6.78)	No adverse effects	High
Liddle and Pennick, 2015	118; 2	Low-back and pelvic pain during pregnancy	Acupuncture + usual prenatal care	Sham acupuncture + usual prenatal care	Low	All women reported pain relief and improved functional disability, but those in the ear acupuncture group reported significantly more pain relief and functional improvement than those in either the sham ear acupuncture or control group	No data	High

Furness et al., 2013	153;5	Dry mouth following radiotherapy treatment	Acupuncture	Sham acupuncture (placebo)	Low	No difference between acupuncture and control groups in dry mouth symptoms	Mild and temporary side effects	Moderate
Boelig et al., 2016	353;5	Hyperemesis gravidarum	Acupuncture, P6 Acupressure	Placebo, metoclopramide, phenobarbital, Chinese medicine	Low	No primary outcome data were available when acupuncture was compared with placebo. There was insufficient evidence to identify clear differences between acupuncture and metoclopramide. Acupuncture was more likely to have any effectiveness compared to phenobarbital and Chinese medicine.	No data	Moderate
Zhang et al., 2018	2569; 29	Side effects of chemotherapy or radiotherapy	Moxibustion, moxibustion	No treatment, conventional	Low	There were reductions in symptom scores for nausea and vomiting and	Most included studies provided no information	Moderate

			plus conventional treatment	treatment, sham moxibustion,		diarrhoea, and higher mean white blood cell count serum haemoglobin and platelets when compared with sham moxibustion. Two studies showed moxibustion improved serumhaemoglobin concentrations compared with conventional medicines.	on the adverse effects.	

Rada et al., 2010	139; 1	Hot flushes in women with a history of breast cancer	Acupuncture	Sham acupuncture	N/A	No differences between the different study groups were found for acupuncture or the treatment of hot flushes.	Minor adverse effects such as slight bleeding or bruising at the needle sit	Moderate
Boldt et al., 2014	47;2	Chronic pain in people with spinal cord injury	Acupuncture	Sham acupuncture, Trager treatment	NA	In two trials acupuncture was not superior to sham acupuncture or Trager treatment in reducing pain.	No adverse effects	Moderate

Manyande et al., 2015	67;1	Assisting the induction of anaesthesia	Parental acupuncture	Parental sham acupuncture	Low	The parent was less anxious, and the child was more co-operative, at induction of anaesthesia with parental acupuncture.	No data	Moderate
Franco et al., 2018	3290; 38	Chronic prostatitis/chronic pelvic pain syndrome	Acupuncture plus moxibustion, acupuncture, electroacupuncture+ advice+ exercise	Only acupuncture, sham acupuncture, advice+ exercise	Moderate	Acupuncture probably leads to clinically meaningful reduction in prostatitis symptoms compared with sham procedure (NIH-CPSI score -5.79, 95% CI -7.32 to -4.2).). Acupuncture may also lead to a clinically meaningful reduction in prostatitis symptoms compared with standard medical	No difference in adverse events	Moderate

						therapy (MD -6.05, 95% CI -7.87 to -4.24)		
Hurlow et al., 2012	88; 3	Cancer pain	TENS	Placebo, sham	N/A	There were no significant differences between groups.	Minor side effects	Moderate
Lee et al., 2015	7667; 59	Postoperative nausea and vomiting	Techniques intended to stimulate the PC6 acupoint: acupuncture, electro-acupuncture, laser acupuncture, transcutaneous electrical stimulation, conventional peripheral nerve stimulation, acu-	Sham treatment or drug therapy	Low-Moderate	There was a moderate-size effect in children and adults (PC6 acupoint stimulation versus sham); moderate-size effect on postoperative vomiting but not on postoperative nausea (PC6 acupoint stimulation and antiemetic versus antiemetic); no difference in the incidence of postoperative nausea and vomiting (PC6	Minor side effects, transient and self-limiting (e.g. skin irritation, blistering, redness and pain)	High

			stimulation device, acupressure, and capsicum plaster				acupoint stimulation versus antiemetic)		
Vogel et al., 2017	56;1	Labour induction	Acupuncture	Routine care	N/A	The intervention did not appear to have any impact on the number of women requiring additional agents to induce labour (RR 0.60, 95% CI 0.31 to 1.17) or having caesarean section (RR 0.43, 95% CI 0.17 to 1.11)	No data	Moderate
O'connor 2003	884; 21	Carpal tunnel syndrome	Laser acupuncture	Placebo	N/A	No significant difference in paraesthesiae or	No data	Moderate

						night pain was demonstrated between laser acupuncture and placebo over a three-week treatment period.		
Oduwole 2018	899; 6	Acute cough	Honey or honey+antibio tics	Honey-based cough syrup, non-honey cough syrup, placebo, no treatment, antibiotics alone or non-honey cough syrups+ antibiotics	Moderate	Honey probably reduces cough frequency better than no treatment or placebo (no treatment: meandifference (MD) -1.05, 95% CI -1.48 to -0.62; I^2= 0%;placebo: MD -1.62, 95% CI -3.02 to -0.22; I^2 = 0%). Honey may have a similar effect as dextromethorphan in reducing cough frequency (MD -0.07,95% CI -1.07 to 0.94; I^2 = 87%). Honey may be better than	No difference between honey and control groups	Moderate

						diphenhydraminein reducing cough frequency (MD -0.57, 95% CI -0.90 to -0.24)		
Jull 2015	3011; 26	Topical treatment for wounds	Honey alone or in combination with other dressings or components	Dressings or other topical agent	Low	Burns treated with honey heal more quickly than those treated with silversulfadiazine (SSD) (WMD -5.12 days, 95%CI -9.51 to -0.73)	Unclear if there is a difference in rates of adverse events	Moderate
McCann 2010	786; 10	Preventing infectious complications in haemodialysis patients with	Topical honey ointment, Medihoney, Manuka honey	Antimicrobial ointment, mupirocin ointment,	N/A	Topical honey did not reduce the risk of exit site infection (RR 0.45, 95%CI 0.10 to 2.11) or	Mild local skin discomfort	High

		central venous catheters		povidone-iodine ointment		catheter-related bacteraemia (RR 0.80, 95%CI 0.37 to 1.73).		
Norman 2017	576; 12	Pressure ulcers	Honey	Ethoxy-diaminoacridine plusnitrofurazone	Very low	No clear evidence of a difference between honey and the combination of nitrofurazone andethoxy-diaminoacridine treatment (one trial) RR 11.42 (0.66 to 196.4)	No participant in either group experienced adverse systemic or local side effects directly attributed to treatment	Moderate
Norman 2016	886;11	Surgical wounds	Honey-soaked gauze	EUSOL-soaked gauze	Moderate	One small study (N=43) showed that more open wounds resulting from excision of pyomyositis abscesses healed when treated with a honey-soaked gauze compared with a EUSOL-soaked gauze over three weeks'	No data	Moderate

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						follow-up (RR: 1.58, 95% CI 1.03 to 2.42).		
O'Meara 2014	4486; 45	Venous leg ulcers	Manuka honey , alcium alginate dressing impregnated with Manuka honey	Hydrogel therapy, usual care, with dressings applied according to district nurse choice	N/A	no between-group difference in time to healing or complete healing was detected for honey-based productswhen compared with usual care	No difference between groups	Moderate

| Norman 2017 | 5807; 56 | Burns | Honey or honey-based dressings | Topical antibiotic | Moderate-High | Honey reduces time to healing comparedwith topical antibiotics: HR 2.45 (95% CI 1.71 to 3.52; I2=66%). Honey results shorter mean time to healing compared with the non-antibacterial dressings (95% CI -6.30 to -4.34; I2= 71%). | It is uncertain whether the incidence of adverse eventsdiffers between groups (very low certainty evidence) | Moderate |
| Cao 2015 | 3227;35 | Acne vulgaris | Cosmetics with purified bee venom | Only cosmetics | Low | In one trial with 12 participants, purified bee venom was found to be statistically significantly better than the no PBV control when the post-treatment Korean Acne | No data | Moderate |

						Grading System (KAGS) scores were measured, which were based on the number of lesions (MD -1.17, 95% CI -2.06 to -0.28, P = 0.01)		
Eekhof 2012	2826; 24	Ingrowing toenails	Manuka honey	Paraffin-impregnated tulle gras	N/A	No significant difference in postoperative pain between manuka honey dressing compared to paraffin-impregnated tulle gras (MD 0.03, 95% CI -0.47 to 0.53)	No data	Moderate
Worthington 2011	10,514; 131	Preventing oral mucositis for patients with cancer receiving treatment	Honey	No treatment	Low	Honey may be beneficial in the prevention of any mucositis (RR = 0.70, 85% CI 0.56 to 0.88, P = 0.002),	No data	High

						moderate to severe mucositis (RR = 0.48, 95% CI 0.31 to 0.74, P = 0.0009) and severe mucositis (RR = 0.26, 95% CI 0.13 to 0.52, P = 0.0002)		
Adderley 2014	164; 4	Fungating wounds	Manuka honey-coated dressings	Silver-coated dressings	N/A	Themedian decrease in wound size in Group A (honey-coated dressings) was 15 cm2 compared with 8 cm2 inGroup B (silver-coated dressings). This difference was not statistically significant (p = 0.563). There was no significant reduction in wound size for all patients (p = 0.388)	No data	Moderate

Zimpel, 2020	153;3	Post-caesarean pain	Music plus analgesia	Placebo plus analgesia	Low	Music plus analgesia may reduce pain when compared with placebo plus analgesia at one hour and 24 hours; also when compared with analgesia at one hour and 24 hours.	Uncertain	Low
Sinha 2011	182; 7	Autism spectrum disorders	Auditory integration therapy (AIT) and other sound therapies that involved listening to music modified by filtering and modulation	Waiting list or receive no treatment, usual therapy or a placebo equivalent.	N/A	Studies did not demonstrate any benefit of auditory integration therapy over control conditions.	No significant differences were found between groups	Low

Galaal 2011	1102; 6	Reducing anxiety in women undergoing colposcopy	Listening to music during colposcopy	Usual care	Low	Music during colposcopy significantly reduced anxiety levels (MD = -4.80, 95% CI: -7.86 to -1.74) and pain experienced during the procedure (MD = -1.71, 95% CI: -2.37 to -1.05) compared to not listening to music.	No adverse events reported	Moderate
Laopaiboon 2009	76; 1	Improving maternal and infant outcomes in C/S	Standard care plus at least 30 minutes listening to music through earphones via a compact disc player	Received standard care and no music	Low	Music added to standard care during caesarean section under regional anaesthesia had some impact on pulse rate at the end of maternal contact with the neonate in the intra-operative period (MD -7.50 fewer beats per minute, 95% CI -14.08 to -0.92) and	No data	Moderate

						after completion of skin suture for the caesarean section (MD -7.37 fewer beats per minute, 95% CI -13.37 to -1.37).		
Jespersen 2015	314;6	Insomnia	Listening to music	No treatment or treatment-as- usual	Moderate	The results of a random-effects meta-analysis revealed an effect in favour of music listening (mean difference (MD) -2.80; 95%confidence interval (CI) -3.42 to -2.17; Z = 8.77, P < 0.00001)	No adverse events reported	High
Bradt 2013	1369;26	Anxiety reduction in coronary heartdisease patients	Listening to music, singing, playing music	Usual care	Low	Music interventions have a small beneficial effect on psychological distress and anxiety in people with CHD and thiseffect isconsistent across studies (MD = -	No adverse events reported	Moderate

					1.26, 95% CI -2.30 to -0.22, P = 0.02, I^2 = 0%). istening to music reduces heart rate (MD = -3.40,95% CI -6.12 to -0.69, P = 0.01), respiratory rate (MD = -2.50, 95% CI-3.61 to -1.39, P < 0.00001) and systolic blood pressure (MD= -5.52 mmHg, 95% CI - 7.43 to -3.60, P < 0.00001). Theresults also suggest that listening to music may improvepatients' quality of sleep following a cardiac procedure or surgery (SMD = 0.91, 95% CI 0.03 to 1.79, P = 0.04).		

| Magee 2017 | 775;29 | Acquired brain injury | Playing musical instruments, Singing and music-based voice interventions, RAS or rhythmic auditory cueing (RAC), Receptive interventions in which participants listen to Music, Songwriting | Standard care alone, standard care with placebo, standard care combined with other therapies | Low | Rhythmic auditory stimulation may be beneficial for improving the following gait parameters after stroke. There were an increase in gait velocity of 11.34 metres per minute (95% confidence interval (CI) 8.40 to 14.28; 9 trials; 268 participants; P < 0.00001; moderate-quality evidence). Music interventions may be beneficial for improving the timing of upper extremity function after stroke. (95% CI -1.69 to -0.47; 2 trials; 122 participants; very low-quality evidence). Music | No data | High |

						interventions may be beneficial for communication outcomes in people with aphasia following stroke. Overall, communication improved by 0.75 standard deviations in the intervention group, a moderate effect (95% CI 0.11 to 1.39; 3 trials; 67 participants; P = 0.02; very low-quality evidence).		
Bradt 2016	3731; 52	Improving psychological and physicaloutcomes in cancer patients	Music therapy interventions offered by trained music therapists; music medicine	Standart care, placebo	Low	There were average anxiety reduction of 8.54 units (95% confidence interval (CI)−12.04 to−5.05, P < 0.0001) on the Spielberger State	No adverse events reported	High

			interventions (listening to pre-recorded music, offered by medical staff)				Anxiety Inventory; positive impact on depression (standardized mean difference (SMD):−0.40, 95% CI−0.74 to−0.06, P = 0.02). The results suggest a large effect of music interventions on patients' quality of life (QoL) and fatigue.		
Bradt 2014	805; 14	Mechanically ventilated patients	Music listening	Standart care	Low	Music listening resulted, anxiety reduction (95% CI -1.75 to -0.47, P = 0.0006). Also reduced respiratory rate and systolic blood pressure.	No adverse events identified	High
Bradt 2013	2051; 26	Preoperative anxiety	Listening to pre-recorded music	Standart care	Low	Music listening resulted, on average, in an anxiety reduction (95% CI -7.27 to -4.17, P < 0.00001)	No adverse events identified	Moderate

| Aalbers 2017 | 421; 9 | Depression | Any form of music therapy (e.g. improvisational, re-creative, compositional, or receptive methods) provided alone or in addition to TAU | Treatment as usual (TAU), psychological therapies, pharmacological therapies, other therapies, | Low-Moderate | There were less clinician-rated depressive symptoms (SMD -0.98, 95% CI -1.69 to -0.27, 3 RCTs, 1 CCT, n = 219) and patient-reported depressive symptoms (SMD -0.85, 95% CI -1.37 to -0.34, 3 RCTs, 1 CCT, n = 142) in music therapy and TAU groups vs TAU groups. | Music therapy plus TAU is not associated with more or fewer adverse events than TAU alone | Moderate |
| Geretsegger 2016 | 165; 10 | Autism spectrum disorder | Music therapy delivered by a professional musictherapist | No-treatment, or standard care | Moderate | Music therapy was superior to 'placebo' therapy or standard care with respect to theprimary outcomes social interaction within the therapy context (SMD 1.06, 95% CI 0.02 | No adverse events reported | Moderate |

						- 2.10); generalised social interaction outside of the therapy context (SMD 0.71, 95% CI 0.18- 1.25), non-verbal communicative skills within the therapy context (SMD 0.57, 95% CI 0.29-0.85), verbal communicative skills (SMD 0.33, 95% CI 0.16 - 0.49), initiating behaviour (SMD 0.73, 95% CI 0.36-1.11), and social-emotional reciprocity (SMD 2.28, 95% CI 0.73 to 3.83)		
Geretsegge r 2017	1215; 18	Schizophrenia and schizophrenia-like disorders	Music therapy or music therapy added to standard care	Placebo, standard care or no treatment	Low-Moderate	A positive effect on global state was found for music therapy compared to standard care (RR 0.38	No data	Moderate

						95% CI 0.24 to 0.59)		
Van der Steen	1097; 22	Dementia	Music-based therapeutic interventions	Usual care or other activities	Low-Moderate	Interventions may improve emotional well-being and quality of life (standardised mean difference (SMD) 0.32, 95% confidence interval (CI) 0.02 to 0.62) and reduce anxiety (SMD -0.43, 95% CI -0.72 to -0.14), reduce depressive symptoms (SMD -0.27, 95% CI -0.45 to -0.09) and overall behaviour problems (SMD -0.23, 95% CI -0.46 to -0.01).	No adverse events reported	Low
Fleming 2016	931; 14	Alleviating pain during orthodontic treatment	Brain wave music (BWM) or cognitive behavioural therapy	No special instructions	Very low	One study showed there was less pain at 24 hours (MD -26.65 mm, 95% CI -39.06 to -	Not measured	High

						14.24; P < 0.001) and three days (MD -23.44 mm, 95% CI -36.82 to -10.06; P < 0.001) in brain wave music group compared to controls		
Hu, 2015	1569; 30	Sleep promotion in the intensive care unit	Earplug-delivered sleep-inducing music, 45-minute music-listening İntervention, use of earplugs and eye masks with music listening, 20-minute relaxingmusic therapy,	No music, but earplugs and eye shield worn, usual care without music, no use of earplugs or eye masks and no music, sitting	Very low	participants in the music group had shorter stage two sleep time (P value = 0.014) and longer stage three sleep time (P value = 0.008). significantly greater reduction in BIS in the music intervention group (post-test mean = 81, SD = 10) compared with the control group (post-test mean = 94, SD	No data	Moderate

			individualized music intervention	and uninterrupted resting		= 5) (P value < 0.01).		
Smith, 2018	1731; 15	Pain management in labour	Relaxation, music and guided imagery; relaxation and music; music; massage and relaxation or music and relaxation; compared music and breathing techniques	Usual care, breathing techniques	Low	There was evidence of lower pain intensity in the latent phase for women receiving music (MD -0.73, 95% CI -1.01 to -0.45). No clear benefit in the active phase (MD -0.51, 95% CI -1.10 to 0.07), no clear benefit in terms of reducing assisted vaginal birth (RR 0.41, 95% CI 0.08 to 2.05) or caesarean section rate (RR 0.78, 95% CI 0.36 to 1.70).	No data	High
McNamara, 2017	112; 3	Chronic obstructive	Singing	Film workshop,	Low	There was a statistically significant improvement	No adverse events or side	High

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		pulmonary disease		handcraft work, and no interventio n		in the SF-36 Physical Component Summary (PCS) score favouring the singing group (MD 12.64, 95% CI 5.50 to 19.77). No difference in dyspnoea or respiratory-specific quality of life.	effects were reported	
Huang 2011	2334; 24	Nocturnal enuresis in children	Hypnosis	No treatment or placebo or another treatment	Low	One trial suggested hypnosis was better than imipramine in the treatment of enuresis. Another trial claimed that children receiving trance or suggestions or a combination of trance and suggestions had better outcomes than waiting list controls. And in one trial, hypnotherapy appeared	Not reported	Moderate

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						to have a higher failure rate than alarm therapy.		
Soares-Weiser 2018	1278; 31	Antipsychotic-induced tardive dyskinesia	Hypnosis or relaxation (8 sessions)	Treatment as usual	Very low	One trial showed (N=15) a benefit in favour of hypnosis or relaxation when compared to TAU in clinic improvement (RR 0.45, 95% CI0.21 to 0.94). But hypnosis was no better compared to relaxation (RR 0.11, 95% CI 0.01 to 1.64)	Not reported	Moderate
Boldt 2014	616;16	Chronic pain in peoplewith spinal cord injury	Self-hypnosis	Electromyography biofeedback relaxation training	N/A	No evidence about self-hypnosis reduces chronic pain	No data	Moderate
Birnie 2018	5550;59	Needle-related procedural pain and distress	Hypnosis	Standard care control	Very low	Hypnosis was efficacious for reducing self-reported pain (n = 5, 176 participants; SMD −1.40, 95% CI	No adverse effect reported	High

| | | | | | | −2.32 to −0.48) and distress (n = 5, 176 participants; SMD −2.53, 95% CI −3.93 to −1.12), and behavioral distress (n = 6, 193 participants; SMD −1.15, 95% CI −1.76 to −0.53), but not behavioral pain (n = 2, 69 participants; SMD −0.38, 95% CI −1.57 to 0.81) | | |
| Abbott 2017 | 928;18 | Recurrent abdominal pain inchildhood | hypnotherapy , guided imagery | usual care, wait-list | Low | There were evidence of greater treatment success postin-tervention (OR 6.78, 95% CI 2.41 to 19.07; Z = 3.63; P = 0.0003) as well as reductions in pain intensity (SMD -1.01, 95% CI -1.41 to - | No adverse effect reported | High |

						0.61; Z = 4.97; P < 0.00001) and pain frequency (SMD -1.28, 95% CI -1.84 to -0.72; Z = 4.48; P < 0.00001)		
Hondras 2005	156;3	Asthma	Chiropractic spinal manipulation	Sham manoeuvre	Moderate	In children there were no significant differences between the groups in the degree of peak expiratory flow change from baseline. In adults with chronic asthma there were no significant differences between the groups in self-rated asthma, lung function, or beta-agonist spray use.	No side-effects were reported	Moderate

Huang 2011	2334; 24	Nocturnal enuresis in children	Chiropractic	No treatment or placebo or another treatment	Low	Active chiropractic adjustment had better results than sham adjustment (RR for failure to improve 0.76, 95% CI 0.60 to 0.95)	Headache, stiff neck and lumbar spine pain in Chiropractic group	Moderate
Rubinstein 2011	6070;26	Chronic low-back pain	Spinal manipulative therapy (SMT)	Inert interventions, sham SMT, all other interventions	Low-High	SMT has a small, statistically significant but not clinically relevant, short-term effect on pain relief (MD: -4.16, 95% CI -6.97 to -1.36) and functional status (SMD: -0.22, 95% CI -0.36 to -0.07) compared to other interventions. There is very low quality evidence that SMT is not statistically significantly	Muscle soreness, stiffness, and/or transient increase in pain. No serious complications.	High

						more effective than inert interventions or sham SMT for short-term pain relief or functional status.		
Rubinstein 2012	2674; 20	Acute low-back pain	Spinal manipulative therapy (SMT)	Inert interventions, sham SMT, all other interventions	Low	No difference in effect of SMT compared to inert interventions, shamSMT, or when added to another intervention	No serious adverse events	High
Proctor 2006		Dysmenorrhoea	High velocity, low amplitude (HVLA) spinal manipulative treatment The Toftness technique ('low-force' chiropractic technique)	Sham manipulation	N/A	One trial indicated a significant difference between active and sham treatment in favour of HVLA manipulation (MD -1.41, 95% CI -2.55 to -0.27). Another one showed	No significant differences in the adverse effects between groups	Moderate

					that pain scores for the HVLA treatment group had not dropped. After three months treatment the sham manipulation participants had significantly lower pain scores (MD 2.20, 95% CI 1.38 to 3.02), however at the six-month follow up there was a significant difference in favour of the Toftness manipulation group (MD - 1.40, 95% CI -2.21 to - 0.59) significantly more than for the sham treatment group after one		

						treatment in one cycle (MD 2.08, 95% CI -3.20 to 7.36).		
Sinopoulou, 2021	30;1	Management of abdominal pain in Crohn's disease and inflammatory bowel disease	Soft non-manipulative osteopathic treatment	No intervention	Very low	There was no clear difference in pain intensity in the osteopathic group when compared to the no-intervention group (MD 0.01, 95% CI −1.81 to 1.83).	N/A	Moderate
Yang 2013	434;6	Pneumonia	Osteopathic manipulative treatment plus routine treatment	Placebo plus routine treatment	Low	Osteopathic manipulative treatment (versus placebo) did notincrease the cure rate or chest X-ray improvement rate. Osteopathic manipulative treatment reducedthe meanduration of hospital stay by 2.0 days	One trial reported that transient muscle tenderness emerged after treatment in two individuals	Moderate

						(mean difference (MD) -2.0 days, 95% CI -3.5 to -0.6). It reduced the duration of intravenous (MD -2.1 days, 95% CI -3.4 to -0.9) and total antibiotic treatment (MD -1.9 days, 95% CI -3.1 to -0.7).		
Liddle 2015	5121;34	Preventing and treating low-back and pelvic pain during pregnancy	Usual prenatal care plus osteopathic treatments in 2-week intervals; usual obstetric care plus Osteomanipulative Therapy	Usual prenatal care plus osteopathic treatments after an 8-week untreated waiting period; usual obstetric care plus	Moderate	OMT added to usual prenatal care improved pain (effect size -7.11; 95% CI -10.30 to -3.93) and functional disability (effect size -2.25; 95% CI -3.18 to -1.32) significantly more than usual prenatal care alone, but not more than usual prenatal care plus	No adverse effects	Moderate

				sham ultrasound		placebo ultrasound (From one study, N=400). OMT significantly reduced pain (68% improvement versus 0%; P < 0.0005) and improved functional disability (28% improvement versus 20% deterioration) over those on a waiting list (From one study, N=57).		
Hawke 2018	1562; 8	Preventing and treating acute respiratory tract infections in children	Oral homeopathic medicinal product	Standard treatments or identical oral placebo	Low	There were no benefit of homeopathic medicinal products compared to placebo on ARTI recurrence or cure rates in children (For prevention OR 1.14, 95% CI 0.83 to 1.57;	Increase in the occurrence of non-severe adverse events in the treatment group	Moderate

						Short-tern cure OR 1.31 favouring placebo, 95% CI 0.09 to 19.54; Long-term cure OR 0.99, 95% CI 0.10 to 9.67)		
McCarney 2004	556; 6	Chronic asthma	Homeopathic dilutions, isopathy	Placebo as adjunctive treatment to usual care	N/A	No trial reported a significant difference on validated symptom scales. There were conflicting results in terms of lung function between the studies.	No serious adverse events	Moderate
Smith 2003	133; 2	Induction of labour	Caulophyllum tablets	Placebo	N/A	There were no differences seen in any of the primary outcome measures	No data	Low
van der Wouden 2017	1650; 22	Cutaneous molluscum contagiosum	Homoeopathic drug calcarea carbonica	Plain sugar globules as a placebo	Low	Homeopathic calcarea carbonica appears to be more effective than	No adverse effects reported	High

						placebo (1 study, 20 participants, RR 5.57, 95% CI 0.93 to 33.54)		
Rada 2010	1373; 16	Hot flushes in women with a history of breast cancer	Single homeopathic remedy, Combination homeopathic remedy (Hyland's menopause), tablet, granule or liquid form homeopathic medicines	Identical-appearing placebo	N/A	There were no significant effects observed in a fouritem profile score that included two self-rated symptom items, an activity of daily living itemand a general feeling of well-being item (mean difference -0.10; 95% CI -4.86 to 4.66). There were no statistical differences among comparisons for the frequency or severity score of hot flushes.	No differences between groups	Low

| Cao, 2016 | 3227; 35 | Acne vulgaris | Wet cupping, wet-cupping therapy and herbal decoction, wet-cupping therapy and acupuncture, wet-cupping therapy combined withherbal medicinal mask, wet cupping,acupuncture, and massage as intervention therapy | Tetracycline, herbal decoction, minocycline, vitamin A acid, viaminate capsule, zincgluconate oral liquid | Low | One trial compared individualised herbal decoction plus wet-cupping therapy with wet-cupping therapy, found no difference (RR 2.33, 95% CI 0.67-8.18). One study compared wet-cupping therapy with externally applied viaminate cream, showed reduction in acne severity score but no difference in remission (RR 5.00, 95% CI 0.26-98.00). Two studies compared wet cupping to tetracycline showed significant remission (RR 2.50, 95% CI 1.31 to 4.77; RR 2.83,95% CI 1.29 to | Black and blue spots on the skin | Moderate |

					6.22). Six trials compared wet-cupping therapy plus acupuncture with western drugs. There were no difference in skin lesion scores and number of participants with remission. One study showed Acne quality of life score was better in cupping plus acupuncture vs. vitamin A cream. One trial showed no difference between wet-cupping therapy plus herbal medicinal mask and viaminate capsulefor remission (RR 1.80, 95% CI0.67 to 4.85). In a study compared wet-		

						cupping therapy, acupuncture, and massage, with zinc gluconate oral liquid; there was significant difference in 'Skin lesion scores' (MD -3.87, 95% CI -6.97 to -0.77); but no difference in remission (RR 4.13, 95% CI 1.00 to 17.04).		
Hough, 2008	106; 3	Reducing respiratory morbidity in infants requiring ventilatory support	Cupping	Contact heel percussion	N/A	There was an increase in the incidence of hypoxaemia and increase in oxygen requirement with cupping when compared to contact heel percussion	N/A	Moderate
Rueda 2011	1592; 15	Improving well-being and quality	Reflexology; 15 to 30-	No interventio	N/A	In one study pre-intervention anxiety	No data	Moderate

| | | of life in patients with lung cancer | minute teaching session on foot reflexology to the partner by a certified reflexologist, an optional 15 to 30-minute foot reflexology session for the partner, and a 30-minute, partner-delivered foot reflexology intervention for the patient | n, Usual care plus 30-minute reading session from their partners | | scores were higher than pre-control time scores and anxiety scores were lower after the intervention than after the control time. The difference in score reduction between control and intervention groups was also significant. Another study showed patients in the reflexology group had 34% reduction in pain from baseline to post intervention compared with a reduction of 2% in controls; | | |

| Cramp 2013 | 11;1 | Fatigue in rheumatoid arthritis | Reflexology massage | Non-specific foot massage | Low | The mean fatigue (Re-flexolgy) in the interven-tion groups was lower, but not sinificant. (SMD -1.24 (-2.59 to 0.11). | Not reported | Moderate |