Smoking frequency, nicotine dependence, and factors related to nicotine dependence during the COVID-19 pandemic

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ABSTRACT

The present study aimed to reveal the frequencies of tobacco smoking and e-cigarette use and factors related to nicotine dependence during the COVID-19 among individuals living in the central district of Burdur, Türkiye. We carried out this cross-sectional, epidemiological study between April and August, 2021. The sample was composed of 660 people selected using the cluster sampling technique. We collected the data using the Fagerstrom Test for Nicotine Dependence (FTND) and a 20-item literature-grounded questionnaire. We then analyzed the data using an independent sample t-test, one-way analysis of variance, and multiple regression analysis. About one-fourth of the participants (23.6%) reported current use of alcohol, while the rates of tobacco smokers and e-cigarette users were 59.7% and 5.6%, respectively. We determined 39.6% to have moderate-level nicotine dependence. Moreover, the participants' FTND scores significantly differed by employment in gender, a paid job, perceived health status, and alcohol use along with smoking (p = 0.003, p = 0.029, p = 0.009, and p = 0.002, respectively). Overall, we concluded that the participants had high frequencies of tobacco smoking and e-cigarette use and an elevated nicotine addiction level during the pandemic.

Key Words: COVID-19, e-cigarette, nicotine dependence, smoking.

INTRODUCTION

Tobacco is a harmful substance of any kind, and there is no safe threshold for exposure to tobacco. It is highly addictive and causes many diseases (e.g., cancer, cardiovascular diseases, respiratory diseases, oral and dental diseases). Unfortunately, tobacco use is still the leading cause of mortality worldwide. The World Health Organization (WHO) reports that more than 8 million people are killed by tobacco use every year. More than 7 million deaths occur among direct tobacco users, while it is the case among second-hand smokers with 1.2 million. More than 80% of the 1.3 billion tobacco users worldwide live in low- and middle-income countries, where the highest rates of diseases and mortality by tobacco use are reported each year (1).

It is well-known that cigarettes are the most popular and frequently used tobacco products. In addition to cigarettes, e-cigarette (electronic cigarettes/vaping devices) use has been getting ahead of traditional cigarettes among the young in recent years. While e-cigarettes are as addictive as conventional ones, they also cause users to inhale chemicals and catch many diseases (e.g., cancer, cardiovascular diseases, and respiratory failures). E-cigarette use is increasing markedly in Italy, Georgia, Latvia, and many other countries, which implies that e-cigarette use, as well as traditional cigarettes, has become a significant public health problem (2).

COVID-19 is a brutal disease, causing various

physiological (e.g., difficulty in breathing, high fever, fatigue, dry cough, and muscle pain) and psychological problems (3). It is often reported that COVID-19, frequently affecting the respiratory tract, is more likely to lead to more severe complications in smokers than non-smokers (4).Moreover, it is emphasized that e-cigarette users have a worsened prognosis of COVID-19, and the way e-cigarette use (i.e., these products repeatedly come into contact mouth and face; users may cough or produce sputum spreading aerosols) contributes to the transmission of the disease (4).

The pandemic is a challenging period where states impose several restrictions and quarantines while people experience socioeconomic problems (e.g., unemployment, closure of workplaces, deaths, etc.) (5). Increased fear and apprehension due to such difficulties may cause changes to smoking behavior (6). However, the relevant literature hosts controversial findings related to smoking behavior during the pandemic. While some studies highlighted increased tobacco smoking during the COVID-19 (6, 7), some others reported that tobacco smoking (8, 9) and e-cigarette use decreased in the same period (8). In the pandemic, some smokers thought of quitting smoking, but the majority did not change their smoking habits (10). Another study also concluded elevated smoking addiction during the pandemic (6) and that almost all of the smoking participants continued to smoke after they were recovered from COVID-19 (11). Ultimately, the common ground of the literature is that all the studies with smokers focused on changes to their smoking patterns. Yet, we aimed to explore smoking frequencies (tobacco and e-cigarettes) and nicotine dependence of individuals living in Burdur during the pandemic. To put it another way, the present study attempted to reveal the frequencies of tobacco smoking and e-cigarette use and factors related to nicotine dependence among individuals living in the central district of Burdur-Türkiye during the pandemic.

Research hypotheses:

1. The participants have a high frequency of smoking during the pandemic.
2. The participants have a high frequency of e-cigarette use during the pandemic.
3. The participants have a high level of nicotine dependence during the pandemic.
4. Some sociodemographic variables affect the participants' nicotine dependence during the pandemic.

2. MATERIALS AND METHODS

2.1. The scope of the research

We carried out this cross-sectional, epidemiological study between April and August 2021 to reveal the frequencies of smoking and e-cigarette use and nicotine dependence of Burdur-located individuals aged 20 years during the pandemic.

2.2. Sample

We calculated the sample size within the target population to be 646 by considering the frequency of occurrence of the investigated phenomenon to be 30%, the confidence interval to be 95%, the significance level to be 0.05, and the design effect to be 2. Just in case, we planned to reach a total of 660 people. Therefore, the sample consisted of 660 people selected using the cluster sampling technique within the target population composed of 74,145 people aged 20 years and over living in the central district of Burdur. The cluster sampling technique is often adopted by the WHO in field research. In addition, the WHO recommends the number of clusters to be at least 30; therefore, we calculated the size of each cluster to be 22 (660/30) (12). Together with the interviewers, we collected the data by home visits. In this procedure, we checked the questionnaire forms for erroneous responses or missing items immediately after the participants filled out the instruments. We did not use the data with missing or erroneous responses and, instead, collected compensation data within the same cluster. Since there were no missing or mistaken responses at the end of the procedure, we included the data of 660 participants in the analysis.

Initially, we could not reach the statistics of the population aged 20 years in neighborhoods of the central district of Burdur. Therefore, we first attempted to extract the statistics pertaining to the total population in the city center and neighborhoods in 2020 (13). Next, considering the percentage of the population aged 20 years and over within the total population (82.5%) (14), we calculated the numbers of individuals aged 20 years and over within the total population and then located these people in neighborhoods. Then, we generated the clusters using a population-weighted systematic method. For this, we computed the sample range by dividing the total population by the number of clusters (74,145 / 30 = 2,471). To avoid initial letter bias, neighborhoods were sorted in stratified alphabetical order, and we calculated cumulative populations in the generated list. There were a total of 476 people aged 20 years and over in the first neighborhood (Akın neighborhood). We then randomly chose a number (342) from a table of random numbers and selected 22 people (the first cluster) starting from the chosen number. Thus, we selected the first cluster from the first neighborhood. In this way, we identified all clusters by adding the sample interval to the cumulative population of the settlement where the previous cluster was located, starting from the first cluster (342 + 2,471 +2,471 …), till reaching the last cumulative population (74,145).

As inclusion criteria, we only recruited those aged 20 years and over, voluntarily agreeing to participate in the study, and being physically and mentally competent to respond to the questions.

2.3. Data collection tools

We collected the data using a 12-item sociodemographic information form, a 20-item literature-grounded survey to measure tobacco smoking and e-cigarette use among the participants (15, 16, 17), and the 6-item Fagerstrom Test for Nicotine Dependence (FTND).

The items about smoking tobacco cigarettes specifically inquire about how cigarettes are obtained, what led the participants to start smoking the most, reasons for smoking, and the health problems caused by smoking. On the other hand, the items about e-cigarette use are oriented to uncover why the participants use e-cigarettes the most, what frequency and how long they have been using e-cigarettes, and how they obtain them.

The 6-item FTND was developed by Heatherton et al. and adapted into Turkish by Uysal et al. (2015). Apart from the "Yes/No" items, the multiple-choice items have three alternatives (0-3). The scores yield three levels of nicotine dependence: low (0-3 points), moderate (4-6 points), and high (≥ 7 points). In other words, higher scores on the scale indicate more intense physical dependence on nicotine. Uysal et al. (2015) calculated its Cronbach's alpha coefficient to be 0.58 (18).

2.4. Data collection

When arriving at a predetermined settlement by the usual means of transport to reach the cluster, we entered the first street in the East-South angle from a familiar checkpoint (square, school, mosque, etc.). The first house was skipped from the left row of the street, and we visited the next one and administered the questionnaire if there were individuals aged 20 and over in that house. Then, in this way, we visited the houses in that cluster until reaching the predetermined number of people aged 20 years and over. If we could not reach the desired number of participants in the first street, we then visited the houses on the clockwise and parallel streets. In the case of apartment blocks, at most two randomly selected flats in each block were included in the cluster.

We collected the data with the help of four interviewers having received postgraduate courses on scientific research and ethics. We handed out the questionnaire booklets to the participants and waited until they completed filling out the forms. Besides, we assisted those with a physical disorder to complete the forms. Each procedure took about 40 minutes.

2.5. Pilot study

We carried out a pilot study for the data collection tools with 20 people selected from a neighborhood out of our sampling locations. Similarly, we collected the data with the help of the same interviewers.

2.6. Data analysis

In the data analysis, we presented the data as percentages and means and performed an independent sample t-test, one-way analysis of variance with post hoc tests (Tukey HSD and Games Howell multiple comparison tests), and multiple regression analysis. In all statistical analyses, we utilized SPSS 25.0 and accepted a p-value < 0.05 to be significant.

3. RESULTS

We found that 62.9% of the participants were males, 51.5% were married, and 39.7% had undergraduate or above education. About one-fourth of the participants (23.6%) reported current use of alcohol, while the rates of tobacco smokers and e-cigarette users were 59.7% and 5.6%, respectively (Table 1). The mean age of the participants was 44.79 ± 19.61 years (Min. = 20.0, Max. = 90.0). In addition, except for those who never smoke and use e-cigarettes, while the mean age of starting tobacco cigarettes was 16.48 ± 5.63 years (Min. = 6.00, Max. = 55.0), it was 23.85 ± 8.45 years (Min. = 13.00, Max. = 49.0) for starting e-cigarettes.

Table 1. Participants' sociodemographic characteristics (N=660)

Sociodemographic Characteristics		n	%
Gender	Male	415	62.9
	Female	245	37.1
Age groups	20-29 years	208	31.5
	30-39 years	97	14.7
	40-49 years	80	12.1
	50-59 years	99	15.0
	60-69 years	85	12.9
	70 years and over	91	13.8
Marital status	Married	340	51.5
	Single	252	38.2
	Divorced/Widow(er)	68	10.3
Educational attainment	Illiterate	22	3.3
	Literate	18	2.7
	Primary school	110	16.7
	Secondary school	75	11.4
	High school	173	26.2
	Undergraduate or above	262	39.7
Perceived monthly income	Low	58	8.8
	Undecided	130	19.7
	High	472	71.5
Having a child(ren)	Yes	395	59.8
	No	265	40.2
Presence of chronic diseases	Yes	206	31.2
	No	454	68.8
Presence of chronic medication	Yes	162	24.5
	No	498	75.5
Alcohol use	Never	319	48.3
	Tried before but could not maintain it	115	17.4
	Currently using	156	23.6
	Quit	70	10.6
Tobacco smoking	Never	152	23.0
	Tried before but could not maintain it	40	6.1
	Currently using	*394*	*59.7*
	Quit	74	11.2
E-cigarette use	Never	564	85.5
	Tried before but could not maintain it	45	6.8
	Currently using	*37*	*5.6*
	Quit	14	2.1
Both tobacco smoking and e-cigarette use	Both	28	4.2
	Only one	375	56.8
	Never	257	38.9

Table 2 presents the participants' smoking characteristics. Accordingly, 95.6% pay for cigarettes, and 69.3% reported a relative addiction to cigarettes. While 76.0% started smoking under the influence of their friends, 51.0% reported current smoking because of psychological problems (e.g., depression, distress). Finally, 35.5% indicated education and informative activities to be the most important tools to prevent smoking (Table 2).

Table 2. Tobacco smokers' characteristics

Smoking Characteristics		n	%
How do you obtain cigarettes? *	From a market or a grocery by paying the fee.	377	9.,6
	From my mother	4	1.1
	From my father	6	1.5
	From my friends	7	1.8
Do you think being addicted to to-bacco? *	Yes	273	69.3
	No	121	30.7
What did affect you to start smoking the most**	Friends	356	76.0
	Family	77	16.3
	Social media	21	4.8
	TV	14	2.9
Does any family member smoke to-bacco? ***	Yes	264	40.0
	No	396	60.0
Why do you smoke tobacco? **	Psychological difficulties such as de-pression, distress	239	51.0
	Other[a]	153	32.7
	Dealing with anger	50	10.7
	Gaining courage	26	5.6
What factor do you think prevents tobacco smoking the most? **	Education and informative activities	166	35.5
	Taxation (price raise)	124	26.5
	Restricting the accessibility of tobacco products	94	20.1
	Other[a]	46	9.8
	Restricting tobacco advertising	21	4.5
	Lowering the minimum legal age of purchasing of tobacco	17	3.6
What health problems do you think smoking causes?****	Asthma, bronchitis, shortness of breath, COPD	43	79.6
	Cardiovascular diseases	6	11.1
	Cancer	3	5.5
	Nervous system diseases	2	3.8
What health problems do you experi-ence when not smoking? *****	Anger and distress	30	37.5
	Headache	24	30.0
	Depression	13	16.2
	Shortness of breath	8	10.0
	Gum pain and canker sores	5	6.3

* The data of 394 participants currently smoking tobacco.
** The data of 468 participants currently smoking tobacco or having quit smoking.
*** The data of the entire sample.
**** The data of 54 participants currently smoking tobacco.
***** The data of 80 participants currently smoking tobacco.
[a] Responses considered "Other" are those of the participants leaving the items missing.

On the other hand, Table 3 demonstrated the participants' characteristics regarding e-cigarette use. While 32.5% reported e-cigarette use to quit smoking, 27.0% use them once for less than half an hour. About half of the participants (43.3%) reported a reduction in their smoking frequency after starting e-cigarettes, and 35.1% quit tobacco smoking while using e-cigarettes. Finally, 62.2% restarted smoking tobacco while using e-cigarettes (Table 3).

Table 3. Characteristics of e-cigarette users

E-cigarette Use Characteristics		n	%
Why do you use e-cigarettes? (Please tick only one option)*	To quit smoking tobacco	12	32.5
	It is less harmful than tobacco	9	24.3
	It is more pleasure-giving and emits less bad odor	6	16.2
	It can be easily used indoors	3	8.1
	It can be used in places where tobacco smoking is prohibited	2	5.4
	It is safer	2	5.4
	Not to disturb others due to tobacco smoking	2	5.4
	It is less costly in the long run	1	2.7
Why do you use e-cigarettes? (You can tick more than one option)*	To quit smoking tobacco	13	17.6
	It is less harmful than tobacco	12	16.3
	To reduce tobacco smoking	10	13.5
	It is less addictive than tobacco	10	13.5
	It is less costly in the long run	9	12.1
	It can be easily used indoors	9	12.1
	It can be used in places where tobacco smoking is prohibited	4	5.4
	Not to disturb others due to tobacco smoking	4	5.4
	It is safer	3	4.1
What frequency do you use e-cigarettes? *	Once for less than half an hour	10	27.0
	Other	8	21.6
	Once for 2-3 hours	6	16.3
	Once for 0.5-1 hours	5	13.5
	Once for 1-1.5 hours	4	10.8
	Twice-four times a day	4	10.8
How long have you been using e-cigarettes? *	Less than 3 months	9	24.3
	3-6 months	12	32.5
	7-12 months	8	21.6
	13 months and over	8	21.6
Do you feel a reduction in the desire to smoke tobacco after using e-cigarettes? *	Yes	15	40.5
	No	22	59.5
Do you have a reduction in tobacco smoking after using e-cigarettes? *	Yes	16	43.3
	No	21	56.7
Do you smoke tobacco while using e-cigarettes? *	Yes	13	35.1
	No	24	64.9
Have you restarted smoking tobacco while using e-cigarettes? *	Yes	23	62.2
	No	14	37.8
How do you obtain e-cigarettes? *	From a market or a grocery by paying the fee.	18	48.7
	From online shopping sites	10	27.0
	From my friends	6	16.2
	Contacting the seller directly/paying at the door	3	8.1

* The data of 394 participants currently using e-cigarettes. ** A total of 74 responses.

In this study, we found the mean FTND score of the tobacco smokers (n= 394) to be 3.84 ± 2.24. Accordingly, we determined that 49.2% of the participants had low-level, 39.6% had moderate-level, and 11.2% had high-level nicotine dependence. Furthermore, there were significant relationships between FTND scores and the smoker participants' gender, employment in a paid job, perceived health status, and alcohol use (p = 0.003, p = 0.029, p = 0.009, and p = 0.002, respectively). Accordingly, the male smokers had significantly higher FTND scores compared to the females. Moreover, those working in a paid job got significantly higher scores on the FTND than the unemployed participants. The smokers with perceived good health status had significantly higher-level nicotine dependence when compared to those with perceived poor health status (p = 0.005). Finally, the smoker participants reporting current use of alcohol had higher-level nicotine dependence than those who never use alcohol (p = 0.003) (Table 4).

Table 4. Tobacco smoker participants mean FTND scores by their demographics

Participants' Characteristics (n=394)		n	FTND M±SD	p
Gender	Male	262	4.08±2.28	[2]<0.003
	Female	132	3.37±2.07	
Employment in a paid job	Yes	303	3.98±2.19	[2]0.029
	No	91	3.39±2.34	
Perceived health status	Poor	39	2.97±1.81	[1]0.009
	Neutral	63	3.47±2.00	
	Good	231	4.12±2.32	
	Very good	61	3.72±2.23	
Alcohol use	Never	181	3.38±2.16	[3]0.002
	Tried before but could not maintain it	64	4.20±2.17	
	Currently using	108	4.31±2.02	
	Quit	41	4.09±2.82	

[1]One-way analysis of variance and TUKEY HSD test, [2]Independent samples t-test, [3]One-way analysis of variance and Games Howell test.

Considering the significance levels of the associations between some characteristics of the participants and their FTND scores, we included the statistically significant variables in the regression analysis. Yet, we had to exclude some variables to avoid the multicollinearity issue in the analysis. Accordingly, we did not include independent variables with high correlations, the variables with low correlation with the dependent variables, and variables with variance inflation factor (VIF) values greater than 3.

Table 5. Results of multiple regression analysis

Variable	FTND				
	Unstandardized B (SH)	Standardized Beta	t	p	95% CI* Minimum / Maximum
Constant	2.309 (0.394)	–	5.861	<0.001	1.534 / 3.083
Gender[1]	0.537 (0.248)	0.113	2.168	0.031	0.050 / 1.025
Perceived Health Status[2]					
Good	1.107 (0.378)	0.244	2.932	0.043	0.365 / 1.850
Alcohol Use[3]					
Tried before but could not maintain it	0.749 (0.318)	0.123	2.355	0.019	0.124 / 1.375
Currently using	0.788 (0.278)	0.157	2.835	0.005	0.241 / 1.334
R=0.28 R^2=0.078 $F_{(4.078)}$=19.273 p<0.001					

*CI: Confidence Interval.

[1]Reference group "female";[2]Reference group "bad", [3]Reference group "never.

The multiple regression analysis revealed that

- when controlling other variables, the mean FTND score of males were 3.66 units higher than females.
- when controlling other variables, those with perceived good health status had 1.107 units higher mean nicotine dependence than those with perceived poor health status.
- when controlling other variables, the participants who tried but could not maintain using alcohol had

0.74 units higher nicotine dependence than those who never use alcohol.

- when controlling other variables, the mean FTND score of those reporting current use of alcohol was 0.78 units higher than that of the participants who never use alcohol.

4. DISCUSSION

The COVID-19 pandemic has brought many changes to almost every domain of life and is still posing adverse impacts on the world (10). The high prevalence of mortality and hospitalization due to COVID-19, as well as socioeconomic difficulties, restrictions, and curfews, have brought undesirable psychological impacts on communities (5). Yet, it is still veiled how the pandemic affects addiction-related behavior. In other words, there is no consensus on whether the pandemic has led to a dependence on tobacco products or a decrease/increase in existing tobacco/nicotine dependence among individuals. On the one hand, it is anticipated that the pandemic has caused various psychological problems (e.g., stress, fear, and anxiety) and increased tobacco dependence (6, 9). Financial difficulties and curfews, on the other hand, are predicted to reduce access to tobacco products. Moreover, it is thought that smoking rates will drop thanks to the increased awareness of smoking-related damages to the respiratory system - the ultimate target of COVID-19, too (9). In the light of controversial assumptions in the literature, this study attempted to unveil the frequencies of tobacco smoking and e-cigarette use and nicotine dependence levels among those residing in a rural city during the pandemic. We found out that 59.7% of the participants still smoke tobacco cigarettes. The previous research in Türkiye reported the prevalence of tobacco smoking to be 32.1% (19) among university administrative staff, 48.8% in municipality staff (15), and 51.8% across the country (20). Although the literature does not suggest any data on smoking frequency in the central district of Burdur, we found smoking frequency to be relatively higher in our

study than in the institution-based studies (university and municipality administrative staff) (15, 19). Our findings were also slightly higher than in population-based research (25 cities in Türkiye) (20). Yet, the low smoking frequency among administrative staff in institutions when compared to the smoking frequency in the community may be associated with the educational, social, economic, and cultural differences between the samples. When comparing our findings with those in the population-based study, the reason for the higher smoking frequency in our study may be attributed to adverse economic, social, and psychological impacts of the pandemic. Moreover, we have no clear information about e-cigarette use in Türkiye. Yet, previous studies reported e-cigarette use to become widespread in our country (17). In the international literature, e-cigarette use was reported to be 3.2% among adults worldwide in 2018 (21). Moreover, it was determined less than 1% in Finland in 2018 (22) and 3.2% in the USA in 2020 (varying between 2.8% and 4.5% by ethnic groups living in the country (23). In this study, we found the frequency of e-cigarette use in the central district of Burdur to be 5.6%. Although we could not make a nationwide comparison, this finding indicates a higher frequency of e-cigarette use compared to the international findings. Ultimately, we can assert that the frequencies of both tobacco smoking and e-cigarette use are pretty high in the central district of Burdur on the study date (the pandemic is still ongoing).

About half of our participants (51.0%) stated that they smoke tobacco due to depression, stress, and hopelessness. The previous research also suggested a link between smoking and anxiety, depression, and hopelessness (24). Moreover, it was previously found that more than half of those seeking treatment to quit smoking suffer from anxiety (24). The research during the COVID-19 pandemic revealed that isolation, new routines, environmental change, financial crises (25, 26), and an increase in depression, anxiety, and stress behavior (27) contribute to smoking behavior. The high level of tobacco smoking (59.7%) among our

participants may be explained by the idea that the COVID-19 period has introduced people to adverse situations (e.g., stress and anxiety).

In a study with e-cigarette users, 65.4% of the participants reported using e-cigarettes to quit smoking, 50.8% used them once for less than half an hour, and 65.3% adopted e-cigarettes for less than a year (17). In the present study, we found the percentages of those using e-cigarettes to quit smoking and those using them once for less than half an hour to be about half of the above-mentioned findings (17), while the number of those adopting e-cigarettes for the last year was less than their counterparts in the study above (17). In studies in different states of the USA, 69.3% (23) and 35.1% (28) of the participants stated using e-cigarettes to quit smoking. Although all the studies included adults, different samples yielded varying results, which may be due to inter-country/region variances in e-cigarette use. After all, one of the striking findings of this study was that the share of e-cigarette users was higher in the pandemic when compared to the results of a similar study in Türkiye (17).

Unfortunately, the national literature lacks research orienting to reveal the frequency of smokers and their nicotine dependence levels within the general population. Yet, there are a plethora of such studies with university students, employees, or patients applying to smoking cessation outpatient clinics. The studies in Türkiye before the onset of the pandemic concluded that 29.1% of healthcare professionals (29) and 44.8% of university students (30) had moderate or high-level nicotine dependence. Besides those performed with individuals, having applied to smoking cessation units before, during COVID-19 revealed 44.7% (31), 65.4% (6), and 71.0% (32) were moderate to high nicotine addicts. In this study, on the other hand, we found 50.8% of the participants to have moderate to high nicotine dependence. A study emphasized that nicotine dependence is expected to be high among individuals applying or considering to apply to a smoking cessation clinic (33). For this reason, it is not surprising that nicotine dependence

is found higher in individuals admitted to smoking cessation clinics (6, 32). However, we concluded higher nicotine dependence among the participants in this study than in a study with patients admitted to smoking cessation clinics (31) and in two other studies in 2019 with healthcare professionals (29) and university students (30). The discrepancy between the findings may stem from that the long-standing COVID-19 pandemic may have contributed to nicotine dependence in the general population. Apart from this belief, nicotine dependence may have been affected by some other variables such as the educational and socioeconomic background of the participants.

In this study, nicotine dependence was high among males, those employed in a paid job, those with perceived good health, and those with current use of alcohol. The previous research found that nicotine dependence is higher among tobacco smokers than e-cigarette users (34) and males compared to females (35). Yet, some other studies could not settle significant associations between nicotine dependence and gender (16, 31), chronic diseases, alcohol addiction, and medication (31). It should be noted that only one study above was carried out at the very onset of the pandemic (31), while the remaining revealed these findings before the pandemic. A mid-pandemic study with smoker participants uncovered that one-third of the participants had to quit their job, and the remaining worked from home. In the same study, almost all of the participants adopted the idea that smokers have a tough time with COVID-19 (3). We found some variables, not found to be associated with nicotine dependence in previous studies, to be related to nicotine dependence, which may be related to changes to dependence levels of people in the face of economic, social, and psychological difficulties during the pandemic.

5. CONCLUSION

Overall, we concluded that the participants had high frequencies of tobacco smoking and e-cigarette use

and elevated nicotine addiction levels during the pandemic. The gender, employment, perceived health status, and alcohol use were the variables associated with nicotine dependence.

Limitations and Directions/Suggestions for Future Research

This study is not free from a few limitations. First, we collected the data only in the central district of Burdur, which is a small, rural city compared to many other cities in Türkiye; therefore, the data to be collected in larger, urbanized cities may yield different findings. Second, we employed a relatively short data collection tool since it was almost impossible to collect face-to-face data during the pandemic. For this reason, the questions were only oriented to reveal the situation during the pandemic (frequencies, characteristics of tobacco smokers and e-cigarette users, and nicotine dependence). Another limitation to the research is the absence of measures with proven validity and reliability in the national literature to measure tobacco smoking or e-cigarette use. Such a limitation mandated us to employ only questions pooled based on the previous literature. Finally, we encountered some other difficulties while collecting the data due to the pandemic (e.g., constant disinfecting of the hands or unwelcomed visits).

We may recommend future studies to reveal the frequency of smoking, specifically e-cigarette use, and explore the reasons for the increase observed in smoking in a wider population. Besides, we recommend performing more comprehensive research to reveal pre- and mid-pandemic smoking behavior stratified with age, gender, and socioeconomic status. Uncovering the type of cigarette (tobacco cigarettes, e-cigarettes), smoking frequency, nicotine dependence, and variables associated with nicotine dependence in adolescent, adult, and older adult groups may contribute to the prevention or cessation of smoking.

REFERENCES

1. World Health Organization. (2021). Tobacco. Available at https://www.who.int/news-room/fact-sheets/detail/tobacco. (Accessed September 3, 2021).

2. World Health Organization. (2020). Summary results of the global youth tobacco survey, in selected countries of the WHO European Region. Available at https://apps.who.int/iris/bitstream/handle/10665/336752/WHO-EURO-2020-1513-41263-56157-eng.pdf?sequence=1&isAllowed=y. (Accessed September 3, 2021).

3. Azulay Chertok, I.R. (2020). Perceived risk of infection and smoking behavior change during COVID-19 in Ohio. Public Health Nurs, 00, 1–9. doi: 10.1111/phn.12814

4. Kashyap, V.K., Dhasmana, A., Massey, A., Kotnala, S., Zafar, N., Jaggi, M., Yallapu Murali, M., & Chauhan Subhash, C. (2020). Smoking and COVID-19: Adding fuel to the flame. Int. J. Mol. Sci, 21, 6581. doi:10.3390/ijms21186581

5. Tönbül, Ö. (2020). Koronavirüs (Covid-19) salgını sonrası 20-60 yaş arası bireylerin psikolojik dayanıklılıklarının bazı değişkenler açısından incelenmesi. Humanistic Perspective, 2 (2), 159-174.

6. Fidanci, İ., Aksoy, H., Yengil Taci, D., Ayhan Başer, D., & Cankurtaran, M. (2021). Evaluation of the effect of the Covid-19 pandemic on smoking addiction levels. J Clin Pract, 75, e14012. https://doi.org/10.1111/ijcp.14012.

7. Yingst, J.M., Krebs, N.M., Bordner, C.R., Hobkirk, A.L., Allen, S.I., & Foulds, J. (2021). Tobacco use changes and perceived health risks among current tobacco users during the COVID-19 pandemic. Int. J. Environ. Res. Public Health, 18, 1795. https://doi.org/10.3390/ijerph18041795

8. Klemperer, E.M., West, J.C., Peasley-Miklus, C., & Villanti, A.C. (2020). Change in tobacco and electronic cigarette use and motivation to quit in response to COVID-19. Nicotine & Tobacco Research, 22(9), 1662-1663. doi:10.1093/ntr/ntaa072

9. Yang, H., & Ma, J. (2021). How the COVID-19 pandemic impacts tobacco addiction: Changes in smoking behavior and associations with well-being. Addict Behav, 119, 106917. doi:

10.1016/j.addbeh.2021.106917

10. Gravely, S., Craig, L.V., Cummings, K.M., Ouimet, J., Loewen, R., Martin, N., Chung-Hall J., Driezen P., Hitchman, S.C., McNeill, A., Hyland, A., Quah, A.C.K., O'Connor R.J., Borland, R., Thompson, M.E., Boudreau, C., & Fong, G.T. (2021). Smokers' cognitive and behavioural reactions during the early phase of the COVID-19 pandemic: Findings from the 2020 ITC Four Country Smoking and Vaping Survey. PLoS One, 16(6), e0252427. doi: 10.1371/journal.pone.0252427

11. Yenibertiz, D., Akıncı Özyürek, B., Şengezer, T., Gökler, E., Söğütlük Dığrak, G., & Koç, F. (2021). Evaluation of changes in the smoking habits of patients with coronavirus disease-19. East J Med, 26(1), 145-150. doi: 10.5505/ejm.2021.62681

12. Güven Tezcan, S. (2017). Temel Epidemiyoloji. Ankara: Hipokrat Kitabevi.

13. Türkiye Nüfusu İl İlçe Mahalle Köy Nüfusları. (2021). Burdur Merkez Nüfusu. Web adresi https://www.nufusune.com/merkez-ilce-nufusu-burdur. (Erişim 16 Şubat 2021).

14. Nüfusu.com. Burdur Nüfusu. (2021). Web adresi https://www.nufusu.com/il/burdur-nufusu#:~:text=Burdur%20n%C3%BCfusu%202020%20y%C4%B1l%C4%B1na%20g%C3%B6re,%2C%20%49%2C78%20kad%C4%B1nd%C4%B1r. (Erişim 16 Şubat 2021).

15. Adıgüzel, İ., Durusoy, R., Çakır, N., Mandıracıoğlu, A., & Öcek, Z. (2018). Smoking prevalence and related factors among workers of Bornova Municipality in Izmir, Turkey. Tob. Induc. Dis, 16(Suppl 3), A59-29. doi: 10.18332/tid/94907

16. Esen, A.D., & Arıca, S. (2018). Sigarayı bırakmak için başvuranlarda nikotin bağımlılık düzeyi ve sosyodemografik özelliklerin değerlendirilmesi. Ankara Med J, 18(3), 328-336. doi: 10.17098/amj.461371

17. Göney, G., Topdemir, A., & Nal, B. (2019). The profile of electronic cigarette users in Turkey. Eurasian Journal of Pulmonology, 21(2), 122-126. http://dx.doi.org/10.4103/ejop.ejop_79_18

18. Uysal, M.A., Öztuna, A., Bahadır, A., Görek Dilektaşlı, A., Karşıdağ, Ç., Horoz A., & İliaz, S. (2015). Psychometric properties of the Turkish version of the Fagerström test for nicotine dependence. Tuberk Toraks, 63(4), 250-256. doi: 10.5578/tt.8878 https://jamanetwork.com/journals/jama/fullarticle/10.1001/jama.2020.1585?utm_campaign=articlePDF%26utm_medium=articlePDFlink%26utm_source=articlePDF%26utm_content=jama.2020.1585

19. Marakoğlu, K., & Ürün Ünal, G. (2019). Prevalence of tobacco use in university public employees and evaluation of their knowledge, attitudes and behaviors on this subject. Anatol J Family Med, 2(2), 58–67. doi: 10.14744/Anatol J Family Med.2019.47965

20. İlhan, M.N., Arıkan, Z., Kotan, Z., Tunçoğlu, T., Pınarcı, M., Taşdemir A., Ay B., & Koçak, N. (2016). Prevalence and sociodemographic determinants of tobacco, alcohol, substance use and drug misuse in general population in Turkey. Arch Neuropsychiatry, 53, 205-212. doi: 10.5152/npa.2015.10050

21. Dai, H., & Leventhal, A.M. (2019). Prevalence of e-cigarette use among adults in the United States, 2014-2018. JAMA, 322(18), 1824-1827. doi:10.1001/jama.2019.15331

22. World Health Organization. (2021). WHO report on the global tobacco epidemic, 2021. Available at file:///C:/Users/USER/Downloads/9789240032095-eng%20(2).pdf. (Accessed September 20, 2021).

23. Mayer, M., Reyez-Guzman, C., Grana, R., Choi, K., & Freedman, N.D. (2020). Demographic characteristics, cigarette smoking, and e-cigarette use among US adults (2020). JAMA Network Open, 3(10), e2020694. doi:10.1001/jamanetworkopen.2020.20694

24. Karaman, S.T., Şimşek, Ç., & Toprak, D. (2019). Anxiety levels and related factors in people who want to quit smoking. Addicta: The Turkish Journal on Addictions, 6 (4), 257-271. http://dx.doi.org/10.5152/addicta.2020.19122

25. Eğribel, E. (2020). Corona sonrası otoriter yeni dünyanın izdüşümü: ev-merkezli güvensiz, güvencesiz anti-toplumsallaşma ve zihinsel, duygusal yoksullaşma. Çocuk ve Medeniyet, 5 (9), 27-43. doi: https://doi.org/10.47646/CMD.2020.197

26. Schnitzer, K., Jones, S., Kelley J.H.K., Tindle, H.A., Rigotti, N.A., & Kruse, G.R. (2021). A Qualitative study of the impact of COVID-19 on smoking behavior for participants in a post-hospitalization smoking cessation trial. Int. J. Environ. Res. Public Health, 18, 5404. https://doi.org/10.3390/ijerph18105404

27. Stanton, R., To Q.G., Khalesi, S., Williams, S.L., Alley, S.J., Thwaite, T.L., Fenning, A.S., & Vandelanotte, C. (2020). Depression, anxiety and stress during COVID-19: Associations with changes in physical activity, sleep, tobacco and alcohol use in Australian adults. Int. J. Environ. Res. Public Health, 17, 4065. doi:10.3390/ijerph17114065

28. Aherrera, A., Aravindakshan, A., Jarmul, S., Olmedo, P., Chen, R., Cohen, J.E., Navas-Acien, A., & Rule, A.M. (2020). E-cigarette use behaviors and device characteristics of Daily exclusive e-cigarette users in Maryland: Implications for product toxicity. Tob. Induc. Dis, 18(November), 93. https://doi.org/10.18332/tid/128319

29. Sözer, Ü., Özvurmaz, S., & Durmaz, S. (2021). Sağlık çalışanlarının sigara bırakmaya yönelik desteğe hazır olma durumu ve ilişkili faktörler. TJFMPC, 15(2), 286-293. doi: 10.21763/tjfmpc.782565

30. Terzi, Ö., Kumcağız, H., Terzi, M., & Dündar, C. (2019). Üniversite öğrencilerinde sigara kullanımı ve nikotin bağımlılık düzeylerinin belirlenmesi. Addicta: The Turkish Journal on Addictions, 6(4), 168-181. http://dx.doi.org/10.5152/addicta.2020.19134

31. Korkut, B., & Sevinç, N. (2021). Bir toplum sağlığı merkezi bölgesinde nikotin bağımlılığı ve etkili faktörler. SDÜ Tıp Fak Derg, 28(1), 137-143 doi: 10.17343/sdutfd.804271

32. Kutlu, R., Demirbaş, N., Yazıcı, T., & Karaoğlu, N. (2021). Sigara içenlerde psikolojik bağımlılığın ve sigara içme isteğinin bırakma başarısı üzerine etkisinin değerlendirilmesi. Selcuk

Med J, 37(3), 231-237. doi: 10.30733/std.2021.01509

33. Fırat, M., Ayran, G., & Kanbay, Y. (2019). Sigara bırakma polikliniğine başvuran bireylerin sigaraya başlama, sigara kullanma ve sigara bırakmayla ilgili özellikleri. Addicta: The Turkish Journal on Addictions, 6(4), 244-256. http://dx.doi.org/10.5152/addicta.2020.19106

34. González-Roz, A., Secades-Villa, R., & Weidberg, S. (2017). Evaluating nicotine dependence levels in e-cigarette users. Addicciones, 29(2), 136-138. doi: https://doi.org/10.20882/adicciones.905

35. Schmidt, A., Neumann, M., Wirtz, M., Ernstmann, N., Staratschek-Jox, A., Stoelben, E., Wolf, J., & Pfaff, H. (2010). The influence of occupational stress factors on the nicotine dependence: a cross sectional study. Tobacco Induced Disease 8(6), 1-6. doi: 10.1186/1617-9625-8-6