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Current Changes in Cigarette Use and Cessation Habits in Patients Admitted in Emergency Department

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Abstract: This study aimed to contribute to the current literature by focusing on admitting to emergency department patients' s habits related to cigarette consumption and general approaches of smoking cessation in 2024's conditions and to test the variables statistically, compare the results with similar studies, and interpret the changes over time. This study included 1996 patients who presented to the emergency department in Binali Yıldırım University Mengücek Gazi Training and Research Hospital over a period of 3 days. Than a questionnaire was applied them. The respective rate of current and former smokers was 28.2% and 12.02%. Smokers were most likely to quit smoking when they had an illness (51.9%), and this was most frequently seen after ≥ 25 years of smoking (70.1%). Total percentage of individuals who quit smoking using Alo171 (smoking cessation phone line), electronic cigarette (E cigarette), medication, applying on KETEM (Cancer Early Diagnosis Screening and Education Unit), nicotine patch as a method was 3.8%. Among current smokers, 63.8% had never attempted at to quit smoking. Comparing the results of the present study with that of similar studies, the current smoking rate was similar. Although $\frac{1}{2}$ pack/day cigarette use is more prevalent in most studies, one pack/day was the most frequent amount in this study. There was no difference based on the maximum age range of smoking initiation but it peaked twice in this study. The smokers tended to quit smoking after falling ill, whereas similar studies have reported to decide to and suddenly quit smoking was the most common. The rate of cessation attempts was consistent, but the number of participants who considered quitting smoking was lower. The proportionally high tendency to quit smoking after becoming ill and the lower percentage of participants who planned to quit smoking suggested that it might be useful to increase awareness-raising activities and smokers should be encouraged to use helper methods. ©2025 NTMS.

Keywords: Emergency Department; Smoking Habits; Smoking Cessation.

1. Introduction

Smoking addiction is considered a serious public health problem. According to World Health Organization (WHO) data, globally there are approximately 1.1 billion smokers (21%) aged ≥ 15 years in 2016, and projected prevalence in 2025 for both sexes is 19,1¹.

Previous studies have reported that smoking rates were decreasing in developed countries and increasing in developing countries ². Relevant research indicates that 750000 children and young individuals, respectively, start smoking every year in Türkiye ³. Moreover, cigarettes hold a higher addiction potential than any

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other substance consumed at any age because of its nicotine content. It was reported that the risk of heart attack in smokers decreased by 50% at 1 year of smoking cessation and the risk of cancer decreased by 50% at 10 year ⁴. Therefore, it is essential that one should not start smoking at all, and if they do, they should quit as soon as possible. Smoking cessation significantly reduces the risk of mortality associated with smoking-related diseases. Previous studies have reported that approximately 70% of smokers already considered smoking cessation and 80% of smokers tried to quit smoking at some point in their lives ⁵. Most smokers try to quit smoking without help, and even if they succeed, many of them start smoking again after a short period of time ⁶. Therefore, adjustments to personal and familial factors that lead to continued tobacco use, a global struggle, accompanied by psychological and pharmacological treatments can ensure more successful outcomes. In 2009 and in 2018, 51.7% and 61.7% of adult smokers, respectively, quit smoking with a rising trend in the United States (US) ⁷. Many strategies can be used to quit smoking, including nicotine replacement therapy in the form of patches, gum, inhalers, and nasal sprays; approved drug therapies, such as bupropion, cytisine, and varenicline; E cigarettes, which are especially preferred over smoking cessation in recent years; and behavioral counseling. Nevertheless, most people who try to quit smoking do so without help and only 3%–6% succeed in the long term. It has been suggested that a combination of behavioral counseling and medication, such as bupropion, is more effective than either intervention alone ⁸. The rate of unassisted cessation attempts in the US has declined from 91.8% in 1986 to 52.1% between 2006 and 2009, and more smokers appear to be turning to help. The most prevalent unassisted method is to make a decision and then suddenly quit the habit. Recent research reported that two-thirds of smokers who quit smoking used an unassisted decision-making method and found it helpful ⁹.

2. Material and Methods

In this study, 1996 patients who presented to the Binali Yıldırım University Mengücek Gazi Training and Research Hospital's emergency department over a period of 3 days and were able to express themselves and gave written consent were included based on the calculations using a statistical software package program G*Power 3.1.9.4, which indicated that a sample size of approximately 500 current smokers was required. After the number of approximately 500 smokers was reached, a questionnaire was applied to the sample group by the study manager. As per exclusion criteria, patients who did not give consent, were unable to answer the questionnaire due to their general medical status, did not have a level of comprehension to respond the questions, and did not speak Turkish language were excluded from the study. The questionnaire items were asked by the study administrator. The answers obtained from the

respondents to the open-ended questions were consolidated and reflected in the results in percentage. The Statistical Package for the Social Sciences software version 25.0 was used for statistical analyses. Ethics committee approval was obtained from *** University prior to the commencement of the study (2024).

3. Results

In the sample group there were a total of 803 smokers, including current (563) and former smokers (240). Among the participants, 1193 patients were nonsmokers. The rate of smokers was 28.2%. The most common age of initiation was 10–15 years of age (31.5%). Regarding the amount of smoking per day, one pack per day was the most common (48.3%). Smoking was most prevalent in the 31–45 age group at a rate of 27.7%. Of 563 patients who were still smoking, 36.2% (204) had tried to quit smoking at least once and failed, whereas 63.8% had never desired to quit smoking and did not attempt to quit the habit. When asked about how they quit smoking, former smokers reported that they most often quit smoking when they became ill (51.9%). When the patients who could not quit smoking were asked about the reasons why they could not quit smoking, 28.7% responded “I have no willpower,” 28.8% stated that they could not quit smoking due to psychological reasons, such as “I am alone,” “I have psychological problems,” “I get depressed when I quit,” and “I am stressed”; and 12.3% responded that they believed that they could quit smoking whenever they wanted.

Table 1: Smoking initiation rates based on age ranges.

Value	Number	Percent (%)
<10 years	30	3,7
10-15 years	254	31,5
16-18 years	174	21,7
19-25 years	242	30,2
>25 years	103	12,9
Total	803	100

The rate of those who previously used any method to quit smoking was 3.8%. The most commonly used additional method was drug treatment at a rate of 58.8%. All respondents who used additional methods reported that they did not benefit from them. Participants who tried to quit using medication discontinued the treatment for multiple reasons, including nausea and not getting used to the medication. Among the former smokers, 70.1% smoked for at least 25 years or more before quitting. In the smokers group there were 204 (36.2%) smokers who had tried to quit and 359 (63.8%) who had never tried. There were a total of 443 people who tried to quit smoking and 241 (54.4%) former smokers who previously tried to quit smoking and succeeded. When former smokers were excluded, smoking cessation success was 22.1%.

Table 2: Percentages of the responses who succeeded smoking cessation based on how they did it.

Value	Number	Percent (%)
Suddenly	98	40,7
Decided and quit smoking	6	2,5
Quit by smoking less	125	51,9
Quit upon illness	2	0,8
Quit after Hacc (Islamic pilgrimage)		
Quit due to smoking	7	2,9
nuisance	1	0,4
Quit after pandemics	2	0,8
Due to pregnancy	238	100
Total		

Table 3: Reasons why smokers cannot quit smoking.

Value	Number	Percent (%)
I can quit over time by reducing	14	6,9
I can quit whenever I want	11	5,4
I get depressed when I quit	8	4
I don't have the willpower	58	28,7
I don't want to quit	3	1,5
I'll gain weight when I quit	3	1,5
I don't want to be deprived of this pleasure	12	5,9
I have psychological problems	7	3,5
I have social problems	7	3,5
I suffer from withdrawal syndrome	7	3,5
I am alone	1	0,5
Because of stress	42	20,8
I don't fully believe that I have to quit	4	2
I quit only to start over	18	8,9
I'm just a social smoker	7	3,5
Total	202	100

Table 4: Methods used to quit smoking.

Value	Number	Percent (%)
Alo171	2	11,8
Electronic cigarette	1	5,9
Medication	10	58,8
Applying to KETEM	2	11,8
Nicotine patch	2	11,8
Total	17	100

Table 5: Results on the years until smoking cessation.

Value	Number	Percent (%)
<1	1	0,4
1-5 years	5	2,1
6-10 years	12	5,0
11-15 years	14	5,8

16-20 years	17	7,1
21-25 years	23	9,5
>25byears	169	70,1
Total	241	100

Table 6: A distribution of smoking based on age ranges.

Value	Number	Percent (%)
18-25 years	101	17,9
26-30 years	56	9,9
31-45 years	156	27,7
45-50 years	69	12,3
51-60 years	93	16,6
>60 years	88	15,6
Total	563	100

4. Discussion

Given that studies on smoking addiction should be conducted frequently and regularly. WHO recommends the use of a standard method in all countries to monitor the status of chronic disease risk factors within countries and to compare data between countries; thus, they have established the WHO STEP wise surveillance manual. It is also recommended that the questionnaires should collect data on the frequency of current smokers based on sex and age, the age of smoking initiation, and the number of packs/day of cigarettes smoked ¹⁰. In Türkiye, relevant surveys are carried out every four years under the supervision of the Ministry of Health. Furthermore, there have been studies on smoking addiction using different criteria and including various sections of society. Nevertheless, there are few studies that reflect the general population with comparable criteria and suggest changes based on repeated studies over time. Given that emergency departments provide access to a large and demographically diverse population, including uninsured patients, they may prove to be ideal sites for investigating smoking addiction in relation to public health. So this study aimed to investigate the current changes in smoking habits based on current data and develop a source for future research for similar studies based on a survey in an emergency department setting.

Current smokers constituted 28.2% of the study group in the present study. A previous study (2007) reported the prevalence of smoking as 50.3% in men, 12.1% in women, and 30.3% in total ¹¹. Another study (2023) applied an addiction scale to university students and

found that 31% of the students who scored above 39 points were defined as addicted to smoking ¹². Based on

the Ministry of Health's 2018 antitobacco activity report, the prevalence of tobacco product use in Türkiye decreased from 31.2% in 2008 to 27.1% in 2012, and as of 2010, the rate of current smokers in Türkiye was 29.5%, with a rate of 43.5% among men ¹³. The prevalence of tobacco product use, which was reported as 32.5% in 2014, was 31.6% in 2016, and this rate decreased to 30.6% according to a 2018 Türkiye Health Survey. Upon a review of previous studies, smoking rate was approximately 30%, which was consistent with the results of the present study, and there was no significant change in today's conditions in terms of smoking addiction. A similar study of patients admitted to a chest diseases outpatient clinic reported that 33% (218) out of 659 patients were smokers, 28% (183) were former smokers, and 39% (258) never smoked. In the above study, 61% were directly exposed to smoking, which was higher than 40.22% observed in the present study. This may be due to the fact that this study included patients visiting to the chest diseases outpatient clinic ¹⁴. Furthermore, in the above study, the rate of smokers under the age of 50 was significantly higher ($p = 0.0001$), consistent with the results of the present study. The highest rate of smoking was in patients aged 31–45 years with a rate of 27.7% in the present study (Table 6). The age at smoking initiation was mostly observed between the ages of 10–15 years with a rate of 31.5% and peaked twice, between the ages of 10–15 years and 18–25 years in the present study. (Table 1) Another study reported that the

mean age at smoking initiation was 17.7 ± 2.8 years¹⁵. A 2024 study found that 71.9% of the sample group started smoking after the age of 16 years¹⁶. Similar studies reported that almost all smoking habits started before the age of 30 years¹⁷. In a 2014 study with factory workers, the prevalence of smoking was 38.0% and the mean age at initiation was 18.82 ± 4.01 years. Studies conducted in Türkiye and abroad, indicate that most of the smokers started smoking before the age of 20 and that the average age of smokers is gradually decreasing. Similar results were obtained in the present study and the mean age at initiation of smoking was 18.82 ± 4.01 years. Furthermore, the rate of smoking initiation under the age of 10 years was 3.7%, and there was an increase in smoking initiation in the age range of 19–25 years in the present study. A study reported that 60.5% of the participants smoked an average of 11 or more cigarettes a day¹⁸. In the present study, the most frequently reported amount of packs per day was one pack/day (48.3%). This rate was higher than those in other studies.

Another study on smoking cessation reported that 86% of smokers wanted to quit, 25% tried and failed to quit, and 49% quit only to start over. In the light of these results, it was concluded that a large proportion of smokers wanted to quit smoking but could not achieve this without professional help¹⁴. Previous studies reported that approximately 70% of smokers considered smoking cessation and 80% tried to do so at some point in their lives¹⁹. The rate of those who stated that they wanted to quit smoking was 63.2% and of those who stated that they tried to quit smoking was 68.4%¹⁸. WHO reported that approximately 70.0% of smokers were willing to quit smoking, whereas 30.0% of them tried to quit, yet 3%–5% succeeded²⁰. In the present study, 204 out of 563 patients (36.2%) who were still smoking tried to quit smoking at least once and 63.8% had never attempted to quit smoking. A 2023 study on medical students reported that 59.3% of current smokers wanted to quit, and only 20.7% of students who tried to quit smoking sought professional help²¹. This rate is indicative of a lower desire to quit smoking in our study than those in other studies. This low rate compared with international studies may be due to the fact that cigarettes are seen as a normal consumption item to a certain extent in Türkiye and that there is a positive relationship between social welfare level and cigarette consumption; however, it may also indicate a deficiency in terms of attempts to raise awareness. The public's misperception of smoking risk is one of the factors affecting quitting rates²². A US study reported that 50% of smokers underestimated the possibility of lung cancer caused by smoking and at least half of them believed that exercise would eliminate the harmful effects of smoking⁴. In a Turkish study, the rate of smoking cessation success at 12 months was reported as 37.4%, and in most studies, it was seen that cessation success at the end of one year varied between 21%–48%. A previous study reported that the rate of long-term success in smoking cessation

was 20.5%²³. In the present study, the rate of success in smoking cessation was 22.1%, which was consistent with previous reports, indicating neither higher nor lower rates of success than that in previous studies.

In the US, the most frequent way to quit smoking is to decide and quit with a rate of 2/3, whereas in the present study, the most common tendency was to quit smoking when ill. Moreover, making a decision and suddenly quitting ranked second in frequency. (Table 2) Among the participants, 82.6% of those who tried to quit smoking reported that they had already tried to quit on their own without using any method¹⁸.

Long-term smoking behavior further increases dependence because of the increased amount of cigarettes consumed, leading to a higher rate of unsuccessful quitting attempts. The longer the duration of use, the more difficult it is to quit smoking, and resulting in mid-life mortality²⁴. The fact that 70% of those who quit smoking had smoked for at least 25 years in the present study supports the above suggestion. (Table 5) Furthermore, the age at smoking initiation is considered an important factor in determining the degree of nicotine dependence²⁵. In the present study, when asked why they could not quit smoking, users most frequently reported that they could not quit smoking because of lack of willpower and stress. It was also seen that the patients had a belief that they could quit smoking whenever they wanted to or that they would quit anyway by reducing consumption over time. (Table 3) This may have been an obstacle to smoking cessation attempts. Other similar studies reported that similar thoughts that prevented people from quitting smoking, such as “I will gain weight,” “I like smoking,” “I cannot quit even though I want to,” “I will quit in the future,” and “I am only harming myself by smoking,” were factors suggesting the reasons for individuals to continue smoking²⁶. Despite this, 28.8% of the participants reported psychological reasons in the present study.

There were only 17 participants who used additional methods (3.84%). The smokers most often turned to medication as an additional method. Nevertheless, patients responded that the drugs had unpleasant side effects; thus, they discontinued the treatment. (Table 4) The rates of assisted methods were considerably lower than those in international studies. Only 5.9% of users tried E cigarettes as a smoking cessation method. This rate was also low compared to international studies. In the U.S., it is estimated that around one quarter of smokers use pharmacologic treatments such as nicotine replacement therapy and bupropion when attempting to quit²⁷. Although electronic cigarette use has not been recognized as an approved method for smoking cessation, it is widely used for this purpose. Studies on US adults, reported that approximately 2.8%–3.2% were current electronic cigarette users and also used cigarettes²⁸. In the present study, although the number of participants who tried to quit smoking by additional methods was low compared to other studies, the number of those who used E cigarettes for this purpose

was also low. This may be indicative of the fact that E cigarette habits are relatively low.

5. Conclusion

Türkiye is considered one of the most successful countries across the world in the field of tobacco control ²⁹. There may not be sufficient numbers of individuals who want to quit smoking thus, the number of initiatives aimed to correct perceived risk of smoking should be increased. Emergency departments can be considered as centers that can be included in addiction follow-up, prevention and cessation studies for public health because of the high number of emergency department visits by all patient groups. Therefore, smokers should be encouraged to use adjunctive methods and doubts about their benefits should be dispelled through public education.

Limitations of the Study

There are only a limited number of similar studies that can be used for comparison. Because the number of studies conducted domestically was low and the existing studies did not meet similar criteria. And the present study was conducted in a single center. It would be more beneficial to conduct multi-center studies involving larger populations in the future.

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Conflict of Interests

The authors declare that there is no conflict of interest and this study was conducted without any commercial or financial relationships that could be construed as a potential conflict of interest.

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Ethical Approval

The study was approved Binali Yıldırım University Mengücek Gazi Training and Research Hospital.

Data sharing statement

All data underlying the results are available as part of the article and no additional source data are required.

Consent to participate

No consent to participate is required for this study.

Informed Statement

No informed statement is required for this study.

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Post-COVID-19 Sleep Quality and Its Determinants in Geriatric Patients: A Cross-Sectional Analysis

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Abstract: This study explores sleep quality in older adults who previously tested positive for COVID-19, examining key factors that may affect it. As the pandemic has posed unique health challenges, understanding these sleep disturbances is particularly relevant for elderly individuals. A total of 121 participants aged 65 and above with a history of COVID-19 were included. Sleep quality was measured using the Pittsburgh Sleep Quality Index (PSQI), along with an analysis of demographic, clinical, and biochemical data. The average age of participants was 72.2 years, with poor sleep quality observed more frequently in women (72.1%, $p = 0.004$). A lower level of education was linked to worse sleep quality ($p = 0.029$). Anxiety disorder ($OR = 6.380$, $p = 0.006$) and restless legs syndrome ($OR = 4.605$, $p = 0.002$) were among the main factors impacting sleep. Additionally, low haemoglobin levels and the use of sleep medications were associated with poor sleep quality ($p = 0.011$). Findings suggest that anxiety, restless legs syndrome, low haemoglobin, and hypnotic drug use contribute to poor sleep quality in older adults. Addressing these factors could support better sleep and overall well-being in this population. ©2025 NTMS.

Keywords: COVID-19; Geriatric Patients; Sleep Quality.

1. Introduction

COVID-19 has been the world's first virus detection in Wuhan, China. The virus has spread rapidly worldwide and has become a global problem. The World Health Organization (WHO) has named this disease COVID-19 on the 30th of January 2020. The COVID-19 infection is highly contagious and can cause severe respiratory infections. The COVID-19 virus belongs to the family of beta coronaviruses, such as the Middle East Respiratory Syndrome (MERS) and Severe Acute

Respiratory Syndrome (SARS) viruses¹. According to data released by the WHO in January 2024, more than 774 million COVID-19 cases and more than 7 million deaths have been reported². The COVID-19 pandemic has caused severe mortality and morbidity worldwide. While many patients experience the infection with mild to moderate symptoms, some may develop a condition called 'Long COVID', in which the symptoms are more prolonged³. These patients have fatigue, weakness,

shortness of breath, cardiovascular pathology and sleep disturbances⁴. The importance of 'Long COVID' in treatment approaches has increased as researchers better understand its physiological mechanisms post-COVID-19 pandemic⁵.

COVID-19 infection can cause immune system cells to move, interact with nerve endings and affect the brain differently. In this case, the peripheral immune system may be affected by the uncontrolled release of cytokines from the immune system. REM and NREM sleep phases may be affected, and various sleep problems may occur⁶. The function of the immune system is directly related to sleep and mental health. An excellent immune system must do its job against viral infections for good quality sleep. The relationship between immune cells and central nervous system (CNS) neurons is complex. Tumour necrosis factor- α (TNF- α) and interleukin-6 (IL-6) are essential in the sleep immune system. IL-6 increases energy expenditure in catabolic events and has a pro-inflammatory function in the immune system. TNF- α is involved in immune response and cell death^{7,8}. With increased inflammation in the human body, the immune system may deteriorate, leading to further deterioration in sleep quality, especially in the elderly⁹.

Social isolation during the COVID-19 pandemic has negatively affected the elderly. The impact of social isolation on sleep quality and mental health in the elderly following the pandemic was assessed using the International COVID-19 Sleep Study (ICOSS), revealing significant findings⁵. In the ICOSS study, a negative situation was observed in the sleep quality of people with the evening-type chronotype, which showed that it negatively affected the quality of life and mental health of elderly people^{5,10}.

Studies have found a severe deterioration in quality of life and sleep quality in elderly individuals after the pandemic compared to their previous lives^{11,12}. After the pandemic, sleep quality in the young population is negatively affected, especially in individuals who adhere to social distancing rules¹³. Studies on sleep quality after the pandemic in elderly individuals remain limited. The relationship between chronic disease and sleep in elderly patients is of concern, given the severe relationship between sleep quality and general health and psychosocial status. During the COVID-19 pandemic, social isolation policies significantly decreased sleep quality in elderly people^{14,15}.

This study aims to clarify the detrimental alterations in sleep quality within this demographic by evaluating the influence of clinical and biochemical markers on sleep quality in the elderly post-COVID-19 pandemic. This study aims to contribute to the formulation of sustainable health strategies for at-risk older populations during future pandemics. The fact that most participants had experienced COVID-19 more than 18 months earlier lends a distinctive clinical relevance to our findings, reflecting the persistent burden of long COVID. Given the limited evidence focusing on this extended period in older populations,

our study provides a novel contribution by highlighting the enduring impact of long COVID on sleep quality in the elderly.

2. Material and Methods

2.1. Study Design

Our study was conducted between September 2022 and March 2023 on patients aged 65 and older who applied to the Internal Medicine Outpatient Clinic of Erzurum Medical Faculty Hospital.

2.2. Study Population

Patients aged 65 years and older who had COVID-19 infection during the COVID-19 pandemic and presented to the outpatient clinic with a positive PCR test were included in the study. Exclusion criteria for our study:

Patients were excluded if they had primary sleep disorders (insomnia, hypersomnia, parasomnia), were undergoing hemodialysis, had severe auditory or visual impairments, suffered from acute infections, or had advanced neuropsychiatricmotor disorders.

2.3. Socio-demographic Profiles and Clinical Characteristics

Data were obtained both from the hospital database and directly from the patients. The socio-demographic data recorded included age, gender and marital status. Educational status was categorised into three categories: illiterate, primary, and high school. Type of COVID-19 treatment (outpatient, inpatient or intensive care), time since COVID-19 infection, presence of systemic diseases, psychiatric conditions (such as anxiety disorder, depression, psychotic disorder), day time sleepiness and intrinsic sleep disturbance factors (such as pain, caffeine consumption, restless leg syndrome) were evaluated. The use of sleep medications and polypharmacy (use of five or more medications) were also taken into account. In addition, patients underwent a comprehensive chest and general physical examination for symptoms such as cough and shortness of breath. Urinary and fecal incontinence was assessed, and weight loss of more than 10% in the previous six months was recorded. Body mass index (BMI) was calculated according to the standard formula.

2.4. Biochemical and Other Analyses

Venous blood samples were collected from each patient in the morning after a fasting period of at least eight hours. Serum analyses included glycated haemoglobin A1c (HbA1c, 4-5.6%), creatinine (0.5-1.1 mg/dL for women, 0.6-1.3 mg/dL for men), low-density lipoprotein (LDL, <100 mg/dL), triglycerides (<150 mg/dL), total cholesterol (<200 mg/dL), alanine aminotransferase (ALT, 7-35 U/L for women, 10-40 U/L for men), aspartate aminotransferase (AST, 8-30 U/L for women, 10-40 U/L for men), albumin (3.5-5.0 g/dL), ferritin (15-150 ng/mL for women), 30-400 ng/mL for men), thyroid stimulating hormone (TSH,

0.4-4.0 mU/L), vitamin B12 (200-900 pg/mL), C-reactive protein (CRP, <1 mg/dL), D-dimer (<0.5 µg/mL), lymphocytes (1,000-4,800 cells/µL), neutrophils (2,500-8,000 cells/µL), white blood cells (WBC, 4,000-11,000 cells/µL), haemoglobin (Hb, 12.0-15.5 g/dL for women, 13.5-17.5 g/dL for men) and platelets (PLT, 150,000-450,000 cells/µL). The glomerular filtration rate (GFR) was calculated using the Cockcroft-Gault formula, with a coefficient of 0.85 for female patients. The normal range was subsequently determined to be >90 ml/min/1.73m². Oxygen saturation (SaO₂) was measured with a pulse oximeter attached to the patient's index finger. Three validated assessment tools were employed in the study: the Pittsburgh Sleep Quality Index (PSQI), the Geriatric Depression Scale (GDS) and the Beck Anxiety Inventory (BAI).

2.5. Pittsburgh Sleep Quality Index (PSQI)

The objective of this 19-item questionnaire is to assess sleep quality and seven primary sleep-related components. The Pittsburgh Sleep Quality Index (PSQI) comprises seven components: subjective sleep quality, time to sleep onset (sleep latency), total sleep time, habitual sleep efficiency, sleep disturbances, use of sleep medications and daytime dysfunction. Each component is assigned a score between 0 and 3, with a total score ranging from 0 to 21. A higher score indicates a lower quality of sleep. A total score above 5 indicates a significant impairment in sleep quality¹⁶. A total score above 5 indicates a significant impairment in sleep quality, a threshold validated in older populations¹⁴.

2.6. Geriatric Depression Scale (GDS)

The instrument comprises 30 items, each answered in the affirmative or the negative. A score of '1' is assigned to responses indicating the presence of symptoms consistent with a depressive disorder. In contrast, a score of '0' is assigned to responses indicating the absence of such symptoms. The full range of possible scores is from 0 to 30. A total score between 0 and 9 is indicative of a normal state of mental health, while a score between 10 and 19 suggests the presence of mild depression. A score between 20 and 30 is indicative of severe depression¹⁷.

2.7. Beck Anxiety Inventory (BAI)

The scale comprises 21 items, each rated from 0 to 3 according to symptom frequency. Total scores range from 0 to 63, with higher scores denoting greater anxiety severity. Anxiety is classified into four levels: minimal (0-7), mild (8-15), moderate (16-25), and severe (26-63)¹⁸.

2.8. Statistical Analysis

Statistical analyses were conducted using Jamovi (version 2.6, R 4.4 based) following Navarro and Foxcroft (2024) (<https://www.jamovi.org>).

A significance threshold (p-value) of 0.05 was applied. For continuous variables, descriptive statistics were reported as either mean and standard deviation or median with interquartile range (25th to 75th percentiles) based on the data distribution. For categorical variables, descriptive statistics were expressed as numbers and percentages.

The Shapiro-Wilk test assessed normality; the Student's t-test was used for normally distributed data comparisons, and the Mann-Whitney U test for non-normally distributed data. Fisher's Exact test evaluated categorical variables, and the likelihood ratio test was used when assumptions were not met. Binary logistic regression was performed on significant variables identified through univariate analysis, followed by multivariate binary logistic regression.

Sub-factor significance levels of the PSQI were examined using random forest analysis, and marginal effects on sleep quality were analysed by assessing feature contributions.

A priori sample size considerations were based on the assumption of detecting medium effect sizes in the relationship between sleep quality and clinical/psychiatric variables. Using proportions observed in the literature and confirmed in our cohort (e.g., anxiety disorder prevalence of approximately 18% in poor sleepers vs. 3% in good sleepers), a total sample of 120 participants was estimated to provide >80% power at a two-sided significance level of 0.05. Our final sample of 121 participants therefore exceeded the minimum requirement, ensuring sufficient statistical power to detect clinically meaningful differences.

3. Results

This study analysed 121 participants based on their sleep quality using the PSQI. A total of 61 participants were identified as having poor sleep quality (PSQI > 5) and were thus classified as belonging to the PS group. In contrast, 60 participants were classified as having good sleep quality (PSQI ≤ 5) and were thus included in the GS group.

The mean age of the participants was 72.2 ± 6.2 years, with no significant age difference between the groups (p = 0.131). However, there was a significant gender disparity, with women comprising a larger proportion of the PS group (72.1%), p = 0.004.

The GS group had a more balanced gender distribution with a slight male predominance (53.3%). Educational levels also differed significantly between the groups (p = 0.029), with 60.7% of the PS group being illiterate compared to 38.3% in the GS group. Higher education, especially high school graduation, was associated with better sleep quality. Although 86.8% of the sample was married, marital status did not significantly impact sleep quality. The analysis revealed no statistically significant differences in marriage or divorce rates between the PS and GS groups (p = 0.330) (Table 1). Body mass index (BMI) levels were similar across the

groups (median BMI: 29.0 kg/m² in PS vs. 28.0 kg/m² in GS, $p = 0.408$). Most participants were either overweight or obese, with no significant differences in BMI distribution between the two groups. A high prevalence of comorbidities was observed, with 96.7% of the sample exhibiting at least one additional medical condition. The most prevalent conditions were hypertension (67.8%) and type 2 diabetes mellitus (57.9%), with no significant between-group differences observed for either condition ($p = 0.518$ and $p = 0.794$, respectively).

The prevalence of chronic obstructive pulmonary disease (COPD) was higher in the PS group (26.2% vs. 15.0%, $p = 0.125$) compared to the GS group. Conversely, the prevalence of coronary artery disease was higher in the GS group (35.0% vs. 23.0%, $p = 0.143$). However, neither of these differences reached statistical significance.

The prevalence of psychiatric disorders was significantly higher in the PS group (41.0%) compared to the GS group (13.3%, $p < 0.001$), particularly anxiety disorders (18.0% in PS vs. 3.3% in GS, $p = 0.006$). Furthermore, the prevalence of depression was higher in the PS group (23.0% vs. 10.0% in GS), although this difference did not reach statistical significance ($p = 0.052$). Restless Leg Syndrome was significantly more prevalent in the PS group (29.5% vs. 8.3%, $p = 0.002$). Additionally, internal sleep disruptors such as pain were more frequently reported in the PS group (60.7% vs. 46.7%, $p = 0.122$), though this difference was not statistically significant.

The utilisation of hypnotic medications was markedly higher in the PS group (23.0%) in comparison to the GS group (1.7%, $p < 0.001$). Additionally, sedative use was more prevalent in the PS group (18.0%, $p < 0.001$), whereas the administration of anxiolytics and antidepressants was more common, although these discrepancies were not statistically significant.

Table 1: Comparison of the socio-demographic between the "poor sleepers" (PS) and "good sleepers" (GS) as assessed by the Pittsburgh Sleep Quality Index.

	Overall (n=121)	Group PS (n = 61) (PSQI>5)	Group GS (n = 60) (PSQI≤5)	p
Age (year) (mean ± SD)	72.2 ± 6.2	73.0 ± 7.1	71.3 ± 5.1	0.131
Sex (n(%))				0.004
Female	72 (59.5)	44 (72.1)	28 (46.7)	
Male	49 (40.5)	17 (27.9)	32 (53.3)	
Educational status (n(%))				0.029
Illiterate	60 (49.6)	37 (60.7)	23 (38.3)	
Primary	41 (33.9)	19 (31.1)	22 (36.7)	
High school	14 (11.6)	3 (4.9)	11 (18.3)	
University	6 (5.0)	2 (3.3)	4 (6.7)	
Marital status (n(%))				0.330
Single	1 (0.8)	0 (0.0)	1 (1.7)	
Married	105 (86.8)	55 (90.2)	50 (83.3)	
Divorced	15 (12.4)	6 (9.8)	9 (15.0)	

PSQI: Pittsburgh Sleep Quality Index, SD: standard deviation.

Day time sleepiness was not significantly different between the PS and GS groups ($p = 0.516$) and affected 44.6% of participants.

However, the PS group exhibited a significantly higher risk of falls (57.4% vs. 36.7% in GS, $p = 0.022$). Cough (45.9% in PS vs. 28.3% in GS, $p = 0.045$) and urinary incontinence (50.8% in PS vs. 26.7% in GS, $p = 0.006$) were also significantly more prevalent in the PS group. Although the incidence of dyspnea (44.3% vs. 28.3%, $p = 0.068$) and weight loss (19.7% vs. 11.7%, $p = 0.224$) was higher in the PS group compared to the other group, these differences were not statistically significant (Table 2).

The PS group had significantly lower haemoglobin levels ($13.4 \pm 1.8\%$ vs. $14.2 \pm 2.2\%$ in GS, $p = 0.011$). ROC analysis suggested that haemoglobin levels below 14.1% were predictive of poor sleep quality. Other biomarkers, such as CRP, WBC counts, thyroid function, and ferritin levels, showed no significant differences between the groups. Although D-dimer levels were observed to be higher in the PS group, this difference did not reach the level of statistical significance ($p = 0.332$). Blood oxygen levels (SpO₂) were similar between the groups (93.0% in PS vs. 91.7% in GS, $p = 0.321$) (Table 3).

Table 2: Comparison of the clinical characteristics between the "poor sleepers" (PS) and "good sleepers" (GS) as assessed by the Pittsburgh Sleep Quality Index.

	Overall (n=121)	Group PS (n = 61) (PSQI>5)	Group GS (n = 60) (PSQI≤5)	p
PSQI (median [IQR])	6.0 [3.0-9.0]	9.0 [7.0-12.0]	3.0 [2.0-4.0]	<.001
BMI (kg/m ²) (median [IQR])	28.5 [26.0-31.0]	29.0 [26.0-31.0]	28.0 [26.0-30.0]	0.408
BMI groups (n(%))				0.391
Underweight (<18.5 kg/m ²)	NA	NA	NA	
Normal (18.5–24.9 kg/m ²)	14 (11.6)	8 (13.1)	6 (10.0)	
Overweight (25–29.9 kg/m ²)	63 (52.1)	28 (45.9)	35 (58.3)	
Obese (≥30 kg/m ²)	44 (36.4)	25 (41.0)	19 (31.7)	
Types of COVID-19 treatment (n (%))				0.749
Outpatient	66 (54.6)	31 (50.8)	35 (58.3)	
Inpatient service	47 (38.8)	25 (41.0)	22 (22.37)	
Intensive care	7 (5.8)	4 (6.6)	3 (5.0)	
Duration of COVID-19 treatment (n (%))				0.124
0-6 months	0 (0.0)	0 (0.0)	0 (0.0)	
6-12 months	0 (0.0)	0 (0.0)	0 (0.0)	
12-18 months	4 (3.3)	0 (0.0)	4 (6.7)	
18+ months	117 (96.7)	61 (100.0)	56 (93.3)	
Coexisting diseases (n (%))				0.306
Present	117 (96.7)	58 (95.1)	59 (98.3)	
Absent	4 (3.3)	3 (4.9)	1 (1.7)	
Types of coexisting diseases (n (%))				
Hypertension	82 (67.8)	43 (70.5)	39 (65.0)	0.518
Type 2 diabetes mellitus	70 (57.9)	36 (59.0)	34 (56.7)	0.794
Chronic obstructive pulmonary disease	25 (20.7)	16 (26.2)	9 (15.0)	0.125
Coronary artery disease	35 (28.9)	14 (23.0)	21 (35.0)	0.143
Chronic renal failure	14 (11.6)	5 (8.2)	9 (15.0)	0.239
Cerebrovascular diseases	4 (3.3)	3 (4.9)	1 (1.7)	0.306
Malignancy	5 (4.1)	2 (3.3)	3 (5.0)	0.633
Other	17 (14.0)	10 (16.4)	7 (11.7)	0.453
Psychiatric disorders (n (%))				<.001
Present	33 (27.3)	25 (41.0)	8 (13.3)	
Absent	88 (72.7)	36 (59.0)	52 (86.7)	
Types of psychiatric disorders (n (%))				
Depression	20 (16.5)	14 (23.0)	6 (10.0)	0.052
Anxiety disorder	13 (10.7)	11 (18.0)	2 (3.3)	0.006
Psychotic disorder	2 (1.7)	2 (3.3)	0 (0.0)	0.096
Internal sleep disruptors (n (%))				0.120
Present	71 (58.7)	40 (65.6)	31 (51.7)	
Absent	50 (41.3)	21 (34.4)	29 (48.3)	
Types of Internal sleep disruptors (n (%))				
Pain	65 (53.7)	37 (60.7)	28 (46.7)	0.122
Restless leg syndrome	23 (19.0)	18 (29.5)	5 (8.3)	0.002
Caffeine	1 (0.8)	0 (0.0)	1 (1.7)	0.235
Sleeping pill use (n (%))				<.001
Yes	14 (11.6)	14 (23.0)	1 (1.7)	
No	107 (88.4)	47 (77.0)	59 (98.3)	
Types of sleeping pill use (n (%))				
Anxiolytic	2 (1.7)	2 (3.3)	0 (0.0)	0.096
Antidepressant	1 (0.8)	1 (1.6)	0 (0.0)	0.240
Sedative	11 (9.0)	11 (18.0)	1 (1.7)	<.001
Daytime sleepiness (n (%))	54 (44.6)	29 (47.6)	25 (41.7)	0.516
Hendrich fall risk (n (%))	57 (47.1)	35 (57.4)	22 (36.7)	0.022
Polypharmacy (n (%))	72 (59.5)	38 (62.3)	34 (56.7)	0.528
Charlson comorbidity index (median [IQR])	5.0 [3.0-6.0]	5.0 [4.0-6.0]	4.5 [3.0-6.0]	0.201
Cough (n (%))	45 (37.2)	28 (45.9)	17 (28.3)	0.045
Dyspnoea (n (%))	44 (36.4)	27 (44.3)	17 (28.3)	0.068
Urinary incontinence (n (%))	47 (38.8)	31 (50.8)	16 (26.7)	0.006
Faecal incontinence (n (%))	6 (5.0)	5 (8.2)	1 (1.7)	0.084
Weight loss (n (%))	19 (15.7)	12 (19.7)	7 (11.7)	0.224

PSQI: Pittsburgh Sleep Quality Index, SD: standard deviation, BMI: body mass index, NA: not applicable.

Table 3: Comparison of the laboratory findings between the "poor sleepers" (PS) and "good sleepers" (GS) as assessed by the Pittsburgh Sleep Quality Index.

	Overall (n=121)	Group PS (n = 61) (PSQI>5)	Group GS (n = 60) (PSQI≤5)	P
Albumin (g/dL) (mean ± SD)	3.99 ± 0.5	3.97 ± 0.46	4.01 ± 0.54	0.253
CRP (mg/dL) (mean ± SD)	16.3 ± 40.3	18.1 ± 47.4	14.5 ± 31.9	0.479
WBC (cells/ μ L)(mean ± SD)	7750.6 ± 3146.1	7834.6 ± 3521.3	7665.2 ± 2739.8	0.909
Platelet (IU/mL)(mean ± SD)	262.1 ± 95.1	266.4 ± 82.1	257.7 ± 107.1	0.077
TSH (mU/L) (mean ± SD)	2.5 ± 7.5	3.2 ± 10.3	1.8 ± 2.4	0.286
Ferritin (ng/mL) (mean ± SD)	102.1 ± 130.4	104.1 ± 145.4	100.1 ± 114.3	0.343
D-dimer (mcg/mL) (mean ± SD)	1033.5 ± 1465.6	1099.1 ± 1651.5	966.8 ± 1259.5	0.332
Lymphocyte count (cells/ μ L) (mean ± SD)	2348.4 ± 2159.3	2586.1 ± 2935.4	2106.8 ± 776.6	0.364
Neutrophil count(cells/ μ L) (mean ± SD)	4514.7 ± 2209.9	4384.1 ± 2070.6	4647.5 ± 2353.2	0.611
Haemoglobin (%) (mean ± SD)	13.8 ± 2.0	13.4 ± 1.8	14.2 ± 2.2	0.011
Vitamin B12 (pg/mL) (mean ± SD)	398.3 ± 246.3	407.2 ± 218.5	389.3 ± 273.2	0.556
GFR (mL/min) (mean ± SD)	74.8 ± 23.6	74.7 ± 25.0	75.0 ± 22.3	0.959
HbA1c (%) (mean ± SD)	7.1 ± 1.8	7.1 ± 2.0	7.0 ± 1.7	0.878
Total cholesterol (mg/dL) (mean ± SD)	167.7 ± 44.0	167.0 ± 43.0	168.5 ± 45.3	0.851
LDL (mg/dL) (mean ± SD)	121.0 ± 40.4	121.2 ± 39.5	120.8 ± 41.5	0.791
Triglycerides (mg/dL) (mean ± SD)	156.9 ± 95.3	145.0 ± 84.6	169.1 ± 104.5	0.279
ALT (U/L) (mean ± SD)	22.5 ± 11.3	23.5 ± 13.7	21.5 ± 8.3	0.961
AST (U/L) (mean ± SD)	18.4 ± 8.7	18.6 ± 8.3	18.3 ± 9.1	0.759
SpO ₂ (%) (mean ± SD)	92.4 ± 8.5	93.0 ± 4.2	91.7 ± 11.4	0.321

PSQI: Pittsburgh Sleep Quality Index, SD: standard deviation, CRP: C-reactive protein, WBC: white blood cells, TSH: thyroid-stimulating hormone, GFR: glomerular filtration rate, HbA1c: glycated haemoglobin, LDL: low-density lipoprotein, ALT: alanine aminotransferase, AST: aspartate amino-transferase, SpO₂: Oxygen saturation.

3.1. Sleep Quality Predictors and Multivariate Analysis

The binary logistic regression analysis results indicated that gender, education, and psychiatric disorders were significant predictors of sleep quality. The odds of women experiencing poor sleep were nearly three times those of men (OR = 2.958, $p = 0.004$). Education had a protective effect, with high school graduates exhibiting significantly lower odds of poor sleep (OR = 0.170, $p = 0.012$). Anxiety disorders increased the risk of poor sleep (OR = 6.380, $p = 0.006$), and multivariate analysis confirmed this association (OR = 4.251, $p = 0.033$). The use of hypnotic medications showed a complex relationship: it was protective in univariate analysis (OR = 0.057, $p < 0.001$) but associated with an increased risk in multivariate analysis (OR = 8.177, $p = 0.011$). Restless Leg Syndrome (OR = 4.605, $p = 0.002$) and urinary incontinence (OR = 3.051, $p = 0.006$) also significantly impacted sleep quality (Table 4).

The PSQI consists of seven key sub-factors that collectively comprehensively assess sleep quality. The sub-factors included in this study are subjective sleep quality (PSQI_f1), sleep latency (PSQI_f2), sleep duration (PSQI_f3), habitual sleep efficiency (PSQI_f4), sleep disturbances (PSQI_f5), use of sleeping medication (PSQI_f6), and daytime dysfunction (PSQI_f7). These sub-factors were analysed using the Random Forest algorithm to assess their relative importance in predicting sleep quality. The binary logistic regression analysis results indicated that gender, education, and psychiatric disorders were significant predictors of sleep quality (Figures 1 and 2). The R^2 values presented in Figure 2 correspond to Nagelkerke R^2 from the multivariate logistic regression models used to predict poor sleep quality.

Table 4: Univariate and multivariate binary logistic regression analyses of variables significantly affecting the "poor sleepers" (PS) and "good sleepers" (GS) groups as per the Pittsburgh Sleep Quality Index (poor sleepers vs. ref: good sleepers).

	Univariate		Multivariate (method: stepwise) (p < .001)	
	Odds ratio [95% confidence interval]	P OLRT/(coef.)	Odds ratio [95% confidence interval]	P OLRT/(coef.)
Sex		0.004		0.047
(Female vs. ref: Male)	2.958 [1.390-6.295]	(0.005)	2.005 [0.781-5.149]	(0.048)
Educational status		0.029		
(Primary vs. ref: Illiterate)	0.537 [0.240-1.200]	(0.130)	NA	NA
(H-sch. vs. ref: Illiterate)	0.170 [0.043-0.673]	(0.012)		
(Uni. vs. ref: Illiterate)	0.311 [0.053-1.835]	(0.197)		
Psychiatric disorders		<.001		
(Present vs. ref: Absent)	4.514 [1.831-11.130]	(0.001)	NA	NA
Depression		0.052		
(Present vs. ref: Absent)	2.681 [0.954-7.530]	(0.061)	NA	NA
Anxiety disorder		0.006		0.033
(Present vs. ref: Absent)	6.380 [1.350-30.160]	(0.019)	4.251 [0.798-22.649]	(0.046)
Restless leg syndrome		0.002		0.027
(Present vs. ref: Absent)	4.605 [1.582-13.400]	(0.005)	3.396 [0.988-11.667]	(0.032)
Sleeping pill use		<.001		0.011
(Yes vs. ref: No)	0.057 [0.007-0.449]	(0.007)	8.177 [0.934-71.568]	(0.038)
Sedative pill use		0.001		NA
(Yes vs. ref: No)	0.078 [0.010-0.617]	(0.016)	NA	NA
Hendrich fall risk		0.022		NA
(Present vs. ref: Absent)	2.325 [1.120-4.830]	(0.024)	NA	NA
Cough		0.045		NA
(Present vs. ref: Absent)	2.146 [1.010-4.560]	(0.047)	NA	NA
Urinary incontinence		0.006		0.006
(Present vs. ref: Absent)	2.842 [1.327-6.080]	(0.007)	3.051 [1.254-7.423]	(0.008)
Haemoglobin		0.008		0.042
(<14.1 vs. ref: ≥14.1)	2.702 [1.285-5.680]	(0.009)	2.103 [0.841-5.259]	(0.036)

OLRT: Omnibus Likelihood Ratio Tests, Coef: Coefficient, H-sch: High school, Uni: University, NA: not applicable.

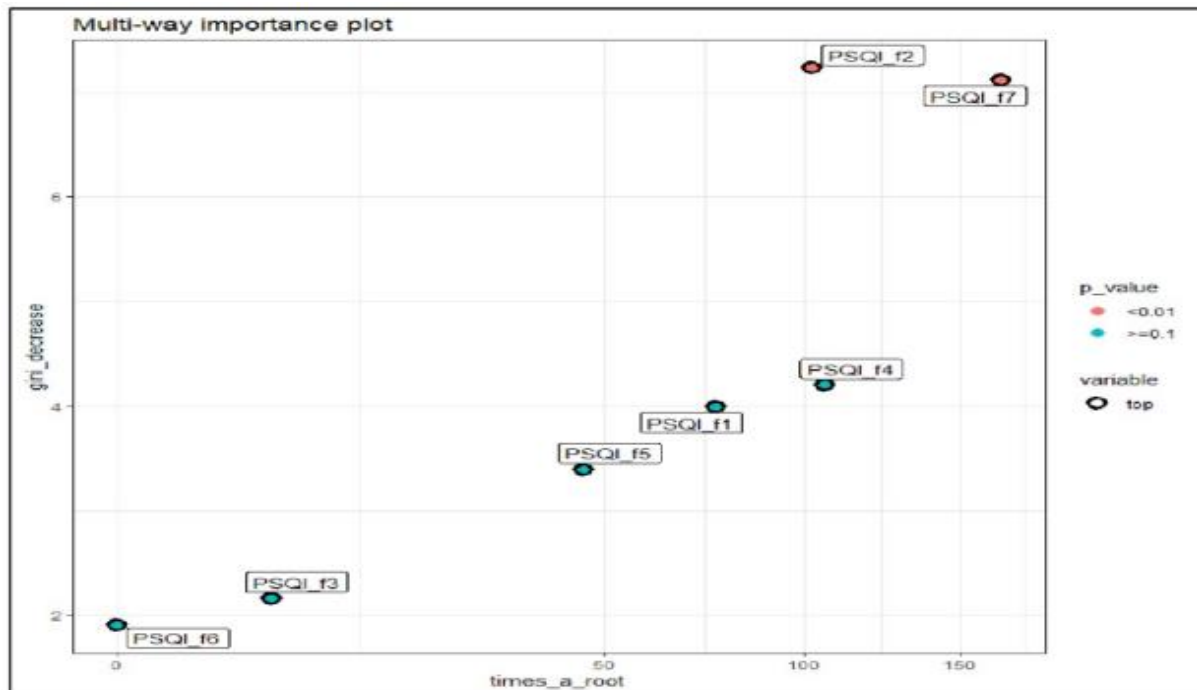


Figure 1: Multi-way importance plot of PSQI sub-factors. The multi-way importance plot derived from the Random Forest analysis highlights the relative contributions of the Pittsburgh Sleep Quality Index (PSQI) sub-factors to overall sleep quality. Sleep latency (PSQI_f2) and daytime dysfunction (PSQI_f7) demonstrated the highest Gini decreases, indicating their dominant influence. Subjective sleep quality (PSQI_f1), habitual sleep efficiency (PSQI_f4), and sleep disturbances (PSQI_f5) showed moderate importance, while sleep duration (PSQI_f3) and use of sleeping medication (PSQI_f6) were the least influential.

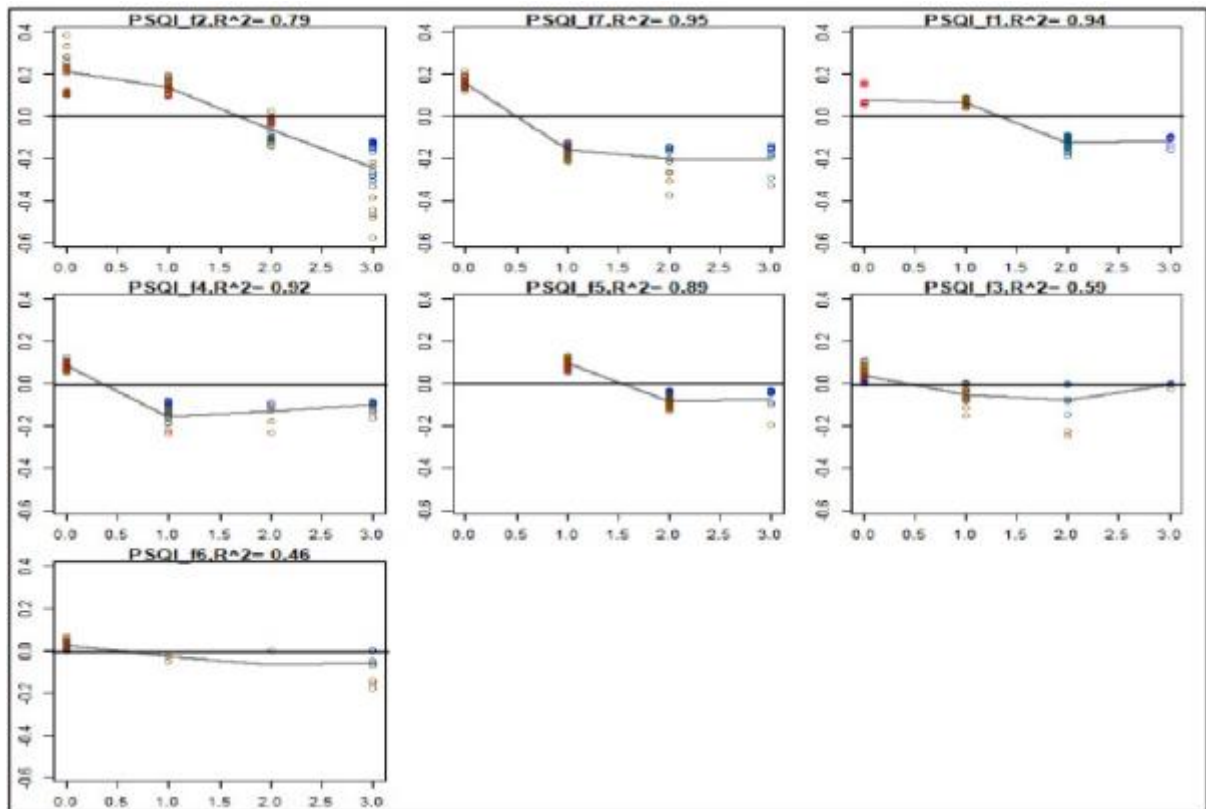


Figure 2: Feature contributions of PSQI sub-factors. The feature contribution plots illustrate the direction and magnitude of each PSQI sub-factor's effect on sleep quality. Levels 0 and 1 of sleep latency (PSQI_f2) and subjective sleep quality (PSQI_f1) were associated with good sleep, whereas higher levels (2–3) contributed to poor sleep. Daytime dysfunction (PSQI_f7) emerged as another critical determinant, with increasing severity linked to deteriorating sleep. Habitual sleep efficiency (PSQI_f4) and use of sleeping medication (PSQI_f6) showed smaller but relevant influences. These findings emphasise the multifactorial nature of post-COVID-19 sleep disturbances in elderly patients.

4. Discussion

Given that studies on smoking addiction should be Our study evaluates factors affecting sleep quality in elderly patients with COVID-19 infection and many systemic diseases. The global pandemic of COVID-19 has precipitated a surge in the incidence of both physical and mental health problems amongst the elderly population. Along with health problems, the COVID-19 infection in the elderly population has negatively affected quality of life and sleep quality. The studies on the quality of sleep conducted after the pandemic have mainly been carried out on young and middle-aged people, and studies on the elderly have been inadequate. Seeing the deficiency in the literature, we have tried to discuss many factors that affect the quality of sleep in elderly patients.

In our study, the fact that sleep disorders were more common in post-menopausal women was consistent with the literature¹⁹. We think that low levels of estrogen and progesterone in post-menopausal women, as well as increased stress and anxiety disorders after the pandemic, reduce sleep quality. In addition, the fact that anxiety disorders and some psychiatric disorders are more likely to occur in women than in men, as in our study, also negatively affects sleep quality.

We believe that the social isolation of female patients after the pandemic and the fear of contracting the virus are additional sources of stress²⁰⁻²². Special stress management services for older female patients and approaches such as cognitive behavioural therapy (CBT) to improve sleep quality may be essential in the future^{23,24}.

The effect of educational level on sleep quality has been investigated. Elderly patients with a high school education were found to have better sleep quality. This result was found to be consistent with the literature. After the COVID-19 pandemic, people with higher levels of education increased their knowledge about sleep health. Also, they had a higher success rate in fighting diseases that affect sleep quality than individuals with comparatively less education. They also have higher compliance rates with warnings and information about sleep quality and other systemic diseases²⁵.

Post-COVID-19 pandemic, older adults with limited educational attainment require comprehensive treatment that addresses systemic diseases, sleep hygiene, effective management of comorbidities, and psychological support to improve sleep quality. These therapies are expected to enhance sleep quality and

overall health outcomes in the elderly population ^{26,27}. Anxiety disorder has been found to be compatible with poor sleep quality. The present findings are similar to studies showing the negative effect of anxiety and depression on sleep quality. Anxiety disorder causes hyperawareness and negatively affects sleep quality. We believe that sleep quality will improve due to addressing mental health with cognitive behavioural therapies (CBT) and drug treatment ^{28,29}.

The effect of many systemic diseases, such as type 2 diabetes mellitus, chronic obstructive pulmonary disease (COPD), hypertension, coronary artery disease and malignancy, on sleep quality has been studied, and the results have not shown a significant association, contrary to the literature ^{30,31}. This phenomenon is attributed to the limited number of observed cases, coupled with a significant improvement in patients' clinical symptoms following the COVID-19 pandemic and patients emerging from social isolation, increasing their activity levels, and experiencing a reduction in chronic stress.

A previously known significant relationship between Restless Leg Syndrome (RLS) and urinary incontinence and sleep quality was found to be consistent with our results. Restless legs syndrome (RLS) is characterised by frequent involuntary movements of the legs during the night, resulting in frequent awakenings and a significant deterioration in sleep quality. Urinary incontinence, particularly in elderly patients, is another condition that can adversely affect sleep quality. This effect is attributed to the increased frequency of nocturnal urination, which disrupts the normal sleep cycle ^{32,33}. The relationship between biochemical and inflammatory markers and sleep quality has been studied, and a significant relationship has been observed with low hemoglobin levels.

The etiology and clinical management of patients with anemia in the elderly following the pandemic are considered inadequate. Anaemia leads to increased fatigue and decreased physical function in older adults, significantly decreasing sleep quality ³⁴. The observed association between reduced haemoglobin levels and poor sleep quality highlights the clinical relevance of routine anaemia screening in older adults recovering from COVID-19. From a therapeutic perspective, it is essential to differentiate iron deficiency anaemia from anaemia of chronic disease, as their management approaches vary considerably. Timely recognition and appropriate treatment may therefore enhance both general health status and sleep quality in this vulnerable population. Anaemia in elderly patients with COVID-19 infection warrants serious consideration, and prompt diagnosis and treatments are imperative.

The study found that hypnotic sleeping pills adversely affect sleep quality in older people. In a multivariate analysis, long-term use was associated with an increase in many adverse outcomes, such as dependence, daytime sleepiness, cognitive changes and risk of falls. The association between sleep medication use and poor

sleep quality should be interpreted with caution, as it may primarily represent indication bias, whereby individuals with more severe disturbances are more likely to receive such prescriptions. In our cohort, the majority of agents prescribed were sedatives, with smaller proportions of anxiolytics and antidepressants, most commonly administered at low to moderate dosages for short- to intermediate durations. Today, there should be healthier guidelines for the use of hypnotics and other sleep medications for severe sleep problems in elderly patients. A literature review reveals a correlation between poor sleep quality and an increased risk of falls. The risk of falls has been found to be high in cases with poor sleep quality ³⁵. The connection between fall risk and sleep quality is evidenced by several factors observed in the population, including a higher prevalence of hypnotic medication use, extended daytime napping, and increased cognitive alterations ³⁰.

Daytime dysfunction and sleep latency emerged as determinants of sleep quality in the random forest analysis. Sleep duration is also significant in terms of timing and efficiency. As the time it takes to fall asleep increases, the quality of sleep in older people is adversely affected, with consequences for their mental health ^{36,37}. The concurrence of restless legs syndrome, urinary incontinence, and fall risk in older adults calls for practical management. Iron evaluation, pelvic floor exercises, evening fluid restriction, and simple environmental adjustments may together reduce symptoms and improve safety in this vulnerable group.

5. Conclusion

As a result, our study evaluates the quality of sleep in elderly people with infection after the COVID-19 pandemic using a number of parameters. Sleep quality was assessed together with physical and mental health and socio-demographic factors. Several factors have been identified as being associated with poor sleep quality, including the experience of the pandemic, low educational level, advanced age, the presence of RLS, low haemoglobin level, urinary incontinence and an increased risk of falls. The COVID-19 pandemic has affected the elderly segment of society. Therefore, comprehensive non-pharmacological methods to improve sleep quality in the long term are needed for this group. Cognitive behavioural therapy (CBT) and training to improve sleep quality should be considered. Future research should concentrate on creating evidence-based medical therapies to improve general health and sleep quality in elderly individuals post-pandemic.

Limitations of the Study

This study had a number of limitations. Firstly, a small number of cases of COVID-19 infection was included in the study. Secondly, sleep quality was assessed at a specific time interval, resulting in an instantaneous assessment. We believe that changes in sleep patterns may make it challenging to identify and establish a causal relationship with patients recovering from

COVID-19 infection. Thirdly, studies using self-report questionnaires such as the PDQI may be at high risk of response bias. Fourth, the lack of longitudinal follow-up information makes it challenging to determine precisely how sleep quality affects clinical and biochemical parameters long after COVID-19 infection. Fifth, haemodialysis patients, terminally ill patients, patients with advanced visual loss and patients with hearing loss, which we did not include in the fifth study, are not assessed for sleep quality, which reduces the validity of the questionnaire for elderly patients.

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Conflict of Interests

The authors declare that they have no conflict of interest to disclose.

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None.

Author Contributions

OFT conceived the idea. MB, DNB, KÇ, AFK developed the theory and performed the computations. MMA, MB verified the analytical methods. All authors discussed the results and contributed to the final manuscript.

Ethical Approval

It was evaluated and approved by the Ethics Committee of Health Sciences University Erzurum Medical Faculty (approval number: 2023/04-37, date: 16.08.2023).

Data sharing statement

The data presented in this study are available on request from the corresponding author.

Consent to participate

Consent was obtained from the patients participating in the study.

Informed Statement

Informed consent was obtained from all subjects involved in the study.

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Mental Health Profile of Children and Adolescents Under Protective Health Measures: A Comprehensive Analysis of Clinical and Sociodemographic Variables

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Abstract: To profile the psychiatric burden, sociodemographic risk factors, supplementary protective interventions, and outpatient follow-up compliance of children and adolescents placed under court-mandated protective health measures in a tertiary child and adolescent psychiatry clinic. This retrospective review covered 138 youths (89 girls, 49 boys) assessed between January 2022 and July 2024 at Recep Tayyip Erdoğan University Training and Research Hospital. Sociodemographic data, reasons for the protective order, prior service use, and follow-up attendance were extracted from medical and social-service records. Psychiatric diagnoses were established through *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* (DSM-5) interviews conducted at the index visit. Group differences were analysed with Pearson chi-square or Fisher exact tests; significance was set at $p < 0.05$. The mean age was 14.4 ± 4.2 years, and the mean age at first psychiatric evaluation under the health measure was 12.9 ± 4.0 years. At least one DSM-5 diagnosis was documented in 82.6 % of participants; the most frequent were attention-deficit/hyperactivity disorder (42.0 %), conduct disorders (34.8 %), and mood disorders (26.8 %). Psychotropic medication was prescribed in 73.9 %, predominantly antipsychotics (50.7 %) and antidepressants (42.0 %). Girls had significantly higher rates of sexual abuse, self-harm, suicide attempts, substance use, prior psychiatric contact, current diagnosis, and medication use ($p \leq 0.043$). Provision of in-kind or financial aid was more common in boys ($p = 0.017$). Regular appointment adherence reached only 62.3 % and was compromised by parental loss or separation, school non-attendance, and psychiatric comorbidity ($p \leq 0.033$). Diagnostic prevalence and medication use rose steadily with age ($p \leq 0.006$). Children and adolescents under protective health measures exhibit an exceptionally high and complex psychiatric load, with service engagement further undermined by gender-specific vulnerabilities, family instability, and educational disruption. Early, gender-sensitive, and integrative care models—augmented by telepsychiatry and “service cascade” approaches are essential to sustain treatment continuity and mitigate long-term mental-health risks in this vulnerable population. ©2025 NTMS.

Keywords: Health Measure; Adolescent Psychiatry; Mental Health Services; Socioeconomic Factors; Continuity of Patient Care.

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1. Introduction

Mental health problems among children and adolescents are a growing public health concern worldwide. Early exposure to trauma, neglect, and family dysfunction significantly increases the risk of long-term psychiatric disorders. To address these challenges, many countries have developed legal and institutional systems to protect vulnerable minors and deliver timely mental health care. National and international regulations on child rights place responsibility for protecting children not only on families but also on state institutions. In Türkiye, Law No. 5395 on Child Protection defines protective and supportive measures for children in need and aims to ensure their physical, cognitive, and mental development¹. Within this legal framework, a health measure is a court-mandated intervention that initiates medical evaluation and follow-up to protect and improve a child's physical and mental health.

Health measures are legal interventions typically applied to children who have faced severe adversities, including abuse, neglect, domestic violence, substance use, or involvement in criminal activities^{2,3}. These measures often necessitate psychiatric assessment and treatment, resulting in a steady increase in referrals to child and adolescent psychiatry clinics⁴. However, despite their legal authority, these court-mandated interventions frequently fail to achieve sustained clinical engagement. Many children do not attend the recommended psychiatric follow-up appointments, leading to fragmented care and limited therapeutic progress⁵. This discontinuity jeopardises children's mental health and development and reduces the efficiency of public healthcare services.

Globally, mental health disorders affect approximately 10–20% of children and adolescents, making them a leading cause of disability in this age group according to the World Health Organization. Prevalence rates are particularly high among youth exposed to violence, poverty, and family instability. Türkiye exhibits similar patterns: studies across the country show that most children under protective health measures are diagnosed with at least one psychiatric disorder^{3,6,7}. The most frequently observed disorders include post-traumatic stress disorder (PTSD), attention-deficit/hyperactivity disorder (ADHD), conduct disorders, depressive disorders, and anxiety disorders. Additionally, elevated rates of school dropout, substance use, and suicide attempts have been documented in this vulnerable population^{5,8}. On a sociodemographic level, risk factors such as female sex, low socioeconomic status, rural residence, parental psychopathology, and fragmented family structures are prominent both in Türkiye and internationally^{2,4,6}. These findings highlight the urgent need for early identification and intervention strategies targeting high-risk subgroups across diverse national contexts. Overall, these findings emphasise the importance of comprehensive assessments and reliable follow-up systems for children and adolescents under health

measures. However, most existing studies are limited by small samples or regional data, hindering generalisability. The present study therefore aims to evaluate the clinical and sociodemographic characteristics of a large cohort of children and adolescents monitored under health measures, thereby providing a more holistic contribution to the literature.

2. Material and Methods

2.1. Sample

This retrospective file-based study was designed to systematically evaluate all children and adolescents for whom a health measure had been issued and who were seen at the Child and Adolescent Psychiatry Outpatient Clinic of Recep Tayyip Erdoğan University Training and Research Hospital between January 2022 and July 2024. The study population was not selected through sampling but included all eligible cases within the specified timeframe, enabling a thorough evaluation of clinical practices within the scope of protective health interventions.

2.2. Procedure

Sociodemographic data for the children and their parents were extracted from medical records by a child psychiatrist. Past and current psychiatric diagnoses were established through DSM-5-based clinical interviews during the health measure assessment. Reasons for the order and information from social inquiry reports were likewise obtained from files. The study was approved by the Ethics Committee of Recep Tayyip Erdoğan University Faculty of Medicine (29 September 2022; decision 2022/168) and conducted in accordance with the Declaration of Helsinki.

2.3. Statistical Analysis

All analyses were performed in IBM SPSS Statistics 29.0 (Armonk, NY, USA). Normality of continuous variables was evaluated with the Shapiro-Wilk test. Descriptive statistics are presented as percentages for categorical data, *mean ± standard deviation* for normally distributed variables, and *median (minimum–maximum)* for non-normal variables. Pearson's chi-square test was used for categorical comparisons when cell counts were sufficient; otherwise, Fisher's exact test was applied. Statistical significance was set at $p < 0.05$.

3. Results

A total of 138 patients (89 girls, 64.5 %; 49 boys, 35.5 %) were included. The mean age was 14.39 ± 4.24 years, and the mean age at first psychiatric examination under the health measure was 12.91 ± 3.95 years. The largest educational subgroup was high-school students (38.4 %), while 22.5 % had dropped out of school. Overall, 25.4 % were not attending school and 27.5 % attended irregularly. Nearly half (45.7 %) lived with both parents, whereas 5.1 % were in institutional care. Parental separation was reported in 37.0 %, and parental loss in 11.6 %. Mothers and fathers were

Table 2: Sociodemographic Characteristics of Patients.

	Min–Max	Mean ± SD
Age	2-20	14,39+4,235
Age of Child at First Examination	1,00-18	12,91+3,95
	n	%
Gender		
Male	49	35,5
Female	89	64,5
Child's Educational Level		
Dropped out	31	22,5
Preschool	11	8,0
Primary school	14	10,1
Middle school	29	21,0
High school	53	38,4
School Attendance Status		
Not attending school	35	25,4
Regular	65	47,1
Irregular	38	27,5
Person(s) Living with Child		
Both parents	63	45,7
Mother or Father	55	39,9
Close relative	13	9,4
Institutional care	7	5,1
Mother's Employment Status		
Unknown	4	2,9
Employed	59	42,8
Unemployed	65	47,1
Deceased	10	7,2
Father's Employment Status		
Unknown	14	10,1
Employed	57	41,3
Unemployed	67	48,6
Family Income Level		
Hollingshead–Redlich Index		
1	4	2,9
2	12	8,7
3	28	20,3
4	36	26,1
5	58	42,0
Parental Marital Status		
Married / Cohabiting	71	51,4
Divorced	51	37,0
Deceased	16	11,6
Maternal Psychiatric Disorder		
Unknown	3	2,2
Absent	121	87,7
Present	14	10,1
Paternal Psychiatric Disorder		
Unknown	3	2,2
Absent	114	82,6
Present	21	15,2

employed in 42.8 % and 41.3 % of cases, respectively; the father's unemployment rate (48.6 %) exceeded the mother's. According to the Hollingshead–Redlich index, 42.0 % of families fell into the lowest income bracket. A history of psychiatric illness was noted in 10.1 % of mothers and 15.2 % of fathers (Table 1). Referrals for a health measure originated mainly from families (37.7 %), hospitals (14.5 %), schools (9.4 %) or the children themselves (5.8 %). In addition to the health measure, 65.2 % received counselling measures, 27.5 % educational measures and 5.8 % custodial

measures; 8.0 % received in-kind or financial aid. Reasons for the order included sexual abuse (26.8 %), physical or emotional abuse (13.0 %), basic care deficit/neglect (15.2 %), behavioural problems (39.1 %), self-harm (25.4 %) and suicide attempt (11.6 %). A further 10.9 % had been involved in crime and 11.6 % reported substance use. After issuance of the order, 62.3 % attended follow-up appointments regularly, whereas 17.4 % never returned. A prior history of psychiatric evaluation was documented in 44.2 % (Table 2).

Table 2: Distribution of Clinical Variables.

Applicant for health measures		n	%
	Family referral	52	37,7
	School referral	13	9,4
	Neighbour/community referral	7	5,1
	Hospital referral	20	14,5
	Child	8	5,8
	Other	38	27,5
Additional Protective Measure		n	%
Educational measure	Absent	100	72,5
	Present	38	27,5
Counselling measure	Absent	48	34,8
	Present	90	65,2
Custodial measure	Absent	130	94,2
	Present	8	5,8
In-kind / Cash assistance	Absent	127	92,0
	Present	11	8,0
Reason for Health Measures		n	%
Sexual abuse history	Absent	101	73,2
	Present	37	26,8
Physical / Emotional abuse	Absent	120	87,0
	Present	18	13,0
Basic care deficit / Neglect	Absent	117	84,8
	Present	21	15,2
Behavioral problems: running away, aggression, property damage, etc.	Absent	84	60,9
	Present	54	39,1
Self-harm	Absent	103	74,6
	Present	35	25,4

Suicide attempt	Absent	122	88,4
	Present	16	11,6
Delinquency	Absent	123	89,1
	Present	15	10,9
Substance use	Absent	122	88,4
	Present	16	11,6
Need for psychological support after parental divorce	Absent	119	86,2
	Present	19	13,8
Outpatient follow-up after health measures	Regular	86	62,3
	Irregular medication	28	20,3
	Irregular appointments	24	17,4
Psychiatric referral before health measures	Absent	77	55,8
	Present	61	44,2
Presence of psychiatric disorder	Absent	24	17,4
	Present	122	82,6
Use of psychotropic medication	Absent	36	26,1
	Present	102	73,9

At the health measure assessment, 82.6 % of participants met criteria for at least one psychiatric disorder. The most common diagnoses were ADHD (42.0 %), oppositional defiant disorder (ODD) / conduct disorder (CD) (34.8 %), mood disorders (26.8 %), anxiety disorders (11.6 %), PTSD (15.9 %), intellectual disability / developmental delay (6.5 %), substance-use disorder (5.7 %), obsessive-compulsive disorder (4.3 %), borderline personality features (2.8 %) and specific learning disorder (2.8 %). An additional 5.7 % fell into an “other” category comprising psychotic disorders, eating disorders, atypical autism, speech delay, internet gaming disorder and complicated grief. Psychotropic medication was prescribed in 73.9 % of cases: 50.7 % received antipsychotics, 42 % antidepressants, 35 %

stimulant/non-stimulant agents and 2.2 % mood stabilisers.

Regarding supplementary measures, counselling was more common among girls, whereas in-kind/financial aid was more frequent among boys ($p < 0.001$ and $p = 0.017$, respectively); there were no sex differences for educational or custodial measures ($p = 0.840$ and 0.259). Girls showed significantly higher rates of sexual abuse, behavioural problems, self-harm, suicide attempt and substance use (all $p \leq 0.043$), whereas no sex differences emerged for physical/emotional abuse, neglect or criminal involvement ($p \geq 0.156$). Girls also had higher rates of prior psychiatric contact, current psychiatric diagnoses and psychotropic use (all $p \leq 0.033$; Table 3).

Table 3: Comparisons by Gender.

Type of Additional Measure		Gender		
		Male	Female	p
Educational measure				
Absent	n	35	65	0.840*
Present	n	14	24	
Counselling measure		Male	Female	p
Absent	n	26	22	<0.001*
Present	n	23	67	
Custodial measure		Male	Female	p
Absent	n	48	82	0.259*
Present	n	1	7	
In-kind / Cash assistance		Male	Female	p
Absent	n	41	86	0.017*
Present	n	8	3	
Reason For The Health Precaution Decision				
Sexual abuse		Male	Female	p
Absent	n	43	58	0.005*
Present	n	6	31	
Physical / Emotional abuse		Male	Female	p
Absent	n	44	76	0.6*
Present	n	5	13	
Basic care deficit / Neglect		Male	Female	p
Absent	n	44	73	0.322*
Present	n	5	16	
Behavioral problems		Male	Female	p
Absent	n	35	49	0.043*
Present	n	14	40	
Self-harm		Male	Female	p
Absent	n	46	57	<0.001*
Present	n	3	32	
Suicide attempt		Male	Female	p
Absent	n	48	74	0.01*
Present	n	1	15	
Delinquency		Male	Female	p
Absent	n	41	82	0.156*
Present	n	8	7	
Substance use		Male	Female	p
Absent	n	47	75	0.033*
Present	n	2	14	
Need for post-divorce support		Male	Female	p
Absent	n	41	78	0.607*
Present	n	8	11	
Psychiatric referral / diagnosis before health measures		Male	Female	p
Absent	n	36	41	0.002*
Present	n	13	48	

		Male	Female	p
Psychiatric diagnosis during examination for health measures				
No Psychiatric Diagnosis	n	13	11	0.033*
At least one psychiatric diagnosis is present.	n	36	78	
Psychotropic medication use		Male	Female	p
No psychotropic medication use	n	18	18	0.029*
At least one psychiatric medication is used.	n	31	71	

*:Fisher Exact Test

Across age groups, indicators of psychiatric care increased significantly with age. Both prior psychiatric contact and diagnosis likelihood were highest among adolescents during the assessment under the health measure ($p < 0.001$ and $p = 0.045$, respectively). Psychotropic medication use followed the same upward trend ($p = 0.006$; Table 4).

Table 4: Comparisons by Age.

		Age	Age	Age	p
Psychiatric referral / diagnosis before health measures		0-6 years	6-12 years	13-18 years	
Absent	n	15	19	43	<0.001*
Present	n	1	9	51	
Psychiatric diagnosis during examination for health measures		0-6 years	6-12 years	13-18 years	p
No Psychiatric Diagnosis	n	6	6	12	0.045**
At least one psychiatric diagnosis is present.	n	10	22	82	
Psychotropic medication use		0-6 years	6-12 years	13-18 years	p
No psychotropic medication use	n	8	11	17	0.006*
At least one psychiatric medication is used.	n	8	17	77	

*:Fisher Exact Test, **:Pearson Chi-Square

Family structure, school attendance and the presence of a psychiatric diagnosis influenced adherence to follow-up. Children living with both parents attended

appointments more regularly than those with divorced or deceased parents ($p = 0.033$). Regular school attendees showed better follow-up compliance than

non-attendees or irregular attendees ($p < 0.001$). Finally, participants without a psychiatric diagnosis were more likely to adhere to follow-up, whereas those

with at least one diagnosis were significantly more prone to irregular attendance or non-attendance ($p < 0.001$; Table 5).

Table 5: Comparisons by Outpatient Follow-up Adherence.

		Outpatient follow-up after health measures			
Parental marital status		Regular	Irregular	Does not attend	p
Married	n	47	17	7	0.033*
Divorced	n	31	9	11	
Deceased	n	8	2	6	
School attendance status		Regular	Irregular	Does not attend	p
Not attending school	n	18	6	11	<0.001**
Regular	n	51	10	4	
Irregular	n	17	12	9	
Psychiatric diagnosis at time of health measures		Regular	Irregular	Does not attend	p
No Psychiatric Diagnosis	n	22	0	2	<0.001**
At least one psychiatric diagnosis is present	n	64	28	22	

*: Pearsan Chi-Square, **:Likelihood Ratio

4. Discussion

This study offers a comprehensive clinical overview of children and adolescents placed under court-mandated protective health measures in Türkiye, revealing critical intersections between psychiatric morbidity, sociodemographic risk factors, and systemic follow-up challenges. In the study findings, the detection of at least one *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* (DSM-5) diagnosis in more than three-quarters of the sample (82.6 %) confirms the high prevalence of psychopathology (50–80 %) previously reported in populations subject to protective measures²⁻⁶. Attention-Deficit/Hyperactivity Disorder (ADHD), conduct disorders, and mood disorders ranked as the three most common diagnostic categories, closely matching distributions reported in international and Turkish studies^{5,10}. This pattern is likely related to the elevated exposure of youth under protective orders to socioeconomic deprivation, chronic family dysfunction, and traumatic life events^{11,12}. Such risk factors may increase psychiatric burden by

predisposing children to neurodevelopmental and mood disorders.

The gender analysis revealed that, in girls, reasons for initiating protective health measures sexual abuse, behavioral problems, self-mutilation, suicide attempts, and substance use were significantly more prevalent than in boys. Similar gender trends have been reported in studies of protected adolescents in the United States (U.S.) and Europe, where they are attributed to girls' greater propensity for internalizing symptoms and the higher likelihood of abuse disclosure¹³⁻¹⁵. This gender difference may stem from the intersection of multiple factors, including sociocultural norms that channel girls' emotional stressors inward, increased risk of sexual objectification and abuse during early adolescence, and lower intervention thresholds for girls within family- and social-service systems. These findings underscore the need for gender-specific intervention protocols tailored for girls. In contrast, boys more often receive in-kind or cash assistance, which may reflect either families' preference for

supporting sons financially or judicial processes favoring boys. Similar gender disparities have been noted in other socioeconomic indicators¹⁶. Possible explanations include sociocultural norms that designate boys as future “economic providers,” as well as implicit or explicit biases among family courts and social-service professionals who may associate economic vulnerability predominantly with male children. Additionally, the structure of application forms may unintentionally prioritize boys for assistance. Furthermore, documentation practices—such as registering cash assistance under the boy’s name while recording in-kind support under the family’s name—may create an artificial inflation of aid statistics for boys. Accordingly, the implementation of transparent, standardized protocols is recommended to minimize gender bias in social-service decision-making.

Both psychiatric diagnosis and psychopharmacological treatment rates increased with age. Prospective studies from Canada and Sweden involving similar populations likewise demonstrate a marked rise in psychiatric diagnostic prevalence and treatment needs with advancing age^{17,18}. Moreover, analyses of U.S. national patient registries indicate that adolescents under child welfare supervision require psychiatric hospitalization at twice the rate of matched controls¹⁹. These findings align with the literature and may be linked to heightened trauma sensitivity and risk behaviors during adolescence, when many psychiatric disorders typically first manifest²⁰. Expanding the window for early intervention—particularly by targeting psychiatric symptoms identified in the 6–12-year age group—could prevent later psychopathology and comorbidity. The study also found that fragmented family structures, school absenteeism, and psychiatric comorbidity adversely affected clinic appointment adherence following protective orders, echoing global concerns about continuity of care in child-welfare systems. International prospective studies similarly report that social determinants (parental cohabitation, education, poverty) strongly predict follow-up attendance^{17,18}. In the present sample, more than one-third of children who had experienced parental loss never attended appointments, a finding consistent with meta-analytic evidence that unstable care environments reduce continuity of psychiatric treatment²¹.

Only 62.3% of participants regularly attended outpatient follow-up after a protective order, indicating a critical weakness in service continuity. Systematic reviews from the United States and Europe report significantly lower treatment uptake among protected children than community controls, with treatment gaps exceeding 50 % for depression and anxiety disorders^{22,23}. Poor follow-up adherence in this population likely arises from a complex interplay of structural and individual barriers: placement changes and logistical challenges (e.g., transportation, lack of escorts) may disrupt continuity of care, while the motivational and executive deficits typical of depression and anxiety can further impede self-management. Fear of stigma

associated with psychiatric services may also play a role. Social determinants (parental cohabitation, school attendance) predicting adherence mirror findings from multicenter studies of child-welfare populations¹⁶. That one-third of non-attenders had psychiatric comorbidity indicates that service disengagement is concentrated among the most vulnerable subgroups. Barriers such as family stress, reduced income, parental psychopathology, and failure to establish routines may explain why parental separation or death impedes access to care. School non-attendance likely disrupts “natural reminder” systems (daily routines, school-based referrals, guidance services) that facilitate compliance. High comorbidity itself can diminish treatment motivation or hinder school participation, thereby exacerbating follow-up disruption. International evidence supports “service cascade” models and tele-psychiatry as effective strategies for improving access in such contexts^{19,24}. Tele-psychiatry, in particular, warrants consideration as a national policy to enhance clinic attendance after protective orders.

Strengths of the study include standardized DSM-5 diagnoses in a single center, a large sample size, and simultaneous analysis of protective-measure types, reasons for protective orders, follow-up data, and clinical variables.

This study makes a noteworthy contribution to the literature by simultaneously examining socio-demographic characteristics, psychiatric morbidity, additional protective interventions, and outpatient follow-up compliance in children and adolescents placed under court-mandated protective health measures within a single data set.

Recommendations Based on Study Findings

1. Early multidisciplinary screening should be implemented—particularly in children aged 6–12 years—to reduce future psychiatric morbidity and comorbidity.
2. Gender-sensitive intervention protocols should be standardised, especially for adolescent girls presenting with self-harm, substance use, or sexual trauma.
3. Telepsychiatry services should be formally integrated into national child-protection frameworks to enhance continuity of care and follow-up adherence.
4. Cross-sectoral coordination mechanisms between health and education systems should be strengthened to address school absenteeism and its impact on treatment compliance.
5. Transparent and standardised protocols should be established to avoid gender bias in the distribution of social welfare support.
6. Expanded family support programs are needed, particularly for children from divorced or bereaved households, to reduce risk of service disengagement.
7. Future national multicenter studies should be conducted to identify high-risk subgroups and evaluate the longitudinal outcomes of protective health measures.

5. Conclusion

In conclusion, the findings indicate that without comprehensive, gender- and adolescence-focused, risk-sensitive, and seamless care networks, reducing psychiatric burden and service discontinuity among youth under protective health measures will remain challenging. Early multidisciplinary interventions and telepsychiatry-based *service cascade* models present critical opportunities for closing this gap at the national level. Strengthening family-support programs, enhancing coordination between health and education sectors for youth with school absenteeism, and conducting multicenter prospective studies are priority avenues for identifying high-risk groups, monitoring care continuity, and evaluating long-term outcomes.

Limitations of the Study

Limitations include its retrospective design, missing records, and the single-center data set, which may restrict generalizability. Furthermore, because variables such as trauma severity and barriers to care were not quantified, causal interpretations are constrained.

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Conflict of Interests

The authors declare that they have no conflicts of interest.

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Author Contributions

Conceptualization, Methodology and Investigation: YSN, MY, UT. Data curation: MY, UT. Formal analysis, Resources, Visualization, Writing-original draft, Writing-review & editing and Supervision : YSN. Project administration: YSN, UT. All authors have read and approved the final version of the manuscript.

Ethical Approval

The study was approved by the Ethics Committee of Recep Tayyip Erdoğan University Faculty of Medicine (29 September 2022; decision 2022/168)

Data sharing statement

The data underlying this article contain potentially identifiable clinical information and cannot be shared publicly due to ethical and privacy restrictions (KVKK and institutional policy). De-identified data (derived measurements and aggregate tables) may be made available from the corresponding author on reasonable request, subject to a data use agreement and institutional approvals.

Consent to participate

This retrospective file-based study involved only de-identified clinical records and posed minimal risk to participants. The requirement for informed consent was waived by the Ethics Committee of Recep Tayyip Erdoğan University Faculty of Medicine (29 September 2022; decision 2022/168). All procedures were conducted in accordance with the Declaration of Helsinki and relevant national regulations.

Informed Statement

Informed consent for participation was waived by the Ethics Committee due to the retrospective design and the use of anonymized data; therefore, no written consent was obtained from participants or their legal guardians.

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Clozapine-Induced Cardiac Tamponade: A Rare Cause of Chest Pain

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Dear Editor,

Clozapine used in treatment-resistant schizophrenia can lead to life-threatening cardiovascular events such as dilated cardiomyopathy, myocarditis, and pericarditis ¹. Specifically, clozapine is associated with myocarditis and dilated cardiomyopathy with an estimated absolute risk of 0.01% to 0.19%. Mortality rate estimates (10%-46%) due to these rarely seen side effects are quite significant ². In this study, we discussed a case of cardiac tamponade that occurred during clozapine titration and resolved after discontinuation of the medication.

A 35-year-old single male patient living in Adıyaman/Turkey was admitted to the emergency department of a training and research hospital with complaints such as chest pain, shortness of breath, and sweating. The patient had been diagnosed with schizophrenia approximately 10 years ago and had a history of being managed with medications such as olanzapine, risperidone, quetiapine, and haloperidol. Despite using risperidone 8 mg/day and olanzapine 20 mg/day regularly for last six months, the patient, whose positive psychotic symptoms persisted, was started on clozapine 25 mg/day five weeks ago and the clozapine dose was increased by cross-titration method while the dose of olanzapine and risperidone was decreased. At

the end of four weeks, olanzapine and risperidone were completely stopped and the clozapine dose was increased to 300 mg/day. On the 7th day of increasing the clozapine dose to 300 mg/day (five weeks after starting clozapine), the above symptoms suddenly appeared with chest pain and the patient was admitted to the emergency department. The patient's blood pressure was 78/37 mmHg, pulse was 135 per minute, respiratory rate was 25 per minute, and oxygen saturation was 90. The patient's physical examination revealed bilateral jugular venous distension. The patient also had cold sweats. The patient's eating habits did not change in recent days. The patient reported no history of alcohol, illicit substance use, or other medical conditions. There were no signs or symptoms suggestive of infection. No history of animal bites or similar was reported. The only medication the patient used was clozapine, and the patient did not use herbal formulations. The patient was evaluated by an emergency medicine specialist, consulted by a cardiologist, and had blood analysis, electrocardiography, thoracic computed tomography (CT) angiography (Figure 1), and echocardiography (Figure 2). In the thorax CT angiography performed to exclude pulmonary embolism, there is pericardial

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effusion in axial sections and pleural effusion in the left hemithorax. No pulmonary embolism was detected (Figure 1). In the echocardiography pericardial effusion was detected (Figure 2). In addition, echocardiography showed collapse in the right heart chambers. The patient was diagnosed with cardiac tamponade. The patient was hospitalized in the cardiology intensive care unit after undergoing pericardiocentesis. It was decided that the current side effect was caused by clozapine and the medication was discontinued. The patient's hemodynamic parameters reached equilibrium within 24 hours. The patient was started on olanzapine 5 mg/day and it was planned to gradually increase the dose. No similar side effect was observed again during outpatient follow-up. The patient and his relatives were warned about the cardiac side effect associated with the use of clozapine, and informed consent was obtained from the patient for the publication of his data. The patient's Naranjo Adverse Drug Reaction Probability Scale (NADRPS) score was 6³.

This case report was evaluated as reversible cardiac tamponade plus pericardial effusion associated with clozapine because there was a temporal relationship between them. Other possible causes of the cardiac tamponade, such as drugs, diet, illicit substance, animal bite, and infection, were excluded. Drug-related side effect severity was determined by NADPRS, indicating a possible relationship between clozapine use and cardiac side effect³.

The most frequently reported cardiac side effect of clozapine is myocarditis, however cardiac tamponade and pericardial effusion are rarely observed. Clozapine-

induced polyserositis can result in ascites, pericardial effusion, and pleural effusion. A rare (less than 1 in 10,000) and dangerous side effect of clozapine is pericardial effusion. Pericardial effusion may occur as soon as one week following the initiation of clozapine medication. There have also been documented instances of delayed cardiac symptoms that develop months or years after the start of clozapine therapy⁴. Bath et al. reported a 20-year-old female patient with schizophrenia who developed cardiac tamponade plus pericardial effusion after 10 months of clozapine use⁴. Murko et al. reported a 43-year-old male patient with schizophrenia who had been using clozapine for seven years and was mentally stable, with cardiac tamponade plus pericardial effusion⁵. In the present case, the side effect occurred after five weeks of clozapine use. Clozapine-induced cardiac tamponade has been explained by a number of mechanisms, including direct toxicity and immune-mediated toxicity¹. However, the pathogenesis of clozapine-associated cardiac tamponade and pericardial effusion remains unclear. As a result, clozapine can present with life-threatening cardiac tamponade and pericardial effusion. A detailed medical history and physical examination should be performed before initiating clozapine therapy. In patients receiving clozapine, cardiac signs such as chest pain, dyspnoea, and tachycardia should be promptly evaluated for cardiac conditions. Pericardiocentesis and discontinuation of clozapine use are the main interventions. More studies are needed to elucidate the mechanisms of occurrence of clozapine-induced cardiac tamponade.

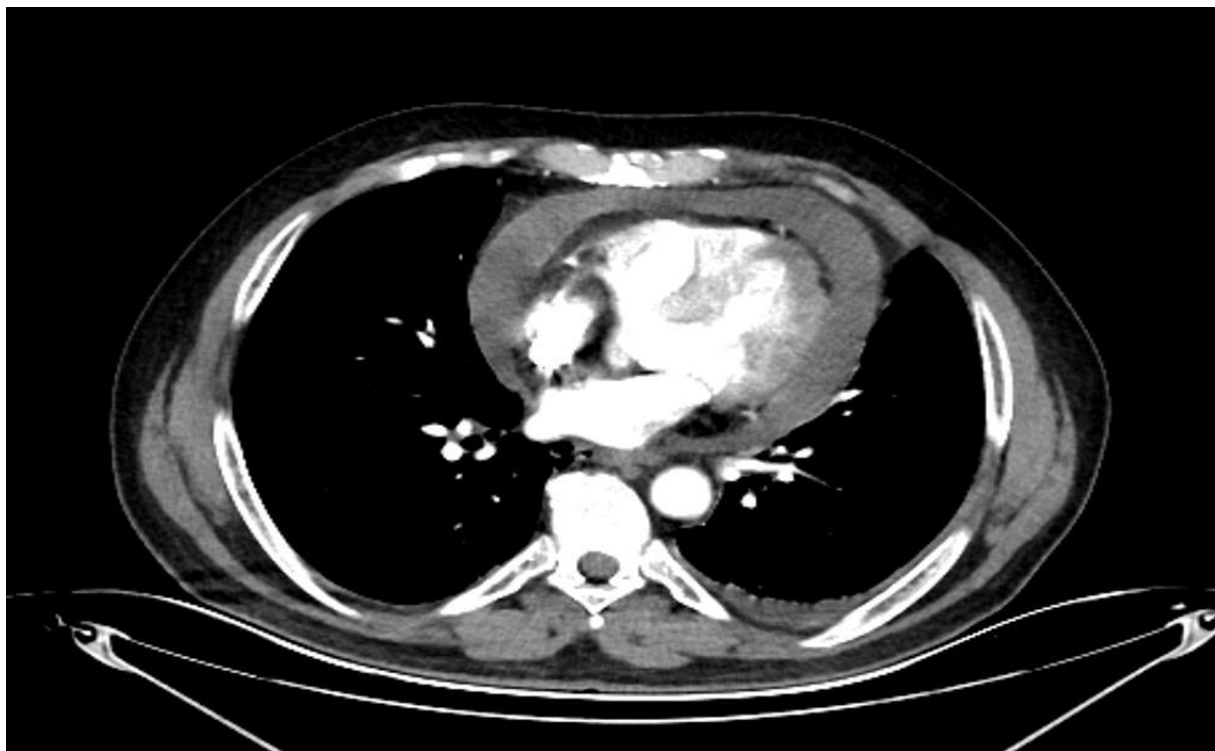


Figure 1: Thoracic Computed Tomography.



Figure 2: Echocardiogram.

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Conflict of Interests

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Author Contributions

Concept – Y.K., D.Ö., O.B.K.; Design – Y.K., S.A.; Supervision – D.Ö., S.A.; Resource – S.A., O.B.K.; Materials – Y.K., D.Ö.; Data collection &/or processing – Y.K., S.A., O.B.K.; Analysis and/or interpretation – S.A., O.B.K.; Literature search – Y.K., D.Ö., S.A.; Writing – D.Ö., S.A., O.B.K.; Critical review – Y.K., D.Ö.

Ethical Approval

There is no need ethical approval for this letter.

Data sharing statement

None.

Consent to participate

Informed consent was obtained from the patient and his/her relative.

Informed Statement

No informed statement is required for this study.

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