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Research Article

Demographic and clinical characteristics in disability assessment of sleep disorder patients

Uyku bozukluğu hastalarının engellilik değerlendirmesinde demografik ve klinik özellikler

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Abstract

Aim: This study aimed to investigate the impact of demographic and clinical characteristics in the disability assessment of patients with sleep disorders.

Material and Methods: A retrospective analysis was conducted on 122 patients referred for disability evaluations related to sleep disorders. Demographic data, clinical parameters, and disability outcomes were analyzed. Key parameters such as the Epworth Sleepiness Scale (ESS), Apnea-Hypopnea Index (AHI), and the presence of other sleep disorders were assessed across patient subgroups.

Results: Patients applying for military service eligibility assessments had a mean age of 25.3 ± 8.7 years and a median ESS score of 7. Obstructive sleep apnea syndrome (OSAS) was present in 37.5% of cases. Fifty percent of these patients were deemed unfit for military service. Patients applying for health reports for driver's licenses had a mean age of 47.6 ± 5.6 years and a mean body mass index (BMI) of 35.3 ± 8.6 kg/m^2. Severe OSAS was diagnosed in most cases, and eligibility for driver's licenses was confirmed for all patients. Patients applying for disability reports had a mean age of 47.7 ± 9.2 years, a mean BMI of 34.4 ± 6.8 kg/m^2, and a median AHI of 40. Severe OSAS was diagnosed in 79.5% of those granted disability retirement. Excessive daytime sleepiness was significantly less common in this group compared to other disability subgroups.

Conclusions: Severe OSAS plays a prominent role in functional impairment and disability assessments, particularly in high-risk occupational settings. Other sleep disorders and sleep duration variations also influence disability outcomes, underlining the need for comprehensive sleep evaluations in disability determinations.

Keywords: sleep disorders, obstructive sleep apnea, disability evaluation, military service, driver's licenses, excessive daytime sleepiness

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Öz

Amaç: Bu çalışma, uyku bozukluğu olan hastaların engellilik değerlendirmelerinde demografik ve klinik özelliklerin etkisini araştırmayı amaçlamıştır.

Gereç ve Yöntemler: Uyku bozukluklarıyla ilgili engellilik değerlendirmelerine yönlendirilen 122 hasta üzerinde retrospektif bir analiz yapılmıştır. Demografik veriler, klinik parametreler ve engellilik sonuçları analiz edilmiştir. Epworth Uykululuk Ölçeği (EUÖ), Apne-Hipopne İndeksi (AHİ) ve diğer uyku bozukluklarının varlığı gibi temel parametreler hasta alt grupları arasında değerlendirilmiştir.

Bulgular: Askerlik hizmeti uygunluk değerlendirmeleri için başvuran hastaların ortalama yaşı 25,3 ± 8,7 yıl ve ortanca EUÖ puanı 7 idi. Obstrüktif uyku apne sendromu (OUAS) vakaların %37,5'inde mevcuttu. Bu hastaların %50'si askerlik hizmeti için uygun görülmedi. Bu hastaların yarısı askerlik için uygun bulunmamıştır. Sürücü belgesi sağlık raporu için başvuran hastaların ortalama yaşı 47,6 ± 5,6 yıl, ortalama vücut kitle indeksi (VKİ) 35,3 ± 8,6 kg/m^2 olarak saptandı. Vakaların çoğunda şiddetli OUAS teşhis edilmiş ve tüm hastalar için sürücü belgesi uygunluk raporu verilmiştir. Engellilik raporu için başvuran hastaların ortalama yaşı 47,7 ± 9,2 yıl, ortalama VKİ değeri 34,4 ± 6,8 kg/m^2 ve median AHİ değeri 40 olarak bulundu. Engellilik nedeniyle emeklilik hakkı tanınan hastaların %79,5'inde şiddetli OUAS teşhis edilmiştir. Aşırı gündüz uykululuğu bu grupta diğer engellilik alt gruplarına göre belirgin şekilde daha az yaygın bulunmuştur.

Sonuçlar: Şiddetli OUAS, işlevsel bozulma ve engellilik değerlendirmelerinde önemli bir rol oynamaktadır, özellikle yüksek riskli meslek gruplarında daha belirgindir. Diğer uyku bozuklukları ve uyku süresindeki değişiklikler de engellilik sonuçlarını etkilemektedir. Bu durum, engellilik belirlemelerinde kapsamlı uyku değerlendirmelerinin önemini vurgulamaktadır.

Anahtar Kelimeler: uyku bozuklukları, obstrüktif uyku apnesi, engellilik değerlendirmesi, askerlik hizmeti, ehliyetler, aşırı gündüz uykululuğu

Introduction

Sleep disturbances involve a broad spectrum of conditions, including insomnia and obstructive sleep apnea (OSA) to hypersomnia and parasomnias, all of which can substantially disrupt physical, mental, and emotional functioning [1]. These conditions are widespread across the globe, with current estimates indicating that as many as one in three adults will encounter sleep disorder symptoms at some stage in their lives [2].

The functional limitations resulting from sleep disorders can substantially diminish individuals' performance in social, occupational, and personal spheres [3,4]. Patients diagnosed with OSA syndrome (OSAS) or chronic insomnia often experience impairments in attention, memory, executive functions, psychomotor skills, and mood regulation [5,6]. Such impairments can lead to increased risk of work-related accidents, productivity losses, higher employee turnover, and escalating healthcare costs [7-9]. Hence, the association between sleep disorders and disability continues to continues to be a significant focus of research. Patients with sleep disorders may face challenges in employment, social interactions, and self-care activities, necessitating formal disability assessments [10,11]. However, the complexity of these disorders, compounded by patient variations in demographic characteristics and clinical factors, makes the evaluation process particularly challenging for clinicians.

Demographic and clinical characteristics can play a key role in understanding the disability status of patients with sleep disorders. Factors such as age, gender, obesity, the type of sleep disorder, the frequency of symptoms, and associated mental health issues can significantly influence the severity of the disorder, its impact on daily life, and the degree of disability [12-14]. Despite this, the integration of such characteristics into standardized disability assessment protocols remains inconsistent, highlighting a critical gap in the literature. Therefore, this study aimed to investigate the impact of demographic and clinical characteristics in the disability assessment of patients with sleep disorders.

Material and Methods

This retrospective study was conducted on patients diagnosed with a sleep disorder at the Neurology Clinic of Başakşehir Çam and Sakura City Hospital between August 2020 and April 2023. The study was approved by the Başakşehir Çam and Sakura City Hospital Clinical Research Ethics Committee (Date: 19.04.2023, Decision No: 154), and was carried out in accordance with the relevant ethical guidelines and the Helsinki Declaration (2013 Brazil revision).

During the study period, 127 patients diagnosed with a sleep disorder were retrospectively reviewed. Inclusion criteria consisted of patients over 18 years of age who had both a sleep disorder diagnosis and an assigned disability score. Patients under 18 years of age, those without a sleep disorder, and those who did not receive a disability score were excluded from the study. The hospital's electronic information system and patient files were used to gather demographic and clinical data.

Epworth Sleepiness Scale

The Epworth Sleepiness Scale (ESS) was administered face-to-face at the time of patients' hospital visits, and the data were collected retrospectively. This questionnaire consists of eight questions, each asking when and under what circumstances the patient tends to doze off during the day. Each question is scored from 0 to 3, where 0 indicates "no chance of dozing," 1 indicates "slight chance of dozing," 2 indicates "moderate chance of dozing," and 3 indicates "high chance of dozing." Total scores span from 0 to 24, and a higher score correlates with increased daytime sleepiness. An ESS score of 11 or more was categorized as excessive daytime sleepiness, with mild severity assigned to scores between 11 and 12, moderate severity for 13–15, and severe for 16–24 [15].

Polysomnography evaluation

All patients' polysomnography examinations, which were previously requested for snoring and various reasons, were taken in rooms suitable for sleep at night and recorded sleep data were scored manually according to standard criteria based on the American Academy of Sleep Medicine (AASM) Manual for the Scoring of Sleep and Associated Events, Version 2.6, released in 2020. In the recording montage, 3-channel electroencephalography (F4-M1, C4-M1, O4-M1), two-channel electrooculography, one-channel submental electromyography, right and left tibialis anterior electromyography, body position, oro-nasal thermal sensor, nasal pressure sensor, thoracic and abdominal respiratory movements, electrocardiography, respiratory sound recording, oxygen (O2) saturation and synchronous video recording were used to record abnormal respiratory events related to sleep. The polysomnography data of the patients were retrospectively examined according to the patients' polysomnography monitoring results. AHI, average oxygen saturation (A-SPO2) and minimum oxygen saturation (M-SPO2) data were recorded in the scoring. Apnea events were defined as a ≥90% decrease in respiratory amplitude lasting at least 10 seconds. Hypopneas were defined as a ≥30% decrease in airflow compared to baseline and a ≥3% oxygen desaturation from pre-event baseline or the event associated with an arousal for 10 seconds with an electroencephalography stimulus. The average number of apnea and hypopnea episodes per hour of sleep is measured as AHI [16]. Patients will be divided into 4 groups according to their AHI scores: those with AHI < 5 simple type snoring, mild OSAS (5 ≤ AHI < 15), moderate OSAS (15 ≤ AHI < 30) and severe OSAS (AHI ≥30) [17].

Rapid eye movement (REM) without atonia sleep was defined as increased tonic or phasic muscle activity during REM sleep. Bruxism was described as repetitive masticatory muscle activity characterized by clenching or grinding of the teeth. Periodic limb movement (PLM) disorder (PLMD) was defined as stereotypical, repetitive, non-epileptiform movements of the lower extremities, typically occurring during non-REM sleep. Narcolepsy was defined as a rapid-onset REM sleep disorder characterized by excessive daytime sleepiness, frequent uncontrollable sleep attacks, and sleep fragmentation [16, 18].

Assessment of disability status

In accordance with the disability assessment procedures regulation issued in 2013, Disability scoring was calculated using the Baltazar formula. Under these guidelines, the insomnia group receives a maximum of 10 disability points. For those with sleep-disordered breathing, disability points are determined by the apnea-hypopnea index: 5 points for mild cases, 10 points for moderate cases, and 35 points for severe cases. A maximum of 35 disability points is given to the hypersomnia group, which includes narcolepsy and idiopathic hypersomnia. Circadian rhythm disorders, sleep movement disorders (including bruxism), and parasomnias are assigned a maximum of 10 disability points. For cases of REM sleep behavior disorder parasomnia, 35 disability points are allocated. If the total disability score is less than 40%, it is considered "no disability." Scores ranging from 40% to 60% are categorized as "workforce loss" whereas scores over 60% are classified as "disability (retirement)" [19].

Statistical analysis

All analyses were conducted using IBM SPSS Statistics for Windows 20.0 (IBM Corp., Armonk, NY, USA) software. The normal distribution of numerical variables was assessed using the Kolmogorov-Smirnov test. Data exhibiting a normal distribution were presented as mean ± standard deviation, and comparisons between groups were made using the Student's T-test. Non-normally distributed data were displayed as median (interquartile range (IQR): 25-75 percentiles) and comparisons between groups were conducted using the Mann-Whitney U test. Value of $P < 0.05$ were considered statistically significant.

Results

Study population

This study involved 122 patients with sleep disorders, including 99 evaluated for disability reports, 8 for military service eligibility reports, and 15 for health reports for driver's licenses. The mean age of patients was 46.2 ± 10.4 years (range: 19–72). The majority were male (91%) and obese (73.0%). Among all patients, the median ESS score was 11 (range: 0–24), and excessive daytime sleepiness was observed in 45.9% of cases. The median AHI score was 38.5 (range: 0–141), with OSAS diagnosed in 94.3% of the patients.

Patients applying for eligibility for military service

The mean age of patients applying for military service eligibility

assessments was 25.3 ± 8.7 years, with a mean body mass index (BMI) of 26.1 ± 3.1 kg/m^2. Their median ESS score was 7 (IQR: 4.5–11.0), and excessive daytime sleepiness was observed in 12.5%. Sleep disorders were distributed as follows: 37.5% with OSAS, 50% with parasomnias, and 12.5% with REM without atonia. Half of the patients received a report indicating that they were unsuitable for military service (Table 1). These patients had parasomnias, with only one patient diagnosed with OSAS.

Patients applying for health reports for driver's licenses

The mean age of patients applying for health reports for driver's licenses assessments was 47.6 ± 5.6 years, with a mean BMI of 35.3 ± 8.6 kg/m^2. Their median ESS score was 2 (IQR: 0–4), and excessive daytime sleepiness was observed in 13.3%. All patients were diagnosed with OSAS, most of whom had severe OSAS. PLMD was observed in 20% of cases, while 6.7% had bruxism. Reports confirming eligibility for a driver's license were issued for all patients (Table 2).

Patients applying for disability reports

The mean age of patients applying for disability reports assessments was 47.7 ± 9.2 years, with a mean BMI of 34.4 ± 6.8 kg/m^2. Their median ESS score was 12 (IQR: 7 - 17), and excessive daytime sleepiness was observed in 53.5%. In these patients, the median AHI score was 40 (IQR: 27-77), with OSAS diagnosed in 98.0% of the patients. Other sleep disorders were distributed as follows: 17.2% with PLMD, 5.1% with REM without atonia, 4% with central sleep apnea syndromes, 4% with bruxism, 3% with hypoxemic syndromes, 1% with parasomnias, 1% with hypersomnias, and 1% with narcolepsy. The median sleep-related disability score was 30 (IQR: 25 - 35), with a total disability score of 57 (IQR: 47 - 76). Of the patients, 13.1% were determined not to have a disability, 42.4% were assessed as having workforce loss, and 44.4% were granted disability (retirement) reports (Table 3).

Based on disability status, the mean age was significantly higher in the disability (retirement) group compared to the no disability and workforce loss groups ((No disability: 42.6 ± 9.0 years vs. Workforce loss: 44.8 ± 6.1 years vs. Disability: 51.9 ± 10.1 years, $p < 0.001$). The disability (retirement) group demonstrated both lower ESS scores (No disability: 16 vs. Workforce loss: 13 vs. Disability: 11, $p < 0.001$) and a lower rate of excessive daytime sleepiness compared to the other groups (No disability: 84.6% vs. Workforce loss: 61% vs. Disability: 36.4%, $p = 0.011$). The median AHI levels were lowest in the no disability group and highest in the disability group. The median PLM index did not differ significantly between the disability groups. In the workforce loss and disability (retirement) groups, 100% of patients were diagnosed with OSAS, while OSAS was identified in 84.6% of the no disability group. Severe OSAS was significantly more prevalent in the disability (retirement) group than in the no disability and workforce loss groups (No disability: 30.8% vs. Workforce loss: 69.0% vs. Disability: 79.5%, $p = 0.003$). Although PLMD was observed more frequently in the disability (retirement) group, the difference was not statistically significant (No disability: 22.7% vs. Workforce loss: 11.9% vs. Disability: 15.9%, $p = 0.429$). There were no statistically significant differences in the rate of other sleep disorders between the groups (Table 4).

Table 1. Demographic and clinical characteristics of patients applying for eligibility for military service.

Variables	Results n = 8
Age, years	25.3 ± 8.7
Gender, n (%)	
Female	-
Male	8 (100)
BMI, kg/m2	26.1 ± 3.1
Obesity, n (%)	1 (12.5)
Neck circumference, cm	38.9 ± 2.9
Epworth sleepiness scale	7 (4.5 - 11)
Excessive daytime sleepiness, n (%)	1 (12.5)
Mild	-
Moderate	1 (12.5)
Severe	-
Spo2, %	
Awake	95.4 ± 0.5
Sleep	94.8 ± 0.9
Minimum	81.4 ± 11.3
Sleep efficiency, %	74.3 ± 18.5
AHI	5 (4 - 21.5)
PLMI	5 (3.5 - 10)
Sleep disorders, n (%)	
OSAS	3 (37.5)
Mild	1 (12.5)
Moderate	-
Severe	2 (25.0)
Parasomnias	4 (50.0)
REM without atonia	1 (12.5)
PLMD	-
Central sleep apnea syndromes	-
Hypoxemic syndromes	-
Bruxism	-
Hypersomnias	-
Narcolepsy	-
Suitability for military service, n (%)	
Suitable	4 (50.0)
Not suitable	4 (50.0)

The data are expressed as the mean ± SD, median (IQR), or number (%). AHI, apnea-hypopnea index; BMI, body mass index; PLMD; periodic limb movement disorder, PLMI, periodic limb movement index, Spo2; blood oxygen saturation.

Table 2. Demographic and clinical characteristics of patients applying for health reports for driver's licenses.

Variables	Results n = 15
Age, years	47.6 ± 5.6
Gender, n (%)	
Female	1 (6.7)
Male	14 (93.3)
BMI, kg/m2	35.3 ± 8.6
Obesity, n (%)	11 (73.3)
Neck circumference, cm	43.2 ± 3.8
Epworth sleepiness scale	2 (0 - 4)
Excessive daytime sleepiness, n (%)	2 (13.3)
Mild	1 (6.7)
Moderate	-
Severe	1 (6.7)
Spo2, %	
Awake	92.8 ± 2
Sleep	91.9 ± 2
Minimum	80.2 ± 6.2
Sleep efficiency, %	80.0 ± 11.6
AHI	32 (26 - 56)
PLMI	1 (0 - 10)
Sleep disorders, n (%)	
OSAS	15 (100.0)
Mild	1 (6.7)
Moderate	4 (26.7)
Severe	10 (66.7)
PLMD	3 (20.0)
Bruxism	1 (6.7)
Central sleep apnea syndromes	-
Parasomnias	-
Hypoxemic syndromes	-
REM without atonia	-
Hypersomnias	-
Narcolepsy	-
Driving license eligibility, n (%)	
Suitable	15 (100.0)
Not suitable	-

The data are expressed as the mean ± SD, median (IQR), or number (%). AHI, apnea-hypopnea index; BMI, body mass index; PLMD; periodic limb movement disorder, PLMI, periodic limb movement index, Spo2; blood oxygen saturation.

Table 3. Demographic and clinical characteristics of patients applying for disability reports.

Variables	Results n = 99
Age, years	47.7 ± 9.2
Gender, n (%)	
Female	10 (10.1)
Male	89 (89.9)
BMI, kg/m2	34.4 ± 6.8
Obesity, n (%)	77 (77.8)
Neck circumference, cm	43.6 ± 4.7
Epworth sleepiness scale	12 (7 - 17)
Excessive daytime sleepiness, n (%)	53 (53.5)
Mild	10 (10.1)
Moderate	15 (15.1)
Severe	28 (28.3)
Spo2, %	
Awake	92.5 ± 2.3
Sleep	91.3 ± 3.7
Minimum	78.1 ± 9.1
Sleep efficiency, %	73.4 ± 14.5
AHI	40 (27 - 77)
PLMI	3 (1 - 10)
Sleep disorders, n (%)	
OSAS	97 (98.0)
Mild	12 (12.1)
Moderate	17 (17.2)
Severe	68 (68.7)
PLMD	17 (17.2)
REM without atonia	5 (5.1)
Central sleep apnea syndromes	4 (4.0)
Bruxism	4 (4.0)
Hypoxemic syndromes	3 (3.0)
Parasomnias	1 (1.0)
Hypersomnias	1 (1.0)
Narcolepsy	1 (1.0)
Sleep disability score, %	30 (25 - 35)
Total disability score, %	57 (47 - 76)
Disability status, n (%)	
No disability	13 (13.1)
Workforce loss	42 (42.4)
Disability	44 (44.4)

The data are expressed as the mean ± SD, median (IQR), or number (%). AHI, apnea-hypopnea index; BMI, body mass index; PLMD; periodic limb movement disorder, PLMI, periodic limb movement index, Spo2; blood oxygen saturation.

Table 4. Demographic and clinical characteristics by disability of patients.				
Variables	No disability n = 13	Workforce loss n = 42	Disability n = 44	P - value
Age, years	42.6 ± 9.0	44.8 ± 6.1	51.9 ± 10.1	<0.001*
Gender, n (%)				
Female	2 (15.4)	3 (7.1)	5 (11.4)	0.659
Male	11 (84.6)	39 (92.9)	39 (88.6)	
BMI, kg/m2	30.8 ± 5.4	34.6 ± 6.0	35.3 ± 7.7	0.106
Obesity, n (%)	8 (61,5)	37 (88,1)	32 (72,7)	0.061
Neck circumference, cm	42.2 ± 4.6	44.1 ± 4.8	43.5 ± 4.5	0.468
Epworth sleepiness scale	16 (12 - 21)	13 (9 - 17)	11 (5 - 15)	0.011*
Excessive daytime sleepiness, n (%)	11 (84.6)	25 (61.0)	16 (36.4)	0.003*
Mild	3 (23.1)	4 (9.8)	2 (4.5)	0.013*
Moderate	1 (7.7)	8 (19.5)	6 (13.6)	
Severe	7 (53.8)	13 (31.7)	8 (18.2)	
Spo2				
Awake	93.6 ± 2	92.7 ± 1.8	92.0 ± 2.7	0.068
Sleep	93.2 ± 3.2	91.1 ± 2.7	90.2 ± 4.4	0.022*
Minimum	83.3 ± 8.9	78.5 ± 7.6	75.8 ± 9.9	0.025*
Sleep efficiency, %	80.5 ± 10.7	73.7 ± 15.3	71.0 ± 14.3	0.112
AHI	27 (12 - 66)	38 (25 - 76)	48 (33 - 83)	0.037*
PLMI	2 (1 - 10)	3 (1 - 7)	4 (1 - 11)	0.589
Sleep disorders, n (%)				
OSAS	11 (84.6)	42 (100.0)	44 (100.0)	0.018*
Mild	4 (30.8)	6 (14.3)	2 (4.5)	0.003*
Moderate	3 (23.1)	7 (16.7)	7 (15.9)	
Severe	4 (30.8)	29 (69.0)	35 (79.5)	
PLMD	2 (15.4)	5 (11.9)	10 (22.7)	0.429
REM without atonia	2 (15.4)	1 (2.4)	2 (4.5)	0.197
Central sleep apnea syndromes	-	2 (4.8)	2 (4.5)	0.999
Bruxism	1 (7.7)	3 (7.1)	-	0.183
Hypoxemic syndromes	-	1 (2.4)	2 (4.5)	0.999
Parasomnias	-	-	1 (2.3)	0.999
Hypersomnias	1 (7.7)	-	-	0.132
Narcolepsy	1 (7.7)	-	-	0.132
Sleep disability score, %	20 (10 - 35)	30 (19 - 35)	35 (30 - 35)	0.004*
The data are expressed as the mean ± SD, median (IQR), or number (%). AHI, apnea-hypopnea index; BMI, body mass index; PLMD; periodic limb movement disorder, PLMI, periodic limb movement index, Spo2; blood oxygen saturation.				

Discussion

This study provides a comprehensive evaluation of the demographic and clinical characteristics of patients diagnosed with sleep disorders who were assessed for various purposes such as military service eligibility, driver's license, and disability reports. The results indicate that OSAS is the most commonly diagnosed sleep disorder in this population, with a significant proportion of patients presenting with obesity and symptoms of excessive daytime sleepiness. Furthermore, the variability in clinical presentations and outcomes across different evaluation groups highlights the diverse impacts of sleep disorders on health and occupational abilities.

Evaluation of Findings Regarding Military Service Eligibility

Among the study groups, patients evaluated for military service were the youngest, showing a relatively lower frequency of OSAS and a higher prevalence of parasomnias. These findings

are consistent with the existing literature, which indicates that the prevalence of OSAS increases with age and BMI [20]. Additionally, 50% of these patients were deemed unfit for military service, which may predominantly be attributed to parasomnias and the severity of OSAS. The presence of parasomnias and sleep behavior disorders, especially among young adults, could be significant factors influencing suitability for military service. In the United States, sleep disorders that disqualify individuals from military recruitment are addressed in the "DoD Instruction 6130.03 Manual," which provides guidelines for Medical Standards for Appointment, Enlistment, or Induction [21]. Based on these guidelines, chronic insomnia, the use of medications or substances to promote sleep 15 or more times within the last 12 months, sleep-related breathing disorders (including sleep apnea) not definitively treated through surgery, a history of narcolepsy, cataplexy, or other hypersomnia disorders, and circadian rhythm disorders requiring treatment or special arrangements, parasomnias, and sleep-related movement disorders are major disqualifying conditions for military recruitment [21]. The current study found that four patients diagnosed with parasomnias were considered unsuitable for military service, with only one of them also being diagnosed with OSAS. Poor nighttime sleep quality, especially when it results in excessive daytime fatigue and impaired concentration, can adversely impact the capacity to fulfill military duties [22]. Most of the current literature examines sleep disorders in either active-duty military personnel or veteran/retired military populations, with reported prevalence rates around 30% to 94% [23-27]. These findings imply that people with sleep disorders before enlisting may develop more severe sleep-related problems after their military duty. Therefore, individuals suspected of having sleep disorders during military examinations should undergo a comprehensive evaluation, with early diagnosis and treatment approaches considered.

Evaluation of Findings Regarding Driver's License Eligibility

The patients assessed for driver's license eligibility in our study had a higher average age and stood out due to all being diagnosed with OSAS, most of whom were categorized as having severe OSAS. The notable obesity burden and elevated BMI levels in this group could serve as key contributors to the pathophysiological mechanisms of OSAS [28]. Previous studies have emphasized the need for meticulous screening of individuals applying for a driver's license for sleep disorders, noting that untreated OSAS increases the risk of traffic accidents [29]. Our findings revealed that all patients seeking a driver's license were granted "eligibility"; however, the detection of severe OSAS in the majority underscores the significance of ensuring treatment compliance and regular follow-up in these individuals. Uncontrolled OSAS can result in excessive daytime sleepiness and attention deficits, posing significant risks to traffic safety [30, 31]. The European Sleep Research Society and comparable organizations do not restrict patients undergoing consistent continuous positive airway pressure therapy from obtaining a driver's license, provided that treatment continuity is closely supervised [32]. The existing literature reports that approximately half of patients with OSAS experience daytime sleepiness [33]. This indicates that these patients tend to downplay their daytime functional deficits, potentially increasing the risk of traffic accidents [34]. Interestingly, all patients in this group were considered eligible to drive. To enhance road safety for this population, the development of objective sleep evaluations and more stringent regulations could be essential.

Evaluation of Findings Regarding Disability Eligibility

Those applying for disability reports had the highest mean age and obesity prevalence among all groups in this study. Additionally, the much higher incidence of OSAS in this group is a key indicator of how severely OSAS can affect overall health and productivity. Studies suggest that severe OSAS is commonly accompanied by comorbidities, particularly cardiovascular diseases, metabolic syndrome, and diabetes, which can significantly elevate disability severity [35, 36]. According to the findings of our study, the retirement (disability) group demonstrated a higher mean age, lower ESS scores, and a reduced incidence of excessive daytime sleepiness compared to other groups. The discrepancy between low ESS scores and the high OSAS prevalence in the disability group indicates that older patients might be less inclined to report daytime sleepiness or could present with alternative clinical symptoms.

In patients with severe OSAS, the risk of performance impairment and susceptibility to accidents rises in occupations requiring sustained focus and vigilance [37]. Therefore, it is crucial to systematically evaluate the work capacity of patients with OSAS and implement protective or preventive measures when necessary. On the other hand, PLMD during sleep and OSAS frequently occur together as overlapping sleep disorders [38]. However, other sleep disorders, such as PLMD and REM sleep without atonia, did not show significant differences among the disability groups. Non-OSA sleep disorders also make a

significant contribution to disability evaluations in a subset of patients. A study conducted in China found that sleep durations of less than 7 hours and more than 7 hours were associated with a higher risk of functional disability in adults aged 65 and older [13]. The results demonstrate a U-shaped correlation between sleep duration and functional impairment.

Research from the United States reported that the relative risks of short and long sleep durations for participants with work disabilities were 1.4 and 1.5 times greater than those with moderate sleep durations [39]. A study involving Finnish twins found that sleep quality and changes in sleep quality served as early indicators of disability pensions due to lower back conditions, independent of other influencing factors [10]. These findings underscore the critical role of comprehensive sleep assessments in disability evaluations, highlighting the multifaceted impact of both sleep duration and quality on functional impairment and workforce participation.

In conclusion, this study highlights the significant role of sleep disorders, particularly severe OSAS, in contributing to functional impairment and disability. The findings emphasize the necessity of systematic evaluations to assess work capacity and implement appropriate interventions, especially for individuals in high-risk occupations. While OSAS remains the most prevalent and impactful disorder, the role of other conditions, such as PLMD and REM sleep without atonia, should not be overlooked in disability assessments. Furthermore, evidence linking both short and long sleep durations to increased functional disability underscores the importance of promoting optimal sleep patterns for maintaining overall health and workforce participation. Future research should focus on tailored interventions and long-term outcomes to mitigate the societal and individual burdens of sleep-related disabilities.

Ethics Approval

The study was performed in accordance with the Declaration of Helsinki, and was approved by the Başakşehir Çam and Sakura City Hospital Clinical Research Ethics Committee (Date: 19.04.2023, Decision No: 154).

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Conflicts of Interest

The authors declare they have no conflicts of interest.

Authors' contribution

Concept – Ş.D., Design – Ş.D. and U.D.H., Supervision – Ş.D., Data collection and/or processing – Ş.D. and U.D.H., Analysis and/or interpretation – Ş.D. and U.D.H., Writing – Ş.D., Critical review- U.D.H.

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