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Original Research

Occupational Diseases and Safety among Orthopedic Surgeons in Türkiye

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Abstract

Objectives: Occupational diseases are often underestimated and overlooked among orthopedic surgeons. This study aimed to investigate the prevalence of occupational injuries and their impact on orthopedic surgeons in Türkiye.

Methods: A modified version of the physical discomfort Web-based anonymous survey and the Short Form-36 (SF-36) were sent via email to all members of the Turkish Association of Orthopedics and Traumatology (TOTBID) mailing list. The data were collected and analyzed.

Results: A total of 217 orthopedic surgeons completed the survey. The most common musculoskeletal disorders were low back pain (73%), wrist tendinitis (36%), lateral epicondylitis (29%) and shoulder pain (28%). Additionally, 98% of surgeons had experienced needle stick or sharp instrument injuries at least once, and fewer than one-third of them received special treatment from their institutions. The behavior of not using any protective equipment was found to be associated with the surgeon's age (p=0.03).

Conclusion: This study highlights the high prevalence of occupational health injuries among orthopedic surgeons in Türkiye. The findings of this study may raise awareness among orthopedic surgeons about occupational health injuries and encourage the implementation of prevention strategies, early recognition of these injuries, and timely, definitive interventions.

Keywords: Low back pain, musculoskeletal disorders, occupational disease, orthopedic surgeons

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No occupation is without its hazards, and the healthcare profession is no exception. Occupational injuries and hazards in orthopedic surgery have garnered increased attention in recent years.[1-3] According to previous studies, the majority of orthopedic surgeons suffer from musculoskeletal disorders (MSD).[4-6] In addition to MSD, orthopedic surgeons are at an elevated risk of needle stick and sharp instrument injuries (NSIs), as well as related infectious diseases such as hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV).[7,8] Radiation exposure is also a significant risk factor due to the frequent use of fluoroscopy in orthopedic surgeries. Wagner

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et al.[9] reported a 25-fold increased risk of thyroid cancer in spine surgeons due to radiation exposure. Furthermore, other occupational hazards, such as smoke inhalation from electrocautery, exposure to toxic chemicals, noise, and psychosocial stress, have also been previously documented.[2]

Most studies on occupational hazards in orthopedic surgery have been conducted in the USA, often focusing on specific subspecialties such as trauma, arthroplasty, or orthopedic oncology surgeons.[2,4-7,9,10] In contrast, our study includes all subspecialties within orthopedics. The aim of this study was to identify the prevalence of work-related MSDs among orthopedic surgeons in Türkiye and to analyze their attitudes, beliefs, and behaviors concerning prevention and intervention strategies.

Methods

Survey Design

In accordance with the principles outlined in the Declaration of Helsinki, the study was conducted after receiving ethical approval from the Istanbul Medipol University Ethical Committee (date: 12.10.2023, number: 817). A modified 27-question version of the physical discomfort web-based anonymous survey and the Short Form-36 (SF-36) were sent via email to all orthopedic surgeons who were members of the Turkish Association of Orthopedics and Traumatology (TOTBID) mail group (n=2597). Informed consent was obtained from all respondents who participated in the survey.

The survey collected demographic data, including academic position, institution type, caseload (e.g., number of surgeries per month, daily outpatient visits), years in practice, the number of institutions worked at simultaneously, and night shift participation. Musculoskeletal disorders were classified according to body region (neck, shoulder, elbow and forearm, wrist and hand, hip, knee, foot and ankle, and low back). Additionally, the survey addressed the usage of protective equipment (e.g., glasses, lead aprons) and dosimeters.

Statistical Analysis

The Number Cruncher Statistical System 2007 (Utah, USA) was used for statistical analysis. The Pearson Chi-square test, Yates Continuity Correction test, and Fisher-Freeman-Halton test were utilized for data analysis. A p-value of <0.05 was considered statistically significant.

Results

A total of 217 surgeons completed the survey. Of these, 160 (74%) participants were under the age of 45, and only 3 (1.4%) were female (Table 1). A majority, 165 (76%), were consultants, with more than half (53%) working in training hospitals. Eighty-six (40%) participants had been in practice for 10 years or more. Additionally, 97 (45%) surgeons had more than 45 daily outpatients, and the same number performed more than 20 surgeries each month (Tables 1 and 2). Twenty-five (12%) participants worked at more than one institution simultaneously, and more than half (53%) had night shifts (Table 2).

Table 1. Demographic information for the survey respondents

	Number	Percentage (%)
Age		
25-35	64	29.5
36-45	96	44.2
46-55	35	16.1
56-65	16	7.4
66-75	6	2.8
Sex		
Male	214	98.6
Female	3	1.4
Academic Position		
Consultant	165	76
Associate professor	27	12.4
Professor	25	11.5
Years in practice		
1-5	77	35.5
6-10	54	24.9
11-20	48	22.1
21-30	26	12
>30	12	5.5
Outpatients per day		
1-20	53	24.4
21-35	48	22.1
36-45	19	8.8
46-60	30	13.8
61-80	31	14.3
>80	36	16.6
Surgeries per moth		
1-5	13	6
6-10	27	12.4
11-20	79	36.4
20-30	58	26.7
>30	40	18.4

A total of 134 (62%) surgeons reported experiencing musculoskeletal disorders (MSDs) due to work in the past year. The most commonly reported conditions were low back pain (73%), wrist tendinitis (36%), lateral epicondylitis (29%), shoulder pain (28%), and varicose veins (21%) (Fig. 1). However, there was no statistically significant association between age, academic position, working hospital, years in practice, caseload, number of working institutions, night shifts, and the prevalence of MSDs.

Table 2. Distribution of institution, nightshift and MSD of the surgeons

	Number	Percentage (%)
Institution		
Military hospital	2	0.9
Public university	48	22.1
State hospital	54	24.9
Private clinic	7	3.2
Private hospital	39	18
Private university	22	10.1
Research hospital	45	20.7
Night shift		
1-2	31	14.3
3-5	51	23.5
>5	33	15.2
None	102	47
MSD		
Yes	134	61.8
No	83	38.2

MSD: Musculoskeletal disorders.

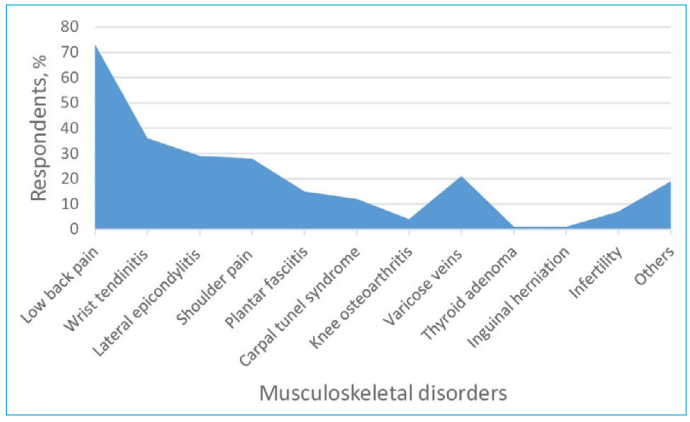

Figure 1. Prevalence of the most common musculoskeletal disorders.

Younger surgeons performed more trauma surgeries compared to older surgeons (p=0.001). As surgeons age, they perform fewer arthroscopic surgeries (p=0.006) and more oncologic orthopedic surgeries (p=0.032) (Table 3).

Of the respondents, 103 (48%) surgeons routinely wore double gloves, while 22 (10%) wore a single glove routinely. The proportion of surgeons wearing a single glove was lowest among consultants (6.7%, p=0.001) (Table 4). While 4 (1.8%) participants never screened patients for contagious diseases preoperatively, 42 (19.4%) surgeons did not use special gloves for protection. Additionally, 143 (66%) surgeons did not use protective glasses in total. Surgeons aged 46-65 were more aware of the importance of protective glasses compared to other age groups (p=0.019) (Table 5). Among surgeons aged 66-75, 5 (83%) did not use any type of protective equipment during surgeries, which was significantly higher than other age groups (p=0.03) (Table 5). Scalpel, Kirschner wire, and drill injuries were very common, with 98% of surgeons reporting such injuries during surgeries. Only 31% of the injured surgeons received special treatment after needle stick and sharp instrument injuries.

Lead aprons and maintaining a safe distance from the fluoroscopy device during surgery are two common protection methods used by surgeons. In our study, only half of the surgeons (112) routinely used lead aprons. No statistically significant association was found between the use of lead aprons and age. However, a statistically significant association was found between academic positions and maintaining a safe distance from fluoroscopy (p=0.005) (Table 6). Additionally, 206 (95%) orthopedic surgeons did not use dosimeters.

Discussion

The most significant finding of this study was that the majority of orthopedic surgeons (62%) in Türkiye had been affected by musculoskeletal disorders (MSDs), with low back pain being the most common condition (73%). A study by AlQahtani et al. involving 86 Orthopedic Trauma Association (OTA) members reported that more than 66%

Table 3. Distribution of subspeciality case preference and age of the surgeons

	25-35	36-45	46-55	56-65	66-75	p
Trauma, n (%)	58 (90.6)	89 (92.7)	25 (71.4)	9 (56.3)	5 (83.3)	0.001
Yes	6 (9.4)	7 (7.3)	10 (28.6)	7 (43.8)	1 (16.7)	
No						
Arthroscopy, n (%)	50 (78.1)	76 (79.2)	19 (54.3)	10 (62.5)	2 (33.3)	0.006
Yes	14 (21.9)	20 (20.8)	16 (45.7)	6 (37.5)	4 (66.7)	
No						
Oncology, n (%)	5 (7.8)	7 (7.3)	1 (2.9)	1 (6.2)	3 (50)	0.032
Yes	59 (92.2)	89 (92.7)	34 (97.1)	15 (93.8)	3 (50)	
No						

Table 4. Relations between double glove usage and academic positions

	Sometimes (%)	Most of the time (%)	Rutinely (%)	Never (%)	p
Academic positions					
Consultant	31 (18.8)	42 (25.5)	81 (49.1)	11 (6.7)	0.001
Associate professor	4 (14.8)	6 (22.2)	12 (44.4)	5 (18.5)	
Professor	9 (36)	0	10 (40)	6 (24)	

Table 5. Protection glasses and equipment usage regarding surgeon's age

	25-35	36-45	46-55	56-65	66-75	p
Protection glasses, n (%)						
Yes	21 (32.8)	25 (26)	19 (54.3)	8 (50)	1 (16.7)	0.019
No	43 (67.2)	71 (74)	16 (45.7)	8 (50)	5 (83.3)	
Protection equipment, n (%)						
Yes	25 (39.1)	33 (34.4)	22 (62.9)	8 (50)	1 (16.7)	0.03
No	39 (60.9)	63 (65.6)	13 (37.1)	8 (50)	5 (83.3)	

of participants had MSDs related to work, while Davis et al. found that 44% of orthopedic surgeons experienced one or more occupational injuries.[4,11] Previous studies have also reported that the most commonly affected regions are the low back and neck, followed by the hands, elbows, and feet.[1,4,6,12,13] In our study, we found that low back pain (73%), wrist tendinitis (36%), lateral epicondylitis (29%), and shoulder pain (28%) were the most common MSDs among orthopedic surgeons in Türkiye, which is consistent with previous findings. However, in studies by Ryu et al.[2] and Davis et al.[11], the hand was the most commonly affected region (25%), followed by the low back (19%). The primary causes of MSDs were prolonged standing and maintaining static positions, which increase mechanical stress on the neck and low back. Additionally, repetitive movements contribute to the higher prevalence of upper limb tendinitis.[14,15]

It might be intuitively expected that the prevalence of MSDs would increase with age, years in practice, and caseload. However, surprisingly, there was no significant association between age, years in practice, and MSDs in previous studies.[4,11,13,16] However, Davis et al.[11] reported that surgeons who had been performing surgery for 21 to 30 years were at the highest risk of developing MSDs. Although two other studies found no association between caseload and the prevalence of work-related injuries[4,13], Auerbach et al.[16] demonstrated that total caseload was correlated with neck pain (p=0.01) and lower extremity edema (p=0.03) in spine surgeons. In our study, we did not find significant associations between age, academic position, working hospital, years in practice, caseload, number of institutions worked at, night shifts, and the prevalence of MSDs.

Table 6. Maintain safe distance from fluoroscopy regarding surgeon's academic position

	Yes (%)	No (%)	p
Academic title			
Consultant	59 (35.8)	106 (64.2)	0.005
Associate professor	19 (70.4)	8 (29.6)	
Professor	10 (45.5)	12 (54.5)	

Needle stick and sharp instrument injuries can cause serious occupational infections due to the transmission of bloodborne pathogens. Because orthopedic surgeons frequently use saws, pins, and wires, they are at a higher risk of these injuries compared to other specialties.[17] Previous studies have reported that the rate of sharp instrument injuries ranged from 33% to 90% over a 10-year period.[18,19] In our study, 98% of surgeons reported having experienced sharp instrument injuries at least once, but less than one third (31%) received special treatment after these injuries. Using double gloves is a proven strategy for reducing the risk of cutaneous exposure to blood[20-22], yet less than half of the respondents in our study used double gloves or special gloves in their daily practice.

Radiation exposure, due to frequent C-arm fluoroscopy use during orthopedic surgeries, is another significant risk factor, leading to severe health problems.[23,24] Protective equipment and maintaining a safe distance from fluoroscopy are two recommended strategies to reduce radiation exposure.[25,26] Fidan et al.[27] found a 33% rate of unprotection in their study on 277 orthopedic surgeons. In our study, 59% of surgeons did not use any form of protective equipment during surgeries, with the 66-75 years age

group showing a particularly high rate of 83% (p=0.03). Additionally, 48% of respondents did not wear lead aprons, and 59% did not maintain a safe distance from fluoroscopy during surgeries. The use of protective glasses varied significantly across age groups (p=0.019), with the 46-65 years age group (54%) being more conscious about using protection. Associate professors were also more likely to keep a safe distance from fluoroscopy (p=0.005).

Our study has several limitations. First, It was based on self-reported measures whose validity and reliability have not been fully established. Additionally, Physician reports of injuries and of the consequences of these injuries may include errors because of recall bias.

Conclusion

This study highlights that nearly two-thirds of orthopedic surgeons in Türkiye suffer from musculoskeletal disorders. Furthermore, more than half of the surgeons do not use any protective equipment to mitigate radiation exposure. It is crucial for orthopedic surgeons to enhance their understanding of occupational diseases and to improve their awareness of preventive measures. Adequate attention should be given to working conditions, and preventative strategies should be integrated throughout their careers, starting from residency and continuing through retirement. These strategies should be incorporated into training programs, seminars, and congress presentations to ensure widespread awareness and adoption.

Disclosures

Ethics Committee Approval: The study was approved by the Istanbul Medipol University Non-interventional Clinical Research Ethics Committee (date: 12.10.2023, number: 817).

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