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Prevalence of musculoskeletal disorders in anesthesiologists in Ismailia Governorate

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ABSTRACT

Aim: Detect the prevalence of work-related musculoskeletal disorders among anesthesiologists and their related risk factors.

Methods: This cross-sectional study was conducted on anesthesia and intensive care physicians in Ismailia/Egypt from June to July 2022. The questionnaire had three parts. The first part consisted of participants' demographic data. The second focused on musculoskeletal disorders and possible risk factors. The last one questioned the impact of musculoskeletal disorders on the participants.

Results: The mean age of the studied population was 35.65 ± 7.734. Thirty-eight (41.8%) participants worked for 60–80 hours/week. The whole study participants reported the presence of at least one form of MSDs. Back pain was the most reported pain (78%), followed by neck pain (50.5%). Possible risk factors included the need for excessive bending and twisting, poor work ergonomics that needs improvement as reported by (81.3%) of participants and suboptimizing patient's position before specific procedures by two thirds of the participants. The physicians reported difficulty falling asleep, feeling anxious, and needing medication to control pain; however, they did not require sick leave (79.1%).

Conclusion: A significant proportion of anesthetists suffer from WRMSDs. Work ergonomics need improvement.

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KEYWORDS
Anesthesiologists; musculoskeletal disorders; prevalence; work

1. Introduction

Work-related musculoskeletal disorders (WRMSDs) are the most common occupational health problems with variable prevalence worldwide ranging from 43–78% [1], with more than 80% of physicians experiencing pain while on duty [2]. It affects different body parts, with upper limb musculoskeletal disorders reported commonly among anesthetists [3]. However, these figures can be inaccurate due to marked underreporting [4]. WRMSDs are multifactorial and influenced by physical, psychological, social, and personal factors [5]. These disorders result from persistent extreme positions, forcefully repeated maneuvers, and poorly designed instruments [6]. Procedural physicians were found to be at risk of developing WRMSDs as they are prone to long working hours with repeated movements and static nonneutral positions, facing challenges with instrument design [7]. Previous research has focused on stressful lifestyles [8] and sharp injuries at work [9]. Although, WRMSDs lead to decreased productivity, the need for surgical intervention [10], and at times change the entire career [11]. Drawing attention to such a problem is essential to improve work-related circumstances to avoid a possible shortage in manpower [12]. Previous studies in Egypt reported on WRMSDs among physiotherapists, dentists, and pediatric physical therapists [1]. Another study reported on musculoskeletal disorders among nurses [13]. There is no data about the prevalence of WRMSDs among anesthesiologists in Egypt; this study was conducted accordingly.

2. Methods

This was a cross-sectional study conducted on anesthesia and intensive care physicians in Ismailia/Egypt from June to July 2022. Ethical approval from the research ethics committee of the faculty of medicine, Suez Canal university was obtained (reference 4956#). Two hundred and fifty licensed physicians by the syndicate in Ismailia were included. Contact details (WhatsApp number and E-mail) registered in the Syndicate were used for communicating the questionnaire The questionnaire was sent electronically to them. Confidentiality of the data was assured as well as questionnaire anonymity. Written consent was included at the top of the questionnaire, and agreement was a prerequisite to start the questions. A note to the participants regarding their ability to withdraw

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Table 1. Distribution of the studied cases according to the first part ($n = 91$).

The first part	No. (%)
Sex	
Female	30 (33.0%)
Male	61 (67.0%)
Age (years)	
Mean ± SD.	35.7 ± 7.73
Median (Min. – Max.)	34 (26–65)
Weight in kg	
Mean ± SD.	86.3 ± 16.8
Median (Min. – Max.)	83 (54–130)
Height in cm	
Mean ± SD.	172.3 ± 9.32
Median (Min. – Max.)	171 (152–194)
Job level	
Resident	21 (23.1%)
Assistant lecturer/Specialist	39 (42.9%)
Lecturer/Consultant	28 (30.8%)
Assistant Professor	1 (1.1%)
Professor	2 (2.2%)
Do you work in anaesthesia, ICU, or both?	
Anaesthesia only	29 (31.9%)
ICU only	7 (7.7%)
Both	55 (60.4%)
Years of practice	
Mean ± SD.	10.01 ± 7.55
Median (Min. – Max.)	8 (0–40)
Are you Right or left-handed?	
Right	87 (95.6%)
Left	4 (4.4%)
Are you a parent?	
Yes	62 (68.1%)
No	29 (31.9%)
Number of children	
Mean ± SD.	1.49 ± 1.31
Median (Min. – Max.)	2 (0–5)
How many hours/week do you work in average? Including private practice	
<40	9 (9.9%)
40–60	38 (41.8%)
60–80	25 (27.5%)
>80	19 (20.9%)

SD: Standard deviation.

at any stage should he/she wish to do so was presented. In addition, the participants were informed that if they felt any distress during or after completing the questionnaire, they could call or email the researchers, whose contact details were supplied.

2.1. Instruments

After a review of the literature [14], a three-part self-administered questionnaire was constructed. Initial testing was done on 10 participants and then published and distributed electronically. The questionnaire was then validated statistically through principal component analysis and the calculation of Cronbach's alpha.

2.1.1. The first

part included questions querying the participants' demographic data [sex, age, weight, height, job level (resident, assistant lecturer/specialist, lecturer/consultant, professor), years of practice, place of work (operating theatre, intensive care unit or both), dominant hand, parenting, number of children, working hours per week, and history of chronic illness].

2.1.2. The second

part contained items about musculoskeletal disorders and possible risk factors: a) Have you complained of any joint pain, b) determine the site of pain (Neck Pain; Shoulder Pain; Elbow pain; wrist pain; Back pain; Hip pain; Knee pain; Ankle pain; Foot pain), c) describe pain severity (mild, moderate, or severe), d) frequency of pain in the last 12 months, e) the previous history of musculoskeletal disorders (Arthritis; Disc prolapse; carpal tunnel syndrome, fibromyalgia, and others), f) need for excessive bending or twisting of your joints, and heavy weight lifting, g) history of falling at your workplace, h) grading of work ergonomics at your workplace, i) knowledge about musculoskeletal stretch/strengthen exercises, j) practicing stretch exercises, and k) How often do you exercise, l) optimizing patients' position before intubation, CVC (central venous catheter), arterial line insertions, spinal/epidural insertion.

2.1.3. The third

part focused on questions about the impact of musculoskeletal disorders on the participants [need

Table 2. Distribution of the studied cases according to different parameters ($n = 91$).

	No. (%)
Have you complained of any of the following? choose all that applies #	
Neck Pain	46 (50.5%)
Shoulder Pain	37 (40.7%)
Elbow pain	7 (7.7%)
Wrist pain	15 (16.5%)
Back pain	71 (78.0%)
Hip pain	14 (15.4%)
Knee pain	37 (40.7%)
Ankle pain	17 (18.7%)
Foot pain	26 (28.6%)
How may you describe your pain?	
Mild	42 (46.2%)
Moderate	47 (51.6%)
Severe	2 (2.2%)
What is your pain frequency in the last 12 months?	
Once/month	11 (12.1%)
Twice/month	9 (9.9%)
Three times/month	5 (5.5%)
Once/week	19 (20.9%)
Twice/week	16 (17.6%)
Three times/week	9 (9.9%)
Daily	18 (19.8%)
Other	4 (4.4%)
Have you ever diagnosed with any of the following? #	
Arthritis	17 (18.7%)
Carpal Tunnel syndrome	4 (4.4%)
Disc prolapse	12 (13.2%)
Fibromyalgia	3 (3.3%)
Other musculoskeletal disorders mention below	8 (8.8%)
No	55 (60.4%)
Other	15 (16.5%)
Do you need to see your doctor because of musculoskeletal injury?	
Yes	23 (25.3%)
No	68 (74.7%)
Did you need to take any medication for musculoskeletal injury?	
Yes	60 (65.9%)
No	31 (34.1%)

health visits, need for treatment for musculoskeletal injury, type of medications, duration needed to control pain, need for Chronic pain clinic visit, need for physiotherapy, difficulty falling asleep or staying asleep, feeling anxious or low mood in the last year, history of any sick leave because of musculoskeletal injury]

The sample size was calculated at significance and error levels of 95% and 2.8%, respectively, with a prevalence of musculoskeletal disorders of 98.4% [14]. A drop-out proportion of 10% was added to the raw result giving a count of at least 84 participants.

3. Statistical analysis

Data were statistically described in terms of mean and standard deviation, frequencies (number of cases), and percentages when appropriate. All statistical calculations were done using the computer program SPSS (Statistical Package for the Social Science; SPSS Inc., Chicago, IL, USA), release 22 for Microsoft Windows.

4. Results

The questionnaire was tested for internal consistency using Cronbach's alpha of 0.774 for the whole questionnaire representing good coherence.

The questionnaire was distributed electronically to 250 physicians. Ninety-one participants responded and returned the completed questionnaire (response rate of 36.4%). The mean age of the studied population was 35.65 ± 7.734. Two-thirds were males (67.0%). A more significant proportion of them was assistant lecturer/specialist (42.9%) and worked in both the operating theatre and ICU (60.4%). Thirty-eight (41.8%) participants worked for 60–80 hours/week (Table 1).

The whole study participants reported the presence of at least one form of MSDs. Back pain was the most commonly reported site of pain (78%). The pain was moderate (51.6%), occurring at least once a week (20.9%). A previous history of arthritis was reported by 17 (18.7%) participants (Table 2).

Possible risk factors included the need for excessive bending and twisting, poor work ergonomics that needs improvement as reported by (81.3%) of

Table 3. Risk factors for WRMSDs.

At work, do you need to have excessive bending or twisting of your joints	Always	14 (15.4%)
	Often	27 (29.7%)
	Sometimes	38 (41.8%)
	Rarely	10 (11.0%)
In your work, do you have to lift heavy weights regularly	Yes	15 (16.5%)
	No	76 (83.5%)
Have you ever tripped or fallen at your workplace	Yes	38 (41.8%)
	No	53 (58.2%)
Grade work ergonomics at your workplace	well equipped	17 (18.7%)
	Need improvement	74 (81.3%)
Have you heard about musculoskeletal stretch/strengthening exercises	Yes	56 (61.5%)
	No	35 (38.5%)
Do you do stretch exercises?	Always	3 (3.3%)
	Often	7 (7.7%)
	Sometimes	17 (18.7%)
	Rarely	39 (42.9%)
	Never	25 (27.5%)
How often do you exercise	Never	18 (19.8%)
	Less than once a week	37 (40.7%)
	once/week	15 (16.5%)
	Twice/week	13 (14.3%)
	Three times/week	4 (4.4%)
	More than three times/week but less than seven days a week	4 (4.4%)
Do you optimize patient positioning before intubation?	Always	28 (30.8%)
	Often	27 (29.7%)
	Sometimes	27 (29.7%)
	Rarely	7 (7.7%)
	Never	2 (2.2%)
Do you optimize patient positioning before CVC, arterial line insertions?	Always	30 (33.0%)
	Often	22 (24.2%)
	Sometimes	26 (28.6%)
	Rarely	11 (12.1%)
	Never	2 (2.2%)
Do you optimize patient positioning before spinal/epidural insertion	Always	35 (38.5%)
	Often	27 (29.7%)
	Sometimes	22 (24.2%)
	Rarely	5 (5.5%)
	Never	2 (2.2%)

participants and optimizing patient's position before specific procedures by only a third of the participants (Table 3).

A significant proportion of the participants reported difficulty falling asleep, feeling anxious, and needing medication to control pain, however; they did not require sick leave (79.1%) (Table 4).

Further analysis of patients with back pain revealed that optimization of the table before spinal/epidural anesthesia differed significantly between those with and without pain (*P* value 0.02) (Tables 5 and 6).

5. Discussion

The mean age of the studied population was 35.65 ± 7.734. A more significant proportion of them was assistant lecturer/specialist and worked in both the operating theatre and ICU. In the study by **Tolu and Basaran**, the mean age was 43. Most of their participants were specialists [14].

The whole study participants reported the presence of at least one form of MSDs. Another study reported a prevalence of 98.4% [14]. Back pain was the most commonly reported site of pain (78%) followed by neck pain (50.5%). It has been reported that neck pain occurred in 65% of physicians [6]. Another study reported upper limb pain in one third of the physicians [15]. A group of anesthesiologists reported low back and neck pain [14]. Different rates and sites of pain were rendered to different tasks and positioning of the participants during their duties [14].

Risk factors for the development of musculoskeletal disorders included the need for excessive bending and twisting, poor work ergonomics that needs improvement, poorly optimized patient position before specific procedures, and prolonged working hours per week. This was emphasized by a previous study reporting repeated maneuvers and long forceful positions as work-related risk factors for developing WRMSDs [16]. An earlier study reported that work ergonomics were suboptimal by 69.1% of the participants [14]. It has been reported that working in the outpatient clinic for>16 hours/week was associated with increased head and neck pain [17]. This would be explained by prolonged working hours acting as a cause of muscle fatigue and exhaustion without enough time to recover [18]. The body must maintain a neutral position at work. Awkward positions and sustained static

Table 4. Impact of musculoskeletal disorders.

Difficulty falling asleep or staying asleep.	Always	4 (4.4%)
	Often	11 (12.1%)
	Sometimes	42 (46.2%)
	Rarely	23 (25.3%)
	Never	11 (12.1%)
Felt anxious or low mood in the last year.	Always	10 (11.0%)
	Often	32 (35.2%)
	Sometimes	41 (45.1%)
	Rarely	7 (7.7%)
	Never	1 (1.1%)
Is it work-related	Yes	79 (86.8%)
	No	12 (13.2%)
Sick leave because of musculoskeletal injury	Yes	19 (20.9%)
	No	72 (79.1%)
Need to see a doctor because of a musculoskeletal injury	Yes	23 (25.3%)
	No	68 (74.7%)
need to take any medication for musculoskeletal injury	Paracetamol	53 (58.2%)
	NSAIDS	49 (53.8%)
	Opioid	0 (0%)
	Gabapentinoids	0 (0%)
	N/A	11 (12.1%)
How long do you need pain medications	<1 week	41 (45.1%)
	1–2 weeks	7 (7.7%)
	>2 weeks	10 (11.0%)
	I am on chronic pain medication	4 (4.4%)
	Multiple occasions for a short time	29 (31.9%)
Need to visit a Chronic pain clinic	Yes	14 (15.4%)
	No	77 (84.6%)
Need to have physiotherapy	Yes	34 (37.4%)
	No	57 (62.6%)

Table 5. Relation between musculoskeletal (back) pain different parameters ($n = 91$).

	Back pain			
	No ($n = 20$) No. (%)	Yes ($n = 71$) No. (%)	Test of Sig	p
Job level				
Resident	4 (20.0%)	17 (23.9%)	$\chi^2 = 2.955$	$^{MC}p = 0.571$
Assistant lecturer/Specialist	7 (35.0%)	32 (45.1%)		
Lecturer/Consultant	8 (40.0%)	20 (28.2%)		
Assistant Professor	0 (0.0%)	1 (1.4%)		
Professor	1 (5.0%)	1 (1.4%)		
Do you work in anaesthesia, ICU, or both?				
Anaesthesia only	6 (30.0%)	23 (32.4%)	$\chi^2 = 0.358$	0.836
ICU only	1 (5.0%)	6 (8.5%)		
Both	13 (65.0%)	42 (59.2%)		
Years of practice				
Mean ± SD.	11.6 ± 7.39	9.56 ± 7.58	U = 564	0.161
Median (Min. – Max.)	11 [1] – 33)	7 (0–40)		
Are you Right or left-handed?				
Right	19 (95.0%)	68 (95.8%)	$\chi^2 = 0.022$	$^{FE}p = 1.000$
Left	1 (5.0%)	3 (4.2%)		
Are you a parent?				
Yes	15 (75.0%)	47 (66.2%)	$\chi^2 = 0.557$	0.456
No	5 (25.0%)	24 (33.8%)		
Number of children				
Mean ± SD.	1.8 ± 1.4	1.4 ± 1.3	U = 608.5	0.314
Median (Min. – Max.)	2 (0–5)	1 (0–5)		
How many hours/week do you work in average? Including private practice				
<40	1 (5.0%)	8 (11.3%)	$\chi^2 = 5.073$	$^{MC}p = 0.156$
40–60	5 (25.0%)	33 (46.5%)		
60–80	7 (35.0%)	18 (25.4%)		
>80	7 (35.0%)	12 (16.9%)		
Do you optimize patient positioning before intubation? (Patient level at xiphisternum)?				
Always/Often	12 (60.0%)	43 (60.6%)	$\chi^2 = 0.002$	0.999
Sometimes	6 (30.0%)	21 (29.6%)		
Rarely/Never	2 (10.0%)	7 (9.9%)		

SD:Standard deviation, U: Mann Whitney test,χ2: Chi square test, MC: Monte Carlo, FE: Fisher Exactp:*p* value for comparison between the studied categories.

Table 6. Relation between musculoskeletal (back) pain different parameters ($n = 91$) "continue".

	Back pain			
	No ($n = 20$) No. (%)	Yes ($n = 71$) No. (%)	χ^2	p
Do you optimize patient positioning before CVC, arterial line insertions? (Position prevents excessive back bending)?				
Always/Often	14 (70.0%)	38 (53.5%)	4.422	0.110
Sometimes	2 (10.0%)	24 (33.8%)		
Rarely/Never	4 (20.0%)	9 (12.7%)		
Do you optimize patient positioning before spinal/epidural insertion?				
Always/Often	16 (80.0%)	46 (64.8%)	6.674*	$^{MC}p = 0.020$*
Sometimes	1 (5.0%)	21 (29.6%)		
Rarely/Never	3 (15.0%)	4 (5.6%)		
In your work, do you need to have excessive bending or twisting of your joints				
Always/Often	7 (35.0%)	34 (47.9%)	1.542	0.463
Sometimes	9 (45.0%)	29 (40.8%)		
Rarely/Never	4 (20.0%)	8 (11.3%)		
Do you do stretch exercises?				
Always/Often	1 (5.0%)	9 (12.7%)	1.255	$^{MC}p = 0.517$
Sometimes	5 (25.0%)	12 (16.9%)		
Rarely/Never	14 (70.0%)	50 (70.4%)		
How often do you exercise?				
Never	4 (20.0%)	14 (19.7%)	3.453	$^{MC}p = 0.614$
Less than once a week	8 (40.0%)	29 (40.8%)		
Once/Week	2 (10.0%)	13 (18.3%)		
Twice/Week	5 (25.0%)	8 (11.3%)		
Three times/Week	0 (0.0%)	4 (5.6%)		
More than 3 times week but less than 7 days a week	1 (5.0%)	3 (4.2%)		

χ^2: Chi square testMC: Monte Carlo.
p: p value for comparison between the studied categories.
*Statistically significant at $p \leq 0.05$.

postures cause strain on the musculoskeletal system and body fatigue [19]. Accordingly, ergonomics education during medical training was recommended to change physicians' behavior and reduce the developing symptoms [6].

MSDs impacted the lives of the participants as being a cause of difficulty falling asleep, feeling anxious, and needing medication to control pain; however, they did not ask for sick leave. This would be supported by doctors having the lowest sick leave rates [20]. This was explained by their concerns about their colleagues and patients and their fear of letting them down [21]. A published systematic review reported an overall sick leave rate of 12% [6]. In a cohort of anesthesia and ICU nurses, musculoskeletal pain was moderate to severe and was believed to affect their life and sleep quality [22].

The nature of the anesthetists' work makes them liable for developing MSDs. They are exposed to poor posturing, especially during airway management with poorly optimized bed levels. Additionally, they are exposed to the marked rotation of the spine and overreaching for tools. This risk would result in musculoskeletal injury if these positions were repeated or prolonged [23–25].

6. Strength and limitations

The sample size was a limitation. The response rate was 37%, limiting the generalizability of the results. Recruitment of anesthesia and ICU nurses would be more informative. The current study did not explore the nature of the procedures that represent a significant risk for the development of WRMSDs. A comparison with office-based physicians would provide strong evidence. The survey depended on self-reported symptoms without formal medical consultation, which might overestimate the results. Besides, anesthetists meet other doctors easily, enabling them to be diagnosed during discussions. It was not done to categorize the anesthesiologists according to their subspecialties (pediatric, cardiothoracic, obstetric anesthesiologists).

7. Conclusion

A significant proportion of anesthetists suffer from WRMSDs. Work ergonomics need to be improved. Educational programs are required to help physicians decrease the possibility of being injured at work.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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