

Musculoskeletal Pain Patterns among Sudanese Surgeons: A Case-Control Study

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Abstract

Background: Musculoskeletal pain and discomfort are common causes that influence most surgeons' performance and lifestyle. The purpose of this study is to investigate where surgeons experience the most musculoskeletal discomfort and suffering compared to non-surgical specialty doctors. **Methodology:** This descriptive case-control study included 156 participants from El Obeid, a city in Sudan's Northern Kordofan state. We randomly selected the volunteers between May and June 2024, irrespective of their age or gender. **Results:** This study included 156 doctors from diverse disciplines aged 27 to 70, with a mean age of 37. Male-to-female ratio: 2:1. Of the 156 participants, 104 (67%) were males and 52 (33%) were females. The bulk of participants were 31–35 (33%), 36–40 (30%), and under 30 (13%). Neck pain was experienced by 38% of participants, including 44% of surgeons and 25% of non-surgical specialists. Surgeons had a greater neck pain rate (RR = 0.420, 95% CI = 0.201–0.879). About 20% of participants, including 24% of surgeons and 13% of non-surgical specialists, reported shoulder pain. The study found a relative risk (RR) of 0.492 and a 95% confidence interval (CI) of 0.197–1.227 between shoulder pain and surgery. Additionally, 57% of participants—66% surgeons and 38% other specialties—reported lower back pain. With an RR of 0.317 (95% CI 0.159–0.633), surgeons are more likely to experience lower back pain. Foot discomfort affected 7% of participants, 9% of cases, and 4% of controls. Cases increased foot pain risk by 0.422 (95% CI 0.088–2.029). **Conclusion:** Surgeons in various specializations in Sudan, as well as doctors in non-surgical specialties, have a significant prevalence of musculoskeletal discomfort. The most often reported areas of pain were the lumbar region, cervical region, shoulder, and lower extremities.

Keywords: Musculoskeletal discomfort, Surgeon, Neck pain, Sudanese.

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INTRODUCTION

Maintaining musculoskeletal health is a crucial concern for healthcare providers. Any discomfort in the locomotor system, particularly in the neck and back, can significantly impact the provider's quality of life. Therefore, it is essential to understand the causes and risks associated with such discomfort [1]. Musculoskeletal pain (MSP) is a prevalent form of disability that affects individuals of all ages and genders worldwide. This condition causes discomfort and significantly impacts the quality of life for those affected [2]. Musculoskeletal discomforts, such as neck and shoulder pain, have become a significant issue for

healthcare providers and the general population. The World Health Organization (WHO) ranked neck discomfort and other locomotor disorders as the fourth and tenth most prevalent health issues, respectively. The Global Burden of Disease Study demonstrated that neck pain is a prevalent source of suffering among individuals aged 15 to 19 years, particularly in relation to other health conditions such as asthma, alcohol consumption, and drug usage [3]. Minimally invasive surgeries are a set of procedures aimed at reducing the length of surgical incisions and shortening the patient's hospital stay. These procedures rely on ergonomics, which involves positioning the surgeon, operating table, and surgical instruments optimally to minimize the risk of errors and

injuries. However, it is worth noting that minimally invasive surgeries can also lead to increased musculoskeletal discomfort and pain among surgeons [4], [5]. The prevalence of neck and shoulder pain and stiffness varies across studies due to the different variables used. Some studies rely on patient reports to assess the disorder, while others use clinical examination [6].

Musculoskeletal discomfort is a prevalent issue that has recently impacted the lives of surgeons, particularly those who do lengthy surgical procedures while standing for extended periods of time. Most surgeons experience musculoskeletal complaints following lengthy operations, with the most common contributing factors being insufficient rest throughout the treatment and a lack of physical activity. Regrettably, there is a lack of literature from Sudan pertaining to this particular subject matter. Hence, this study seeks to determine the predominant location of this musculoskeletal discomfort and pain. This study aims to investigate the prevalence of musculoskeletal pain and discomfort among surgeons during and after operations, particularly among those who do not take intraoperative microbreaks and do not follow a protocol for exercising during surgical procedures. The study also seeks to assess the impact of implementing a protocol for microbreaks with exercise on surgeons' performance and overall lifestyle improvement.

MATERIALS AND METHODS

This descriptive case control study involved 156 participants who live in the city of El-Obeid, which is situated in the northern Kordofan province of Sudan. We randomly selected the participants from May 2024 to

June 2024, without taking into account their age or gender. We deliberately designed and employed an online survey to collect data on musculoskeletal pain and discomfort among surgeons and other specialized doctors, who served as the control group. Aside from the participants' demographic parameters, the survey also incorporates additional information, including inquiries about physical activity, musculoskeletal pain, and discomfort in different body regions.

Ethical Consent

Prior to completing the questionnaire, we directed each participant to thoroughly examine the ethical consent. The study protocol was approved by the Prof. Medical Research Consultancy Center's ethics committee. The approval number is 0009/MRCC.6/24.

Statistical Analysis

The obtained data was arranged into standardized spreadsheets and entered into computer software (SPSS) version 24, developed by SPSS Inc., based in Chicago, IL, USA. The study involved calculating frequencies, cross-tabulations, relative risk, and performing a Chi-square test, all with a 95% confidence interval.

RESULTS

The study included 156 doctors from various specialties, ranging in age from 27 to 70 years, with a mean age of 37±67 years. Of the 156 participants, 104 (67%) were males and 52 (33%) were females, resulting in a male-to-female ratio of 2:1. The majority of the participants were between the ages of 31 and 35, followed by the age groups of 36–40 and ≤30 years, accounting for 33%, 30%, and 13%, respectively.

Table 1: Distribution of study participants by age and sex

	Females	Males	Total
≤30 years	11	10	21
31-35 years	22	30	52
36-40 years	17	30	47
41-45 years	2	16	18
≥46 years	0	18	18
Total	52	104	156

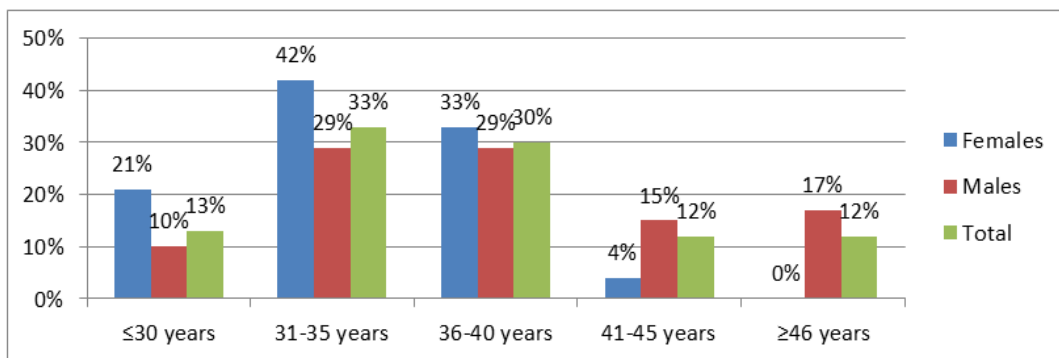


Figure 1: Distribution of the study participants by age and sex

Table 2 and Figure 2 illustrate the distribution of research participants by gender and pain site. 59 of 156 individuals (38%), comprising 41 of 104 (39%) males and 18 of 52 (35%) women, reported experiencing neck pain. Men are more likely to experience neck pain, with a relative risk (RR) of 1.229 (0.614–2.460) and a 95% confidence interval. About 32 (20%) people complained of shoulder pain, including 19 (18%) men and 13 (25% women). Research links female sex to an increased risk of shoulder pain; RR (95% CI) = 0.671 (0.301–1.494). 24 subjects (15%), comprising 16 men (15%) and 8 women (15%), reported upper back pain. Both sexes (male and female) have a comparable risk of upper back discomfort; RR (95% CI) = 1.00 (0.397–2.516). 89 (57%) of the participants, comprising 63 (60%) men and 26 (50%) women, reported lower back pain. Males have a higher incidence of lower back discomfort; RR (95% CI) = 1.537 (0.786–3.006). Six people complained of

forearm pain, including five males and one woman. Approximately 20 (13%) participants complained of hand pain, with 16 (15%) men and 4 (8%) women. 27 (17%) subjects, including 18 (17%) men and 9 (17%) women, reported leg pain. There is an equal risk of sex-related leg pain. RR (95% CI) = 1.000 (0.415–2.411). 16 (15%) patients complained about knee joint pain. The study involved seven men (7%) and nine women (17%). An increased risk of knee joint pain is associated with female sex; RR (95% CI) = 0.345 (0.121–0.986). Thirteen (8%) participants reported ankle joint pain, with seven (7%) males and six (11%) females. An increased risk of ankle joint pain is associated with female sex; the RR (95% CI) is 0.553 (0.176–1.739). 39. 11 individuals (7%) Six (6%) men and five (9%) women experienced foot pain. An increased risk of foot pain is associated with female sex; RR (95% CI) = 0.576 (0.167–1.982).

Table 2: Distribution of study participants by gender and location of pain

Variable	Male (n=104)	Female (n=52)	Total
Neck pain			
Yes	41	18	59
No	63	34	97
Shoulder pain			
Yes	19	13	32
No	85	39	124
Upper back pain			
Yes	16	8	24
No	88	44	132
Lower back pain			
Yes	63	26	89
No	41	26	67
Forearm pain			
Yes	5	1	6
No	99	51	150
Wrist joint pain			
Yes	5	1	6
No	99	51	150
Hand pain			
Yes	16	4	20
No	88	48	136
Leg pain			
Yes	18	9	27
No	86	43	129
knee joint pain			
Yes	7	9	16
No	97	43	140
Ankle joint pain			
Yes	7	6	13
No	97	46	143
Foot pain			
Yes	6	5	11
No	98	47	145

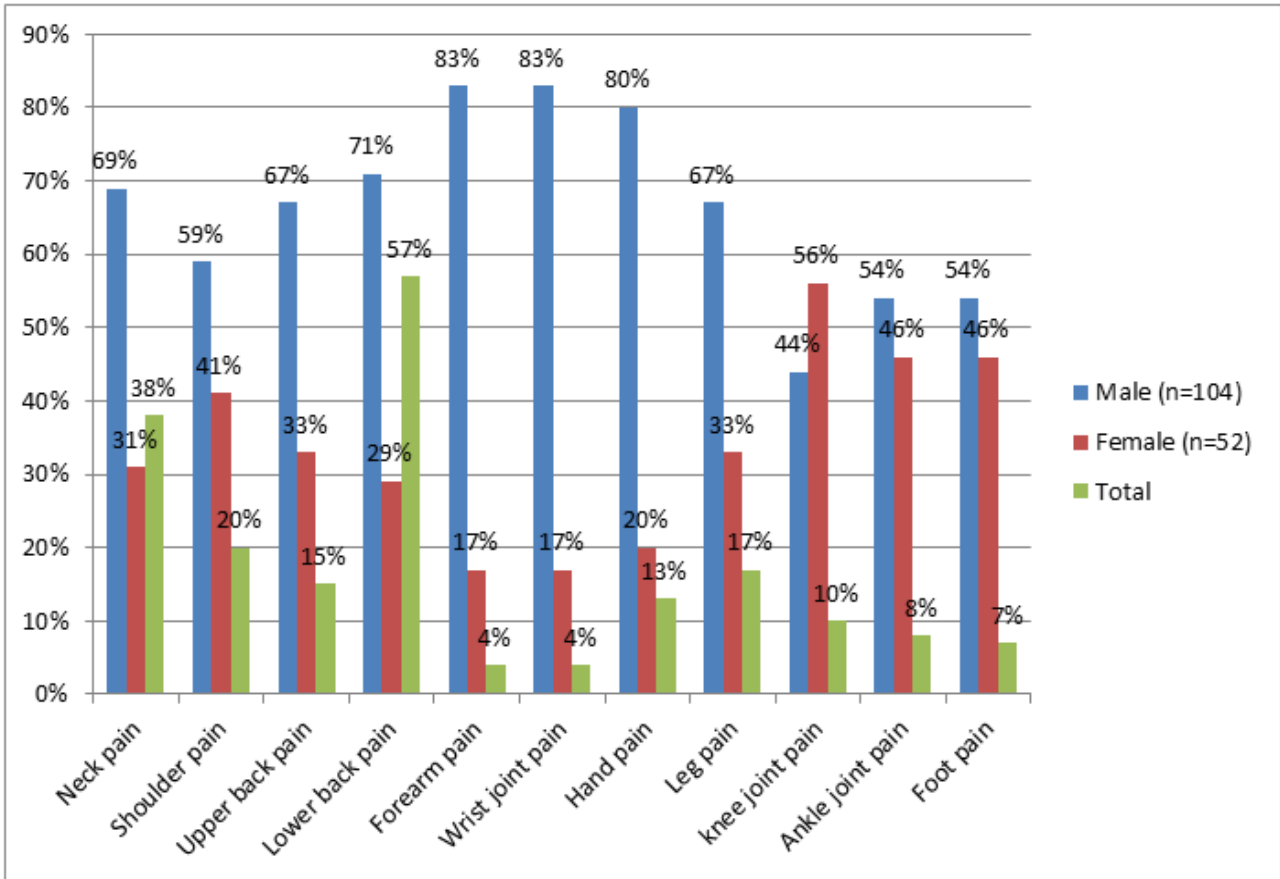


Figure 2: Distribution of the study participants by gender and pain site

Table 3 and Figure 3 show the distribution of study participants by age group and pain site. Neck discomfort was most prevalent in the 31–35 age group, followed by 36–40 and ≥46 years, with 25/59 (42%), 12/59 (20%), and 9/59 (15%), respectively. Shoulder discomfort was more common in the 31–35 age group, followed by 36–40 and ≤30 years, with 11/32 (34%), 7 (22%), and 6 (19%) cases in capta. Lower back pain was most common in the 31–35 age group, followed by 36–40, and evenly distributed across all other age groups, with 31/89 (35%), 25 (28%), and 11/89 (12%), respectively. Hand pain was more prevalent between the

ages of 31 and 40, as seen in Table 3. Knee joint discomfort was more common in age groups 31–35 years, followed by ≥46 years and 36–40 years, with 7/16 (44%), 4 (25%), and 3 (19%), respectively, in capta. Table 3 shows that leg pain was more common in people under the age of 40 (23/27, 85%). Foot discomfort was most common in the 31-35 age group, followed by ≥46 years and 36-40 years, with 6/11 (55%), 2 (18%), and 2 (18%), respectively. However, calculating these values over all age groups indicates significant differences in proportions, as shown in Figure 3.

Table 3: Distribution of study participants by age groups and pain site

Variable	≤30 years	31-35 years	36-40 years	41-45 years	≥46 years	Total
Neck pain						
Yes	5	25	12	8	9	59
No	16	27	35	10	9	97
Total	21	52	47	18	18	156
Shoulder pain						
Yes	6	11	7	3	5	32
No	15	41	40	15	13	124
Total	21	52	47	18	18	156
Lower back pain						
Yes	11	31	25	11	11	89
No	10	21	22	7	7	67
Total	21	52	47	18	18	156

Variable	≤30 years	31-35 years	36-40 years	41-45 years	≥46 years	Total
Hand pain						
Yes	3	7	5	3	2	20
No	18	45	42	15	16	136
Total	21	52	47	18	18	156
Leg pain						
Yes	5	9	9	3	1	27
No	16	43	38	15	17	129
Total	21	52	47	18	18	156
Knee joint pain						
Yes	2	7	3	0	4	16
No	19	45	44	18	14	140
Total	21	52	47	18	18	156
Foot pain						
Yes	1	6	2	0	2	11
No	20	46	45	18	16	145
Total	21	52	47	18	18	156

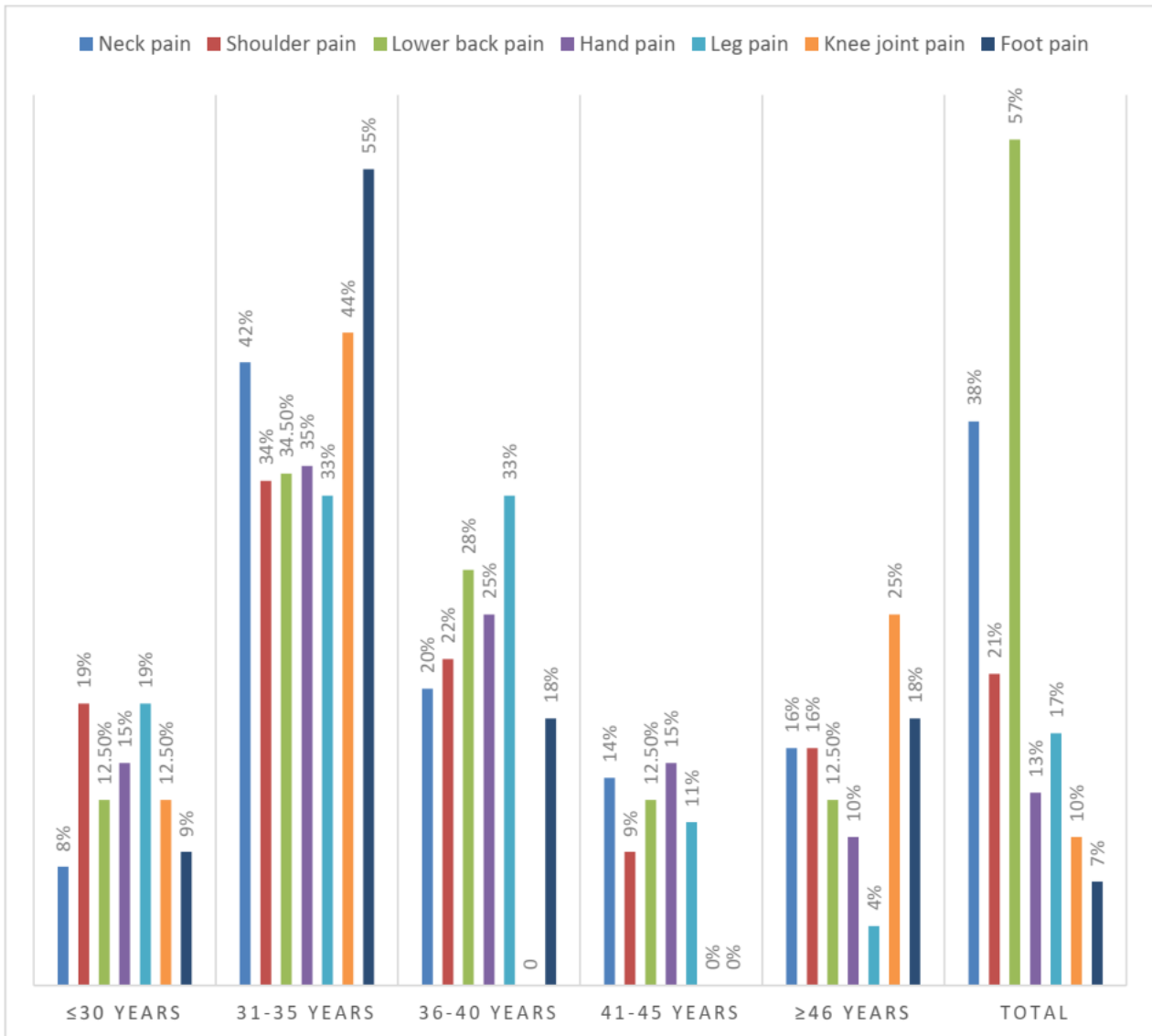


Figure 3: Distribution of study participants by age groups and pain site

Table 4 and Figure 4 depict the distribution of study participants by case, control, and pain site. 59/156 participants (38%), comprising 46/104 (44%) cases and 13/52 (25%) controls, reported neck discomfort. Cases are more likely to experience neck pain, with a relative risk (RR) of 0.420 (0.201–0.879) and a 95% confidence range. About 32/156 (20%), comprising 25/104 (24%) cases and 7/52 (13%) controls, reported shoulder pain. Cases related to an increased risk of shoulder pain: RR (95% CI) = 0.492 (0.197–1.227). 89 (57%) individuals reported lower back discomfort, comprising 69 (66%) cases and 20 (38%) controls. Cases have a higher

incidence of lower back pain (RR = 0.317, 95% CI = 0.159–0.633). Hand pain was reported by approximately 20 (13%) participants, with 17 (16%) cases and 3 (6%) controls. Cases related to an increased risk of hand pain: RR (95% CI) = 0.313 (0.087–1.123). 27 (17%) subjects, including 26 (25%) cases and one (2%) control, experienced leg pain. Leg discomfort instances have a higher RR (95% CI) of 0.059 (0.008–0.447). Eleven (7%) people reported foot pain, while nine (9%) cases and two (4%) controls reported it. Cases related to an increased risk of foot discomfort: RR (95% CI) = 0.422 (0.088–2.029).

Table 4: Distribution of the study participants by case, control, and pain site

Variable	Case (n=104)	Control (n=52)	Total
Neck pain			
Yes	46	13	59
No	58	39	97
Shoulder pain			
Yes	25	7	32
No	79	45	124
Lower back pain			
Yes	69	20	89
No	35	32	67
Hand pain			
Yes	17	3	20
No	87	49	136
Leg pain			
Yes	26	1	27
No	78	51	129
Foot pain			
Yes	9	2	11
No	95	50	145

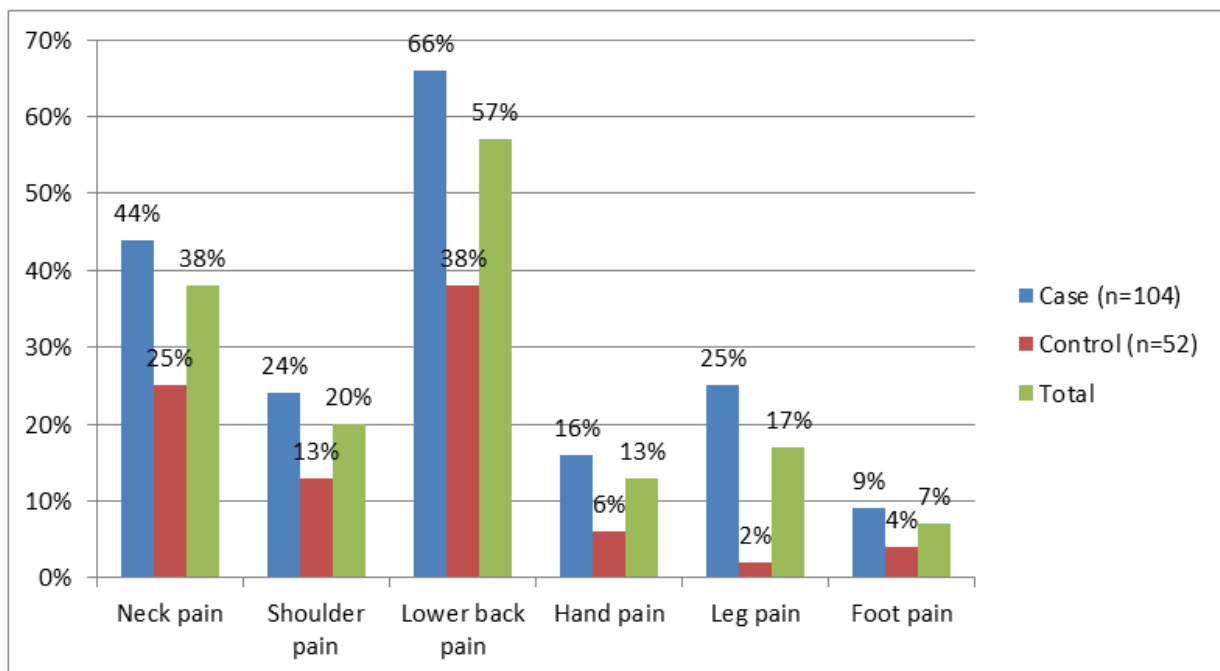


Figure 4: Distribution the study participants by case, control, and pain site

DISCUSSION

The purpose of this study was to uncover patterns of musculoskeletal pain among Sudanese surgeons in comparison to doctors who specialize in non-surgical specialties such as internal medicine, dermatology, radiology, and others. Lower back pain was the most common type of pain reported by the study's participants (57%). Back pain, particularly in the lower back, is common around the world, with 80% of individuals having it at least once in their lives [7].

People working in the health industry, particularly in surgery, report more pain and discomfort in the lower back than in other areas of the musculoskeletal system. Thirty-eight percent of surgeons experience back pain. General surgeons make up the biggest percentage, followed by gynecologists. There was a significant rate of back discomfort among surgeons with extensive work experience. Back pain was unaffected by the surgeon's gender, dominant hand, specialty, or other working conditions [8]. Their study had a larger sample size, and the fact that they counted total back pain may explain the disparities between our and their findings. In this study, surgeons reported a wide ring of neck pain. Approximately two-thirds of surgeons suffer from neck pain at some point during the year. According to the Neck Incapacity Index, almost 53% of the population was unable to function owing to neck pain, with 45.5% having mild pain, 6.5% experiencing moderate pain, and 0.8% experiencing severe pain. Furthermore, 17.5% of surgeons reported taking time off work for neck pain, with a median loss of 3.5 days (interquartile range, 2–7.8 days) [9]. Neck pain is common among doctors practicing a variety of disciplines, including laparoscopic surgery, plastic surgery, urology, orthopaedics, dentistry, and ophthalmology. According to a poll, 88% of surgeons suffered from neck pain, with 11.9% experiencing pain in other parts of their bodies [10].

In this study, 20.5% of the doctors reported experiencing shoulder pain. A variety of conditions can cause shoulder pain, with rotator cuff tendinopathy being the most common [11].

In this study, 38% of the participants reported having neck pain. In the study, 44% of surgeons reported neck pain, compared to 25% of doctors in non-surgical specialties such as internal medicine and dermatology. Surgeons have a higher prevalence of neck pain than other non-surgical doctors. There were 865 people (29%) who reported neck pain and 1,619 people (54%) who reported thoracolumbar pain. Morbidity was severe in 13% of men with only neck pain, 24% of men with neck pain and rhizopathy, and 46% of men with pain, rhizopathy, and motor dysfunction. The remaining 77% of patients experienced neck and thoracolumbar pain. Twenty-three percent of males with neck pain had only neck discomfort and no thoracolumbar pain, whereas the

other 77% had both. 10% of men with neck pain but no thoracolumbar pain, and 30% of men with neck and thoracolumbar pain suffered from severe morbidity [12]. There was a statistically significant relationship between neck discomfort and surgery days, as well as a worsening of neck pain on surgical days. They may not, however, feel pain as a result of surgical intervention; other reasons or difficulties may be contributing to their suffering [13].

According to the study findings and previous work, surgeons should be aware of ergonomic issues, such as sitting at an optimal height in relation to the patient, having their eyes at the appropriate height, and so on.

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REFERENCES

1. Bucher, T., Volken, T., Pfeiffer, F., & Schaffert, R. (2023). Musculoskeletal pain in health professionals at the end of their studies and 1 year after entry into the profession: a multi-center longitudinal questionnaire study from Switzerland. *BMC Musculoskeletal Disorders*, 24(1), 518. doi: 10.1186/s12891-023-06635-z.
2. Ayed, H. B., Yaich, S., Trigui, M., Hmida, M. B., Jemaa, M. B., Ammar, A., ... & Damak, J. (2019). Prevalence, risk factors and outcomes of neck, shoulders and low-back pain in secondary-school children. *Journal of research in health sciences*, 19(1), e00440.
3. Gheysvandi, E., Dianat, I., Heidarimoghadam, R., Tapak, L., Karimi-Shahanjarini, A., & Rezapur-Shahkolai, F. (2019). Neck and shoulder pain among elementary school students: prevalence and its risk factors. *BMC public health*, 19(1), 1-11. doi: 10.1186/s12889-019-7706-0
4. Ntiamoah, P., Machuzak, M., Gildea, T. R., & Mehta, A. C. (2023). Ergonomics of bronchoscopy: good advice or a pain in the neck?. *European Respiratory Review*, 32(170), 230139. doi: 10.1183/16000617.0139-2023
5. Alhusuny, A., Cook, M., Khalil, A., Xie, Y., & Johnston, V. (2020). Neck/shoulder problems and visual disturbances among surgeons: a scoping review. *Journal of Surgical Research*, 247, 413-428. doi: 10.1016/j.jss.2019.09.064. Epub 2019 Oct 31.
6. Jakobsen, E. L. T., Biering, K., Kærgaard, A., Dalbøge, A., & Andersen, J. H. (2018). Long-term prognosis for neck-shoulder pain and disorders: a 14-year follow-up study. *Occupational and environmental medicine*, 75(2), 90-97. doi: 10.1136/oemed-2017-104422.
7. Jain, S., Shinde, S., & Jain, P. Correlation Between Direction of Prolapsed Intervertebral Disc (PIVD)

- And Lumbar Vertebral Alignment. *International Journal of Disabilities Sports and Health Sciences*, 7(2), 315-325.
8. Aldaheri, A. A., Aljuhani, M. M., & Aldaheri, R. E. (2023). The prevalence and associated factors of lower back pain among surgeons in Makkah Region, Saudi Arabia. *Journal of Family Medicine and Primary Care*, 12(7), 1308-1314. doi: 10.4103/jfmpc.jfmpc_468_22. Epub 2023 Jul 14.
 9. Abolfotouh, S. M., Alnori, O., Choma, T., Moore, D., & Abolfotouh, M. A. (2024). Epidemiology of work-related neck pain among spine surgeons. *Global Spine Journal*, 14(5), 1515-1523. doi: 10.1177/21925682221148685.
 10. Acharya, H., Patel, P., Shetty, G. M., Shah, M., Bamb, H., & Nene, A. (2022). Prevalence and risk factors of neck pain in spine surgeons-Are we our own patients?. *Journal of Clinical Orthopaedics and Trauma*, 33, 102012. doi: 10.1016/j.jcot.2022.102012.
 11. Abouh, A. M. A., Elkhair, M. M., Younis, A. A. I., Khalifa, M. M. H., Adam, N. M. O., Kortukala, F. I. G., ... & Ahmed, H. G. (2024). Musculoskeletal pain patterns in a group of Sudanese surgeons. *Kordofan Journal of Medical and Health Sciences*, 1(01), 9-14.
 12. Damm, H., Jönsson, A., Rosengren, B. E., Jephsson, L., Ohlsson, C., Ribom, E., ... & Karlsson, M. K. (2023). Prevalence and morbidity of neck pain: a cross-sectional study of 3000 elderly men. *Journal of Orthopaedic Surgery and Research*, 18(1), 36.
 13. Zafar, A., Akhtar, S., Sadiq, U., & Sobia, S. (2021). Prevalence of non-specific neck pain among surgeons in different hospitals of Lahore. *American Journal of Health, Medicine and Nursing Practice*, 6(2), 42-47.