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Prevalence and risk factors of neck pain in spine surgeons - Are we our own patients?

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ABSTRACT

Aim: This survey of spine surgeons aimed to determine the prevalence of neck pain and identify the associated risk factors. The prevalence of neck pain has been reported in various medical sub-specialities including laparoscopy surgeons, dentists, plastic surgeons, ophthalmologist, urologist and orthopaedic surgeons. However, the literature is lacking on prevalence and risk factors for neck pain in spine surgeons.

Methods: A survey questionnaire containing demographic, Neck pain and work practice details was administered to 300 spine surgeons (members of an online group) via text message and e-mail.

Results: One hundred and eighty surgeons responded to the survey (response rate, 60%). Three spine surgeons had previous cervical spine surgeries. The 1-month prevalence rate of neck pain was 74.4% (134/180 surgeons). One hundred and eighteen surgeons (88%) reported only neck pain, 16 surgeons (11.9%) had neck pain with radicular arm pain. Only 20.5% of surgeons used a loupe, 18% of surgeons used a microscope, and 24% of surgeons used operating table height at umbilicus during surgery. There was no significant difference between the mean age ($p = 0.65$), work experience ($p = 0.8$), time spent in surgery ($p = 0.7$), and operating table height preference ($p = 0.4$) when symptomatic and asymptomatic groups were compared. However, a significantly greater percentage of surgeons had a sedentary lifestyle ($p = 0.002$) & used loupes as compared to microscopes ($p = 0.04$) in the symptomatic group. There was significant correlation between the surgeon's lifestyle & use of loupe and the incidence of neck pain.

Conclusion: Spine surgeons have a higher prevalence of neck pain than general populations and surgeons from other specialties. Considering the high prevalence of neck pain, general health, work, and ergonomic guidelines and recommendations must be formulated to help prevent and decrease the burden of neck pain among spine surgeons.

1. Introduction

Neck pain is a common musculoskeletal symptom with a global mean point prevalence of 7.6% and a mean 1-month prevalence of 23.3% in the adult population.[1–4] The incidence of neck pain may increase based on the individual's occupation and has been reported to be frequent among healthcare professionals such as physicians, surgeons, and dentists.[5–8] A recent study by Meltzer et al.[8] studied the ergonomics of the operating surgeon using wearable sensors and reported that surgeons spent 65% of procedure time in “high-risk” neck positions putting them at increased risk of chronic neck pain.

Altering the operating table's height and using a visualisation tool (loupe or microscope) has been recommended to improve the ergonomics of the operating surgeon.[9,10] However, modern and expensive visualisation tools like loupe or an operating microscope may not be universally available, and most surgeons in developing countries operate without these tools putting them at greater risk for neck pain. Although few studies have reported the prevalence of neck pain in ENT surgeons, urologists, dentists, plastic surgeons & ophthalmologists,[5–8] the literature is lacking on the incidence of neck pain and the associated risk factors among spine surgeons in limited-resource setting with limited operating visualisation tools.

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Hence, this national survey aimed to determine the prevalence of neck pain among spine surgeons and determine the demographic and ergonomic risk factors such as age, lifestyle, number of hours spent in the outpatient clinic and operating, visualisation techniques used during surgery, and operating table height associated with neck pain. We hypothesized that the prevalence of neck pain among spine surgeons would be significantly higher than the prevalence of neck pain previously reported among the general population and surgeons from other specialties.

2. Materials and methods

The current study was designed as an online electronic survey administered to a national, online group of spine surgeons and was conducted in April 2020. The inclusion criterion was spine surgeons who had completed their residency in orthopaedic surgery and were either independent spine surgery consultants or were undergoing a spine surgery fellowship. The target population was spine surgeons who were members of the online spine surgeons group. The exclusion criteria were non-spine surgeon members of the group, spine surgeons with underlying inflammatory disorders such as rheumatoid arthritis or spondyloarthropathies, with a history of trauma, tumour or infection of the cervical spine, and spine surgeons who had previously undergone a cervical spine surgical procedure.

The survey involved a 14-point questionnaire (which collected details of their neck pain and treatment taken and details of their work practice), prepared after discussion and consensus among a team of 5 spine surgeons. The initial section collected demographic details such as age, gender, weight, height, and lifestyle (sedentary, semi-active, or active) of the participants. The first part of the 14-point questionnaire collected information regarding their neck pain which included duration and frequency of pain, associated symptoms of radicular pain (pain radiating to limbs) or radiculopathy (tingling numbness or weakness in limbs), and type of treatment taken for the neck pain such as pain medication, physiotherapy, intermittent rest, a combination of the above, or surgery. The second part of the questionnaire collected details of the surgeon's work practice such as experience (years of surgical practice), hours per week spent in the outpatient clinic, hours per week spent in operating, type of visualisation tool used (loupe, operating microscope, or none), preferred table height (at/above the umbilicus, below the umbilicus, or no preference), and their years of experience as a spine surgeon.

The questionnaire was initially sent to 10 volunteers to assess relevance, comprehensiveness, and length, and necessary changes were made. The questionnaire was prepared using Google Forms (Google LLC, California, USA) template and was sent to each member of the online spine group as a link through text message or e-mail. A total of 3 attempts were made to contact each surgeon using both channels within 1 month of the survey's start.

Prevalence rates for neck pain were recorded for the study population and calculated for subgroups based on subject demographic and work/practice features. Continuous data were compared using *t*-Test, and categorical data were compared using Fisher's test. A multivariate analysis was performed for age (25–40, >40 years), lifestyle (sedentary, semi-active, or active), years in practice ($\leq$10 years and >10 years), outpatient clinic hours per week ($\leq$20 and > 20 h), operating hours per week ($\leq$20 and > 20 h), visualisation technique (loupe, microscope, none), and operating table height preference (at or above the umbilicus, below the umbilicus, and no preference) to determine whether a dose-dependent relationship exists between subject demographic and ergonomic factors and the prevalence of neck pain. A p-value of <0.05 was considered to be significant.

3. Results

3.1. Study population

Of the 300 spine surgeons contacted, 180 filled the form giving a response rate of 60%. Three surgeons had a previous history of cervical spine surgery (discectomy in 2 surgeons and decompression and fixation in one surgeon). The demographic details of all study subjects are summarised in Table 1. Overall, a majority of surgeons (73%) had work experience of $\leq$10 years, a majority of surgeons (60%) spent >20 h per week in the outpatient clinic, and a majority of surgeons (57.7%) spent <20 h per week performing surgeries (Table 2). A majority of surgeons (61.6%) did not use visualisation tools such as loupe and operating microscope during surgery and a majority of surgeons (69%) did not have a preference for operating table height during surgery.

3.2. Prevalence of neck pain

One hundred and thirty-four surgeons reported neck pain within the last 1 month, which gave a point prevalence rate of 74.4% for neck pain. Based on the demographic subgroups, the prevalence rate for neck pain was not significantly different between the 25–40 years and >40 years age groups ($p = 0.85$). However, neck pain prevalence was significantly greater in surgeons with a sedentary lifestyle when compared to surgeons with an active lifestyle ($p = 0.002$). There was no significant difference in neck pain prevalence between surgeons with varied years of work experience ($p = 0.8$), between surgeons with outpatient clinic work of $\leq$20 and > 20 h per week ($p = 0.06$), between surgeons with operating hours $\leq$20 and > 20 h per week ($p = 0.6$), and surgeons with operating table height at or above the umbilicus or below the umbilicus and no preference ($p = 0.4$). On comparing two subgroups of surgeons using loupes and microscopes, surgeons using loupes had significantly more neckpain than those using microscopes (0.04).

3.3. Symptomatic surgeons

Among 134 symptomatic surgeons, 81 surgeons (62%) reported having episodic neck pain at least once a month, 26 surgeons (20%) reported to be suffering from neck pain at least once a week, and 24 surgeons (18%) complained of neck pain almost every day post-surgery. One hundred and eighteen surgeons (88%) reported only neck pain, 16 surgeons (11.9%) had neck pain with radicular arm pain. In terms of management of their neck pain, 11 surgeons (8.5%) took pain medications as and when required, and 15 surgeons (11.5%) resorted to physiotherapy or massages for the pain, 29 surgeons (22%) took intermittent rest to relieve their pain, 32 surgeons (24.5%) used a combination of rest, pain medication and physiotherapy, and 44 surgeons (33.5%) were not on any treatment.

3.4. Symptomatic vs. asymptomatic surgeons

When spine surgeons with neck pain were compared with spine surgeons without neck pain, the mean age ($p = 0.65$), mean height ($p = 0.2$), and mean weight ($p = 0.95$) were not significantly different. However, significantly lesser percentage had an active lifestyle ($p = 0.02$) in the symptomatic group. There was no significant difference in work experience as a spine surgeon ($p = 0.8$), time spent in the outpatient clinic per week ($p = 0.15$), and the operating time per week ($p = 0.7$) when the 2 groups were compared. Similarly, there was no significant difference in the percentage of surgeon's operating table height preference ($p = 0.4$) when the 2 groups were compared.

Table 1
Results

	Pain	No Pain	p value
TOTAL	134	46	
Weight			
<60 or (blank)	2	0	p = 0.95
60–70	19	7	
70–80	46	17	
80–90	40	15	
90–100	24	6	
>100	3	1	
BMI			p = 0.6
20–25	47	15	
25–30	73	24	
30–35	12	5	
>35	2	2	
Height			p = 0.2
<160 or (blank)	2	3	
160–174	67	22	
175–189	63	21	
190–204	2	0	
Age			p = 0.65
<30	11	3	
30–39	77	26	
40–49	31	14	
>50	15	3	
Lifestyle			*p = 0.02*
Exercise atleast thrice a week	49	20	
Exercise daily	15	12	
Exercise on weekend	32	7	
None of the above	38	7	
OPD hrs/week			p = 0.15
>30 h	29	16	
10–20 h	39	15	
20–30 h	50	13	
5–10 h	16	2	
How do you operate?			p = 0.12
Loupe	31	6	
Microscope	20	12	
Naked eyes	83	28	
OT table height			p = 0.4
Above umbilicus	8	3	
At umbilicus	28	5	
Below Umbilicus	8	4	
Comfortable height	82	33	
I dont care much	8	1	
Scrubbed hrs/week			p = 0.7
>40	11	3	
20–30	40	11	
30–40	11	0	
10–20	50	21	
5–10	22	11	
Experience			p = 0.8
>20 years	11	3	
10–20 years	27	8	
2–5 years	40	12	
5–10 years	27	13	
Less than 2 years	29	10	

Table 2
Sub categorized results.

	Pain	No Pain	*p value*
Lifestyle			*p = 0.002*
Exercise atleast thrice a week	54	32	
Exercise less than thrice a week	70	14	
OPD hours/Week			p = 0.6
>20 h	79	29	
<20 h	55	17	
How do you generally operate?			*p = 0.04*
Loupe	31	6	
Microscope	20	12	
Scrub hours/week			
>20 h	72	32	p = 0.06
less than 20 h	62	14	

4. Discussion

This study aimed to determine the prevalence of neck pain among spine surgeons and its associated risk factors. Our results indicate that the prevalence of neck pain among spine surgeons was high at 74.4% (134/180 surgeons), who reported at least one episode of neck pain within the last 1 month. Furthermore, a sedentary lifestyle & use of loupes over microscopes showed a significant correlation with the prevalence of neck pain.

A survey on musculoskeletal disorders conducted among spine surgeons who were members of the Scoliosis Research Society (SRS) reported a neck pain prevalence of 59% among 561 surgeons (response rate 62%) which was lower than the 1-month neck pain prevalence rate of 74% found in the current study.[11] This higher prevalence rate in the current study could be due to the lower mean age of 37.5 years among respondents which coincides with the age of peak incidence for neck pain of 35–49 years when compared to the mean age of 54 years among respondents of the SRS survey, and because 16% of respondents in the SRS survey were non-active surgeon members.[11,12] The prevalence of neck pain among surgeons of different subspecialties has been previously reported[6,13–19] (Fig. 1). Wyatt et al.[17] in a national survey of orthopaedic surgeons, reported a neck pain prevalence rate of 59.3%. Similarly, surgeons from other surgical specialties such as urology, ophthalmology, otolaryngology, microsurgery, surgery, and laparoscopic surgery have a reported neck pain prevalence ranging from 28% to 59.8% which was much lower than the 74.4% prevalence in the current study for spine surgeons[13–16,18] (Fig. 1). However, Cass et al.[19] in a survey of laparoscopic gynaecological surgeons reported a high neck pain prevalence of 74% among 128 responders (response rate 24%) similar to the prevalence rate in spine surgery reported in the current study (Fig. 1).

A higher prevalence of neck pain among laparoscopic gynaecological surgeons has been attributed to the non-availability of ergonomic friendly surgical instruments and tools and the general lack of awareness among surgeons regarding safe ergonomic practices during surgery.[19] Park et al.[10] in an ergonomic and kinematic analysis of the cervical spine position using a spine surgery simulator reported that setting the operating table height above the umbilicus and using an operating microscope was ergonomically superior for neck position during spine surgery. In the current study, only 20.5%of surgeons used a loupe, 18% of surgeons used a microscope, and only 24% of surgeons set their operating tables above the umbilicus. Although operating table height did not significantly correlate to neck pain prevalence, the surgeons using loupes had significant more neck pain than those using microscopes (p = 0.04) in the current study. We conjecture that poor neck ergonomics and lack of awareness or adaptation of safe ergonomic practices during surgery may be the reason for the high neck pain prevalence in the current study. A sedentary lifestyle was significantly correlated with neck pain prevalence in the current study. It has been reported that a sedentary lifestyle and lack of

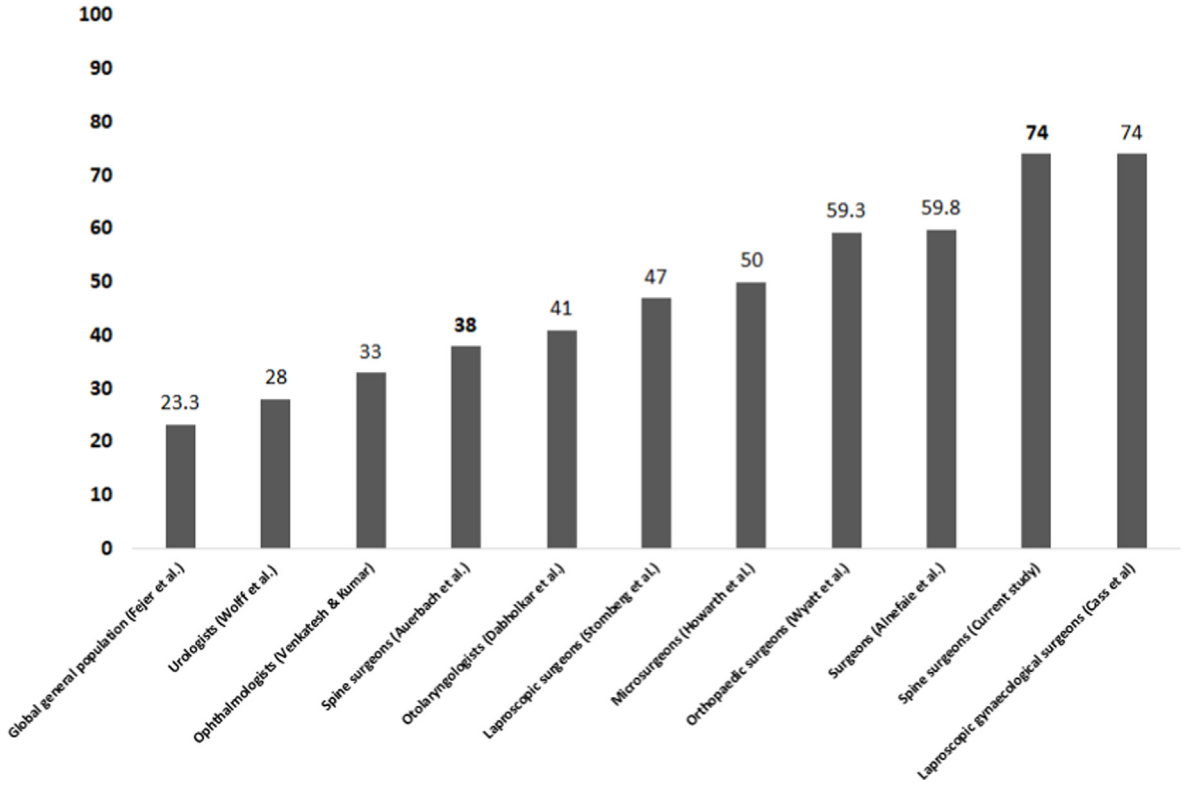

Fig. 1. Prevelance of neck pain in General population and other medical sub specialities.

physical activity may be associated with increased risk for neck and low back pain[20,21] and increasing daily physical activity such as walking can have a protective effect for the onset of neck pain in subjects with a sedentary lifestyle.[22] This was confirmed in the current study where spine surgeons with a sedentary lifestyle had the highest neck pain prevalence, and a significantly greater percentage of spine surgeons in the asymptomatic group had an active lifestyle when compared to symptomatic surgeons (Table 1).

This study has a few limitations. First, we did not have a control group to compare the prevalence of neck pain with other study groups. Second, the response rate in the current study was 60%, which increases the risk of selection bias. However, this response rate was similar to or higher than response rates reported for similar surveys conducted on healthcare professionals.[11,19,23]

The findings of the current study indicate that the burden of neck pain among spine surgeons in a limited resource setting is significantly high, especially compared to the general population or other surgical subspecialties (Fig. 1).

We also put forward a few recommendations based on our results and literature review. Firstly, lifestyle modification by the spine surgeon with regular exercises might be beneficial to prevent neck pain. And secondly, raising awareness among spine surgeons and adapting safe ergonomic practices such use of an operating microscope over a loupe when possible, optimum operating table height (above the umbilicus), and taking microbreaks during surgery should be standard practice and may help prevent or reduce the incidence of neck pain among spine surgeons.[9,10,23,24]

5. Conclusion

Spine surgeons have a higher prevalence of neck pain as compared to general populations and their counterparts in other surgical specialties. A sedentary lifestyle and use of loupe when preferred as magnification devise over microscopes, ware significantly associated with the prevalence of neck pain. Considering the high prevalence of neck pain among spine surgeons, general health, work, and ergonomic guidelines and recommendations must be formulated to help prevent and decrease the burden of neck pain among spine surgeons.

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