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PREVALENCE AND RISK FACTORS ASSOCIATED WITH NECK AND LOW BACK PAIN AMONG MEDICAL DOCTORS ACROSS THE INDIA: A CROSS-SECTIONAL STUDY

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ABSTRACT

Background: Musculoskeletal disorders are a significant and highly prevalent occupational hazard in health care, however data focusing exclusively on doctors in India are limited.

Materials and Methods: We conducted an online cross-sectional convenience survey of 609 physicians and surgeons across India to estimate the prevalence of neck and low back pain and identify associated risk factors over 1 week, 1 month, and 12 month recall periods.

Results: over a quarter and a third of physicians reported experiencing neck and low back pain in the last 1-week and 1-month, respectively, this increased to 54.8% of respondents for low back pain and 53.4% for neck pain in the last one year. Multivariable logistic regression analyses identified female sex, obesity, excessive occupational bending and psychosocial factors, such as stress and pain-related depression, as the most consistent correlates of pain. Conversely, traditional lifestyle factors such as smoking, diet, physical activity, and caffeine intake as well as past and family history of back pain showed little to no association.

Conclusion: To our knowledge, this is one of the largest Indian studies focusing exclusively on doctors. While our results suggest a high prevalence of pain, the use of non probability of online sampling may limit the generalizability of these findings to the entire doctors population. However Our results emphasizes the need for structured ergonomic interventions and wellness programmes in the country.

Keywords: Musculoskeletal Disorders, YLDs

INTRODUCTION

Musculoskeletal disorders (MSDs), defined as conditions that affect the muscles, bones, joints, ligaments, and tendons, are a major global health challenge and are significant contributors to years lived with disability (YLDs) and reduced quality of life worldwide, and exert a substantial economic burden through healthcare costs and productivity losses.[1] According to the 2021 Global Burden of Disease Study, neck pain and low back pain are highly prevalent conditions with low back pain being the leading cause of YLDs, and affecting thrice as many individuals (619 million) compared to neck pain (203 million).[2,3] Among various occupational groups, healthcare workers are disproportionately affected by MSDs, stemming from the inherent demands of their profession, which often combines long and unpredictable working hours with ergonomically challenging procedures in many specialities. Indeed, a recent systematic review of 36 studies examining the prevalence of work-related MSDs among 12,940 individuals spanning six healthcare professions across 5 continents reported that the lower back and neck were the most commonly affected sites, with 12 month prevalence

estimates frequently exceeding 40-50%.[4] Another systematic review of over 800 hospital physicians found that 12-month prevalences of neck and low back pain ranged from 42%-83% and 33%-68%, respectively.[5] Similar meta-analytic evidence from the broader Indian population, which comprised of workers from fields such as agriculture, mining, textile, construction, information technology, and healthcare found that the healthcare sector had the second highest pooled prevalence of various musculoskeletal disorders.[6] Specifically, the pooled prevalence of low back pain was the highest in agriculture (0.77; (95 % Confidence Interval (CI) 0.61–0.88) and was followed closely by healthcare (0.56; 95% CI 0.49–0.64), while neck pain showed the opposite trend, with the highest prevalence noted among healthcare workers (0.47; 95% CI 0.36–0.57).[6] Musculoskeletal disorders (MSDs) are significant contributors to global disability. Healthcare workers are disproportionately affected. In India, the burden of MSDs among healthcare professionals is high, often due to the rapidly evolving and overstrained public healthcare system, coupled with a large patient population and suboptimal working and ergonomic conditions. Despite this, data on musculoskeletal pain among Indian physicians remain limited. Existing studies have examined related populations such as medical students and other healthcare workers or have combined physicians with these groups, which then limits the ability to disentangle physician-specific ergonomic patterns, such as prolonged operating times, as well as outpatient and on-call duties. Even fewer studies have specifically quantified the prevalence and risk factors of neck and low back pain in this population. Moreover, prior work has evaluated MSDs only at a single time point or recall period, without distinguishing between short-term (1 week), intermediate (1 month), and longer-term (12 month) pain, making it difficult to understand how associations with demographic, lifestyle, occupational, and psychosocial factors evolve over time. There is a clear unmet need for region- and profession-specific data on how the aforementioned factors interact to shape neck and low back pain among doctors in India. Here, we aimed to investigate the prevalence and associated risk factors of neck and low back pain among a large cohort of Indian doctors and elucidate patterns in their associations over different durations of pain recall.

MATERIALS AND METHODS

Study Design and Setting: We conducted an online cross-sectional, convenience observational study designed to estimate the prevalence of neck and back pain and associated risk factors among doctors across India. The population of interest comprised of licensed allopathic doctors who completed medical school (MBBS) and were practicing or undergoing training. This included general practitioners, specialists, and super specialists working in public, private, or academic institutions. The study was conducted at the Department of Orthopedics at Sri Ramachandra Institute of Higher Education and Research, Chennai, India during the period of September 2023 to January 2024 receiving ethical approval from the Institutional Ethics Committee (Ref No: CSP/23/JUL/133/714). Electronic consent was obtained from all participants using consent statements embedded within the Google Forms.

Eligibility Criteria and sampling: Licensed allopathic doctors actively practicing medicine in India were eligible and who were willing to provide written informed consent prior to filling out the questionnaire were considered eligible for this study. Participants with a self-reported diagnosis of chronic musculoskeletal disorders with ongoing treatment were excluded, as were participants who belonged to other healthcare professions. Incompletely filled survey forms were also excluded from the final analysis.

Sample Size Calculation and Sampling Strategy: The minimum required sample size was calculated based on anticipated prevalence rates from previous studies in the literature examining the prevalence of neck and back pain in the general population7,as well as among healthcare workers8. Using the reported prevalence rates in these studies, we anticipated that 53% of respondents would have low back pain and 65% of respondents would have neck pain. Using the formula for estimating a single proportion9, $n = [Z^2 \times p \times (1-p)] / d^2$, where $Z = 1.96$ for a 95% CI, a prevalence, p, of 0.65 (since it is the higher of the two prevalence estimates), and a precision margin (d) of 5%, the minimum required sample size was calculated to be 350 participants. Accounting for a 10% non-response and incomplete response rate, the total was adjusted to 389 participants. To achieve this sample size, we contacted various medical associations, professional bodies, hospital networks, across different states of India to facilitate outreach. Within these identified networks, a combination of convenience and snowball sampling was employed to reach a broad spectrum of doctors during the study period. Participants were also recruited through social media platforms by circulating an invitation message containing a brief description of the study, eligibility criteria, a secure link to the online questionnaire hosted on Google Forms, and an electronic consent statement.

Survey Instrument: We developed a structured 37-item questionnaire that comprised of five broad domains, namely, sociodemographic and anthropometric data, occupational characteristics, lifestyle and behavioural factors, detailed history of neck and low back pain, inclusive of aggravating and relieving factors, over the past 1 week, 1 month, and 1 year, as well as perceived functional and psychosocial impact of pain. The questionnaire was pilot-tested on a small group of doctors for clarity, comprehensibility, appropriateness, and feasibility prior to distribution.

Operational Definitions For this study, "neck pain" was defined as pain felt between the occiput and the third thoracic spine, and "low back pain" was defined as pain felt between the twelfth rib and the gluteal folds.. Obesity in Asian Indian adults is defined as a body mass index (BMI) of ≥25 kg/m², 10calculated by using self-reported height and weight

Outcomes: The primary outcome of the study was to evaluate the 12-month prevalence of low back pain and neck pain, which was defined as any self-reported pain in these regions over the last 12 months. Secondary outcomes included 1-month and 1-week prevalence, proportion of individuals reporting limitation of everyday or social activities due to pain, as well as the proportion of individuals reporting emotional distress related to neck or back pain.

Statistical Analysis: Data collected via Google Forms were exported into a spreadsheet for analysis. For descriptive statistics, data were expressed as N (%). Prevalence of neck and back pain among the total population were reported for each timepoint/recall period with 95% CIs. To identify associated risk factors, bivariate analysis was conducted using chi-square tests for categorical variables. Variables that were found to be statistically significant in the bivariate analysis ($p < 0.05$) were entered into a multivariate logistic regression model to identify independent risk factors for neck and low back pain. Association of these risk factors with pain at all three timepoints were reported with adjusted odds ratios (AOR), 95% CIs, and p-values. Unless otherwise stated, a p-value < 0.05 was considered statistically significant.

RESULTS

Table 1: Prevalence of Neck and Low-Back Pain among Physician- and Surgeon-Respondents

Pain Type / Period	N	Prevalence %	95% CI of Prevalence
Low Back Pain			
1 week	156	25.6	22.15-29.08
1 month	227	37.3	33.43-41.11
1 year	334	54.8	50.89-58.80
Neck Pain			
1 week	168	27.6	24.04-31.14
1 month	217	35.6	31.83-39.44
1 year	325	53.4	49.40-57.30

Baseline characteristics: Of the 609 physicians who completed the survey, half of them were over 40 years old (n=331) and approximately one-third were female (n=210). The cohort had a very high prevalence of obesity, which was reported by over 500 physicians (84.4%). The distribution between surgical and non-surgical specialities was relatively even, with 44.9% (n=271) in surgical fields and 55.5% (n=338) in non-surgical fields. Lifestyle factors indicated that 55% (n=335) engaged in weight lifting and 61.6% (n=375) were actively involved in sports. Regarding social history, a low prevalence of smoking was observed (4.1%, n=25), while 20.1% (n=123) reported a history of alcohol consumption. With respect to dietary patterns, three-fourths of the cohort (n=453) were vegetarian and a quarter were non-vegetarian (n=156). A small segment of surveyed individuals (12.3%, n=75) reported prolonged travel to work, which defined as more than 2 hours of cumulative commute time.

Table 2: Summary of clinical, physical, and emotional variables associated with perceived neck and low back pain

Variable	Low Back Pain N(%) (n=334)	Neck Pain N(%) (n=325)
Medications for any pain	50 (14.9)	51 (15.7)
History of surgery for neck/back pain	22 (6.6)	25 (7.7)
Limits daily activities	76 (22.8)	79 (24.3)
Limits social activities	75 (22.5)	74 (22.8)
Emotionally depressed by neck/back pain	88 (26.3)	84 (25.8)
Not satisfied with current occupation	54 (16.2)	57 (17.5)
Monotony in occupation	148 (44.3)	145 (44.6)
Excess bending of neck and back	220 (65.9)	227 (69.8)
Aggravated due to stress	228 (68.3)	236 (72.6)
Family history	107 (32)	104 (32)

Self-reported prevalence of neck and low back pain: In the total population, 334 physicians (54.9%) reported low back pain during the study period, while 325 reported neck pain (53.3%). Neck and low back pain prevalence demonstrated progressive increases with the recall period. For example, 156 doctors (25.6%, 95% CI: 22.15-29.08) reported experiencing low back pain within the last week. This figure rose to 227 doctors (37.3%, 95% CI: 33.43-41.11) when considering the last month, and further increased to 334 doctors (54.8%, 95% CI: 50.89-58.8) over the course of the past year. Similarly, 168 doctors (27.6%, 95% CI: 24.04-31.14) reported neck pain in the last one week, which then increased to 217 doctors (35.6%, 95% CI: 31.83-39.44) and 325 doctors (53.4%, 95% CI: 49.4-57.3) experiencing pain within the last one month and one year, respectively [Table 1]. When stratified by baseline

demographic, medical history, and psychosocial characteristics, most attributes were comparable between individuals with low back and neck pain. Both groups had similar numbers of physicians who were taking concomitant medications for any pain (14.9% vs 15.7%), had a family history of pain in these regions (32% vs 32%), felt unsatisfied by current working conditions (16.2% vs 17.5%), and who felt that pain limited their daily (22.8% vs 24.3%) and social activities (22.5% vs 22.8%). Both groups also reported similar rates of feeling depressed due to pain (26.3% vs 25.8%), but a slightly higher proportion of individuals with neck pain reported aggravation of pain due to stress (68.3% vs 72.6%) as well as excessive bending at work (69.8% vs 65.9%) [Table 2].

Table 3: Risk Factors for Neck Pain at 1 Week

RISK FACTORS	Neck Pain Yes	Neck Pain No	OR	95% CI	AOR	95% CI	P Value
Age >40	94 (28.4)	237 (71.6)	0.92	0.64-1.31	1.16	0.75-1.80	0.491
<40	74 (26.6)	204 (73.4)					
Sex Female	70 (33.3)	140 (66.7)	1.54	1.07-2.22	1.41	0.956-2.09	0.084
Male	98 (24.6)	301 (75.4)					
Diet Veg	128 (28.3)	325 (71.7)	1.14	0.762-1.72	1.21	0.79-1.86	0.375
Non-veg	40 (25.6)	116 (74.4)					
Smoking Yes	7 (28)	18 (72)	1.02	0.42-2.49	0.54	0.20-1.45	0.22
No	161 (27.6)	423 (72.4)					
Alcohol No	146 (30)	340 (70)	1.97	1.19-3.25	2.05	1.15-3.65	0.015
Yes	22 (17.9)	101 (82.1)					
Coffee Yes	73 (27.7)	191 (72.3)	1.006	0.70-1.44	0.97	0.67-1.39	0.857
No	95 (27.5)	250 (72.5)					
Travel duration >2 hrs	21 (28)	54 (72)	1.02	0.59-1.75	1.09	0.63-1.88	0.771
<2 hrs	147 (27.5)	387 (72.5)					
Weight lifting Yes	97 (29)	238 (71)	1.17	0.81-1.67	0.82	0.55-1.20	0.303
No	71 (25.9)	203 (74.1)					
Sports Yes	102 (27.2)	273 (72.8)	0.951	0.66-1.37	1.001	0.67-1.50	0.998
No	66 (28.2)	168 (71.8)					
Obesity Yes	147 (28.6)	367 (71.4)	1.41	0.84-2.38	1.33	0.78-2.26	0.302
No	21 (22.1)	74 (77.9)					
Past history of neck/back pain Yes	10 (31.2)	22 (68.8)	1.21	0.56-2.60	0.882	0.36-2.15	0.782
No	158 (27.4)	419 (72.6)					
Limitation of daily activities Yes	54 (57.4)	40 (42.6)	4.75	3.00-7.51	2.88	1.43-5.80	0.003
No	114 (22.1)	401 (77.9)					
Limitation of social activities Yes	42 (46.7)	48 (53.3)	2.73	1.72-4.32	0.619	0.29-1.30	0.212
No	126 (24.3)	393 (75.7)					
Emotionally depressed Yes	58 (55.2)	47 (44.8)	4.42	2.85-6.86	3.20	1.90-5.40	0.0001
No	110 (21.8)	394 (78.2)					
Satisfied with occupation No	35 (34)	68 (66)	0.69	0.44-1.09	0.678	0.40-1.16	0.157
Yes	133 (26.3)	373 (73.7)					
Feeling of monotony Yes	81 (32.4)	169 (67.6)	1.50	1.05-2.14	0.88	0.58-1.33	0.532
No	87 (24.2)	272 (75.8)					
Excessive bending of neck/back Yes	126 (35.1)	233 (64.9)	2.68	1.80-3.98	2.08	1.32-3.28	0.002
No	42 (16.8)	208 (83.2)					
Pain aggravates due to stress Yes	128 (38)	209 (62)	3.55	2.38-5.30	2.10	1.33-3.30	0.001
No	40 (14.7)	232 (85.3)					
Family history of back/neck pain Yes	45 (26.5)	125 (73.5)	0.925	0.62-1.38	0.68	0.43-1.07	0.099
No	123 (28)	316 (72)					
Specialty Surgery	87 (32.1)	184 (67.9)	1.50	1.05-2.14	1.30	0.85-2.00	0.221

Tests Used: Bivariate Analysis and Multivariable Logistic Regression; Abbreviations: OR = Odds Ratio; CI = Confidence Interval; AOR = Adjusted Odds Ratio

Table 4: Risk Factors for Neck Pain at 1 Month

RISK FACTORS	Neck Pain Yes	Neck Pain No	OR	95% CI	AOR	95% CI	P Value
Age>40	123 (37.2)	208 (62.8)	0.86	0.62-1.20	1.14	0.75-1.70	0.539
<40	94 (33.8)	184 (66.2)					
Sex Female	88 (41.9)	122 (58.1)	1.51	1.07-2.13	1.49	1.02-2.16	0.039
Male	129 (32.3)	270 (67.7)					
Diet Veg	171 (37.7)	282 (62.3)	1.45	0.98-2.15	1.49	0.99-2.24	0.05
Non-veg	46 (29.5)	110 (70.5)					
Smoking Yes	11 (44)	14 (56)	1.44	0.64	0.43	0.18-1.07	0.07
No	206 (35.3)	378 (64.7)					
Alcohol No	183 (37.7)	303 (62.3)	1.58	1.02-2.44	1.81	1.09-3.03	0.02
Yes	34 (27.6)	89 (72.4)					
Coffee Yes	91 (34.5)	173 (65.5)	0.914	0.65-1.28	1.03	0.73-1.46	0.86
No	126 (36.5)	219 (63.5)					
Travel duration >2 hrs	34 (45.3)	41 (54.7)	1.59	0.98-2.60	1.66	1.003-2.74	0.049
<2 hrs	183 (34.3)	351 (65.7)					
Weight lifting Yes	123 (36.7)	212 (63.3)	1.11	0.80-1.55	0.899	0.625-1.29	0.56
No	94 (34.3)	180 (65.7)					
Sports Yes	135 (36)	240 (64)	1.04	0.74-1.47	0.904	0.60-1.30	0.604
No	82 (35)	152 (64)					
Obesity Yes	193 (37.5)	321 (62.5)	1.78	1.08-2.92			
No	24 (25.3)	71 (74.7)					
Past history of neck/back pain Yes	15 (46.9)	17 (53.1)	1.64	0.80-3.35	1.30	0.57-2.99	0.535
No	202 (35)	375 (65)					
Limitation of daily activities Yes	66 (70.2)	28 (29.8)	5.68	3.51-9.19	2.22	1.13-4.37	0.020
No	151 (29.3)	364 (70.7)					
Limitation of social activities Yes	57 (63.3)	33 (36.7)	3.88	2.43-6.19	1.35	0.67-2.70	0.404
No	160 (30.8)	359 (69.2)					
Emotionally depressed Yes	64 (61)	41 (39)	3.58	2.32-5.54	2.08	1.22-3.53	0.007
No	153 (30.4)	351 (69.6)					
Satisfied with occupation No	43 (41.7)	60 (58.3)	0.73	0.48-1.12	0.69	0.41-1.16	0.165
Yes	174 (34.4)	332 (65.6)					
Feeling of monotony Yes	103 (41.2)	147 (58.8)	1.51	1.08-2.10	0.98	0.66-1.46	0.937
No	114 (31.8)	245 (68.2)					
Excessive bending of neck/back Yes	162 (45.1)	197 (54.9)	2.92	2.03-4.20	2.18	1.43-3.33	0.0001
No	55 (22)	195 (78)					
Pain aggravates due to stress Yes	165 (49)	172 (51)	4.06	2.80-5.88	2.44	1.61-3.70	0.0001
No	52 (19.1)	220 (80.9)					
Family history of back/neck pain Yes	65 (38.2)	105 (61.8)	1.17	0.81-1.69	0.94	0.62-1.43	0.764
No	152 (34.6)	287 (65.4)					
Specialty Surgery	113 (41.7)	158 (58.3)	1.61	1.15-2.25	1.39	0.92-2.09	0.114
Non-surgery	104 (30.8)	234 (69.2)					

Tests Used: Bivariate Analysis and Multivariable Logistic Regression; Abbreviations: OR = Odds Ratio; CI = Confidence Interval; AOR = Adjusted Odds Ratio.

Table 5: Risk Factors for Neck Pain at 1 Year

RISK FACTORS	Neck Pain Yes	Neck Pain No	OR	95% CI	AOR	95% CI	P Value
Age >40	171 (51.7)	160 (48.3)	1.16	0.84-1.60	1.50	1.003-2.26	0.048
<40	154 (55.4)	124 (44.6)					
Sex Female	126 (60)	84 (40)	1.50	1.07-2.12	1.55	1.082-2.236	0.017
Male	199 (49)	200 (50.1)					
Diet Veg	247 (54.5)	206 (45.5)	1.199	0.83-1.73	1.22	0.83-1.75	0.338
Non-veg	78 (50)	78 (50)					
Smoking Yes	16 (49)	9 (36)	1.58	0.69-3.64	0.52	0.21-1.27	0.149
No	309 (52.9)	275 (47.1)					
Alcohol Yes	63 (51.2)	60 (48.8)	0.898	0.60-1.33	1.13	0.72-1.77	0.593
No	262 (53.9)	224 (46.1)					
Coffee Yes	141 (53.4)	123 (46.6)	1.003	0.73-1.38	0.96	0.69-1.32	0.785
No	184 (53.3)	161 (46.7)					
Travel duration >2 hrs	46 (61.3)	29 (38.7)	1.45	0.88-2.38	1.47	0.89-2.43	0.131
<2 hrs	279 (52.2)	255 (47.8)					
Weight lifting No	174 (51.9)	161 (48.1)	0.88	0.64-1.21	1.14	0.81-1.60	0.45
Yes	151 (55.1)	123 (44.9)					
Sports Yes	199 (53.1)	176 (46.9)	0.97	0.70-1.35	0.91	0.64-1.32	0.64
No	126 (53.8)	108 (46.2)					
Obesity Yes	279 (54.3)	235 (45.7)	1.27	0.82-1.96	1.22	0.78-1.91	0.39
No	46 (48.4)	49 (51.6)					
Past history of neck/back pain Yes	25 (78.1)	7 (21.9)	3.29	1.40-7.75	3.24	1.26-8.36	0.015
No	300 (52)	277 (48)					
Limitation of daily activities Yes	79 (84)	15 (16)	5.76	3.20-10.27	1.74	0.82-3.70	0.148
No	246 (47.8)	269 (52.2)					
Limitation of social activities Yes	74 (82.2)	16 (17.8)	4.94	2.80-8.70	1.70	0.80-3.60	0.162

No	251 (48.4)	268 (51.6)					
Emotionally depressed Yes	84 (80)	21 (20)	4.37	2.60-7.30	2.32	1.27-4.21	0.006
No	241 (47.8)	263 (52.2)					
Satisfied with occupation No	57 (55.3)	46 (44.7)	1.053	0.83-1.30	0.856	0.51-1.40	0.554
Yes	268 (53)	238 (47)					
Feeling of monotony Yes	145 (58)	105 (42)	1.373	0.99-1.90	1.16	0.79-1.73	0.432
No	180 (50.1)	179 (49.9)					
Excessive bending of neck/back Yes	227 (63.2)	132 (36.8)	2.66	1.90-3.72	1.81	1.23-2.68	0.003
No	98 (39.2)	152 (60.8)					
Pain aggravates due to stress Yes	236 (70)	101 (30)	4.80	3.40-6.78	3.38	2.29-4.99	0.0001
No	89 (32.7)	183 (67.3)					
Family history of back/neck pain Yes	104 (61.2)	66 (38.8)	1.55	1.08-2.23	1.46	0.97-2.20	0.07
No	221 (50.3)	218 (49.7)					
Specialty Surgery	161 (59.4)	110 (40.6)	1.50	1.10-2.15	1.30	0.87-1.95	0.198
Non-surgery	164 (48.5)	174 (51.5)					

Tests Used: Bivariate Analysis and Multivariable Logistic Regression; Abbreviations: OR = Odds Ratio; CI = Confidence Interval; AOR = Adjusted Odds Ratio.

Table 6: Risk Factors for Low Back Pain at 1 Week

RISK FACTORS	Back Pain Yes	Back Pain No	OR	95% CI	AOR	95% CI	P Value
Age >40	96 (29)	235 (71)	1.48	1.02-2.15	1.32	0.85-2.02	0.213
<40	60 (21.6)	218 (78.4)					
Sex Female	60 (28.6)	150 (71.4)	1.26	0.87-1.84	1.19	0.79-1.79	0.40
Male	96 (24.1)	303 (75.9)					
Diet Veg	117 (25.8)	336 (74.2)	1.05	0.69-1.56	1.05	0.68-1.62	0.816
Non-veg	39 (25)	117 (75)					
Smoking Yes	8 (32)	17 (68)	1.39	0.59-3.28	0.57	0.22-1.48	0.251
No	148 (25.3)	436 (74.7)					
Alcohol Yes	28 (22.8)	95 (77.2)	0.824	0.52-1.31	1.25	0.73-2.15	0.424
No	128 (26.3)	358 (73.7)					
Coffee Yes	71 (26.9)	193 (73.1)	1.12	0.78-1.62	0.89	0.62-1.31	0.573
No	85 (24.6)	260 (75.4)					
Travel duration >2 hrs	25 (33.3)	50 (66.7)	1.53	0.92-2.59	1.61	0.95-2.74	0.079
<2 hrs	131 (24.5)	403 (75.5)					
Weight lifting Yes	92 (27.5)	243 (72.5)	1.24	0.86-1.80	0.66	0.44-0.99	0.042
No	64 (23.4)	210 (76.6)					
Sports Yes	84 (22.4)	291 (77.6)	0.65	0.45-0.94	1.69	1.12-2.55	0.013
No	72 (30.8)	162 (69.2)					
Obesity Yes	130 (25.3)	384 (74.7)	0.898	0.55-1.47	0.90	0.54-1.50	0.692
No	26 (27.4)	69 (72.6)					
Past history of neck/back pain Yes	10 (31.2)	22 (68.8)	1.34	0.62-2.90	1.02	0.45-2.29	0.969
No	146 (25.3)	431 (74.7)					
Limitation of daily activities Yes	45 (47.9)	49 (52.1)	3.34	2.12-5.27	2.37	1.21-4.64	0.012
No	111 (21.6)	404 (78.4)					
Limitation of social activities Yes	43 (47.8)	47 (52.2)	3.29	2.07-5.22	1.05	0.53-2.10	0.878
No	113 (21.8)	406 (78.2)					
Emotionally depressed Yes	52 (49.5)	53 (50.5)	3.77	2.43-5.85	3.77	2.23-6.36	0.0001
No	104 (20.6)	400 (79.4)					
Satisfied with occupation No	30 (29.1)	73 (70.9)	0.80	0.50-1.29	1.01	0.60-1.68	0.976
Yes	126 (24.9)	380 (75.1)					
Feeling of monotony Yes	73 (29.2)	177 (70.8)	1.37	0.95-1.98	0.999	0.68-1.47	0.997
No	83 (23.1)	276 (76.9)					
Excessive bending of neck/back Yes	107 (29.8)	252 (70.2)	1.74	1.19-2.56	1.65	1.10-2.47	0.015
No	49 (19.6)	201 (80.4)					
Pain aggravates due to stress Yes	112 (33.2)	225 (66.8)	2.58	1.74-3.83	1.48	0.98-2.21	0.057
No	44 (16.2)	228 (83.8)					
Family history of back/neck pain Yes	53 (31.2)	117 (68.8)	1.48	0.99-2.19	1.40	0.94-2.10	0.095
No	103 (23.5)	336 (76.5)					
Specialty Surgery	66 (24.4)	205 (75.6)	0.89	0.61-1.28	1.29	0.84-1.99	0.245
Non-surgery	90 (26.6)	248 (73.4)					

Tests Used: Bivariate Analysis and Multivariable Logistic Regression; Abbreviations: OR = Odds Ratio; CI = Confidence Interval; AOR = Adjusted Odds Ratio.

Factors associated with neck pain at 1-week, 1-month, and 1-year: Multivariable logistic regression analysis for neck pain revealed distinct risk factors associated with pain during each recall period. For instance, pain experienced in the last week had severaloccupational and psychosocial correlates. With respect to the former, excessive bending of the neck, unsurprisingly, remained a strong risk factor for pain (AOR 2.08; 95% CI 1.32–3.28, p=0.002).Perceived aggravation of pain due to stress also showed a highly significant association (AOR 2.10; 95% CI 1.33–3.30, p=0.001). Alcohol intake was independently associated with an increased likelihood of 1-week neck pain (AOR 2.05; 95% CI

1.15–3.65, p=0.015). Pain during this period also showed a significant associationwith limitation of daily activities (AOR 2.88; 95% CI 1.43–5.80, p=0.003), as well as emotional depression due to pain (AOR 3.20; 95% CI 1.90–5.40, p<0.001). Other lifestyle and baseline factors were not found to be significantly associated with 1-week neck pain after adjustment in the multivariate model [Table 3].

For neck pain experienced in the preceding month, female sex was significantly associated with higher odds of pain(AOR 1.49; 95% CI 1.02–2.16, p=0.039). Similar to the patterns observed at 1-week, alcohol use remained independently associated with 1-month neck pain by nearly twofold increased odds (AOR 1.81; 95% CI 1.09–3.03, p=0.02). Prolonged daily travel to work, defined as a total commute time of greater than two hours, similarly showed a significant association (AOR 1.66; 95% CI 1.00–2.74, p=0.049). Obesity was found to be significantly associated with 1-month neck pain in the unadjusted analysis (OR 1.78, p<0.05). Once again, perceived excessive bending of the neck at work emerged as an independent correlate of pain reported during this period (AOR 2.18; 95% CI 1.43–3.33, p<0.001). Alongside these physical and lifestyle factors, the functional and emotional impacts of pain were also significant. Limitation of daily activities (AOR 2.22; 95% CI 1.13–4.37, p=0.020) and experiencing emotional depression due to pain (AOR 2.08; 95% CI 1.22–3.53, p=0.007) were both independently associated with two-fold higher odds of 1-month neck pain, mirroring the patterns seen in the 1-week recall period; however, the magnitude of the point estimates wasslightly lower at 1-month (AOR 2.22 and 2.08) compared to 1-week (AOR 2.88 and 3.20) [Table 4].

Finally, for 12-month neck pain, age above 40 years was associated with higher odds of experiencing pain compared to those younger than 40 (AOR 1.50; 95% CI 1.00–2.26, p=0.048), while female sex continued to show a significant independent association (AOR 1.55; 95% CI 1.08–2.23, p=0.017). However, several lifestyle factors, including diet, smoking, alcohol use, coffee intake, travel duration, weight lifting, sports participation, and obesity, were not significant risk factors for 12-month neck pain, which could potentially reflect recall bias and inaccuracy with increasing timeframes. A self-reported past history of neck pain was found to be a strong risk factor for 12-month neck pain(AOR 3.24; 95% CI 1.26–8.36, p=0.015), as was occupational factors such as excessive bending of the neck at work (AOR 1.81; 95% CI 1.23–2.68, p=0.003)and the perception that pain was aggravated by stress (AOR 3.38; 95% CI 2.29–4.99, p<0.001). Feeling emotionally depressed due to neck or back pain was also a significant factor (AOR 2.32; 95% CI 1.27–4.21, p=0.006). Notably, while limitation of daily or social activities were associated with more recent pain episodes, these factors did not reach statistical significance for 12-month neck pain [Table 5].

Table 7: Risk Factors for Low Back Pain at 1 Month

RISK FACTORS	Back Pain Yes	Back Pain no	OR	95% CI	AOR	95% CI	P Value
Age >40	142 (42.9)	189 (57.1)	1.71	1.22-2.39	1.63	1.09-2.45	0.017
<40	85 (30.6)	193 (69.4)					
Sex Female	86 (41)	124 (59)	1.26	0.90-1.79	1.19	0.82-1.72	0.367
Male	141 (35.3)	258 (64.7)					
Diet Veg	171 (37.7)	282 (62.3)	1.08	0.74-1.58	1.078	0.73-1.59	0.706
Non-veg	56 (35.9)	100 (64.1)					
Smoking Yes	10 (40)	15 (60)	1.12	0.49-2.55	0.809	0.33-1.97	0.641
No	217 (37.2)	367 (62.8)					
Alcohol Yes	43 (35)	80 (65)	0.88	0.58-1.33	1.05	0.66-1.69	0.829
No	184 (37.9)	302 (62.1)					
Coffee Yes	102 (38.6)	162 (61.4)	1.10	0.796-1.54	0.89	0.63-1.24	0.484
No	125 (36.2)	220 (63.8)					
Travel duration >2 hrs	35 (46.7)	40 (53.3)	1.56	0.96-2.53	1.55	0.944-2.54	0.083
<2 hrs	192 (36)	342 (64)					
Weight lifting Yes	123 (36.7)	212 (63.3)	0.948	0.682-1.32	0.94	0.66-1.34	0.727
No	104 (38)	170 (62)					
Sports No	100 (42.7)	134 (57.3)	1.45	1.04-2.03	1.53	1.05-2.22	0.026
Yes	127 (33.9)	248 (66.1)					
Obesity Yes	200 (38.9)	314 (61.1)	1.60	0.99-2.59	1.69	1.03-2.76	0.037
No	27 (28.4)	68 (71.6)					
Past history of neck/back pain Yes	14 (43.8)	18 (56.2)	1.33	0.65-2.70	1.02	0.45-2.29	0.969
No	213 (36.9)	364 (63.1)					
Limitation of daily activities Yes	65 (69.1)	29 (30.9)	4.88	3.04-7.86	2.37	1.21-4.64	0.012
No	162 (31.5)	353 (68.5)					
Limitation of social activities Yes	57 (63.3)	33 (36.7)	3.55	2.23-5.65	1.06	0.53-2.10	0.878
No	170 (32.8)	349 (67.2)					
Emotionally depressed Yes	74 (70.5)	31 (29.5)	5.48	3.46-8.68	3.76	2.23-6.36	0.0001
No	153 (30.4)	351 (69.6)					
Satisfied with occupation No	40 (38.8)	63 (61.2)	1.03	0.87-1.20	1.01	0.60-1.68	0.976
Yes	187 (37)	319 (63)					
Feeling of monotony Yes	103 (41.2)	147 (58.8)	1.33	0.95-1.85	0.99	0.68-1.46	0.997
No	124 (34.5)	235 (65.5)					
Excessive bending of neck/back Yes	159 (44.3)	200 (55.7)	2.13	1.50-3.01	1.65	1.10-2.47	0.015

No	68 (27.2)	182 (72.8)					
Pain aggravates due to stress Yes	157 (46.6)	180 (53.4)	2.52	1.78-3.56	1.48	0.98-2.21	0.057
No	70 (25.7)	202 (74.3)					
Family history of back/neck pain Yes	76 (44.7)	94 (55.3)	1.54	1.08-2.21	1.40	0.94-2.10	0.095
No	151 (34.4)	288 (65.6)					
Specialty Surgery	97 (35.8)	174 (64.2)	0.89	0.64-1.24	1.46	0.97-2.20	0.067
Non-surgery	130 (38.5)	208 (61.5)					

Tests Used: Bivariate Analysis and Multivariable Logistic Regression; Abbreviations: OR = Odds Ratio; CI = Confidence Interval; AOR = Adjusted Odds Ratio.

Table 8: Risk Factors for Low Back Pain at 1 Year

RISK FACTORS	Back Pain Yes	Back Pain No	OR	95% CI	AOR	95% CI	P Value
Age >40	194 (58.6)	137 (41.4)	1.40	1.01-1.92	1.33	0.90-1.96	0.157
<40	140 (50.4)	138 (49.6)					
Sex Female	129 (61.4)	81 (38.6)	1.50	1.10-2.10	1.45	1.003-2.085	0.048
Male	205 (51.4)	194 (48.6)					
Diet Veg	246 (54.3)	207 (45.7)	0.92	0.64-1.30	0.94	0.64-1.38	0.754
Non-veg	88 (56.4)	68 (43.6)					
Smoking Yes	12 (48)	13 (52)	0.751	0.337-1.674	1.15	0.49-2.75	0.746
No	322 (55.1)	262 (44.9)					
Alcohol Yes	62 (50.4)	61 (49.6)	0.80	0.538-1.188	1.00	0.63-1.56	0.984
No	272 (56)	214 (44)					
Coffee Yes	152 (57.6)	112 (42.4)	1.21	0.88-1.68	0.81	0.59-1.14	0.232
No	182 (52.8)	163 (47.2)					
Mode of transport Two-wheeler	116 (61.4)	73 (38.6)	1.47	1.04-2.09	1.50	0.99-2.27	0.057
Non-two-wheeler	218 (51.9)	202 (48.1)					
Travel duration >2 hrs	42 (56)	33 (44)	1.05	0.652-1.70	1.03	0.63-1.70	0.893
<2 hrs	292 (54.7)	242 (45.3)					
Weight lifting Yes	184 (54.9)	151 (45.1)	1.01	0.73-1.39	0.92	0.65-1.30	0.64
No	150 (54.7)	124 (45.3)					
Sports Yes	198 (52.8)	177 (47.2)	0.806	0.58-1.12	1.28	0.88-1.85	0.188
No	136 (58.1)	98 (41.9)					
Obesity Yes	294 (57.2)	220 (42.8)	1.84	1.18-2.86	1.95	1.23-3.07	0.004
No	40 (42.1)	55 (57.9)					
Past history of neck/back pain Yes	22 (68.8)	10 (31.2)	1.869	0.869-4.00	1.47	0.63-3.42	0.371
No	312 (54.1)	265 (45.9)					
Limitation of daily activities Yes	76 (80.9)	18 (19.1)	4.20	2.45-7.23	1.30	0.63-2.69	0.468
No	258 (50.1)	257 (49.9)					
Limitation of social activities Yes	75 (83.3)	15 (16.7)	5.02	2.80-8.96	2.06	0.98-4.35	0.056
No	259 (49.9)	260 (50.1)					
Emotionally depressed Yes	88 (83.8)	17 (16.2)	5.43	3.14-9.39	3.30	1.80-6.14	0.0001
No	246 (48.8)	258 (51.2)					
Satisfied with occupation No	54 (52.4)	49 (47.6)	1.055	0.864-1.28	0.89	0.54-1.47	0.661
Yes	280 (55.3)	226 (44.7)					
Feeling of monotony Yes	148 (59.2)	102 (40.8)	1.35	0.97-1.87	1.02	0.70-1.50	0.889
No	186 (51.8)	173 (48.2)					
Excessive bending of neck/back Yes	220 (61.3)	139 (38.7)	1.88	1.36-2.62	1.38	0.94-2.03	0.099
No	114 (45.6)	136 (54.4)					
Pain aggravates due to stress Yes	228 (67.7)	109 (32.3)	3.27	2.35-4.57	2.31	1.58-3.38	0.0001
No	106 (39)	166 (61)					
Family history of back/neck pain Yes	107 (62.9)	63 (37.1)	1.59	1.10-2.28	1.43	0.96-2.10	0.076
No	227 (51.7)	212 (48.3)					
Specialty Surgery	150 (55.4)	121 (44.6)	1.04	0.75-1.43	1.03	0.70-1.53	0.867
Non-surgery	184 (54.4)	154 (45.6)					

Tests Used: Bivariate Analysis and Multivariable Logistic Regression; Abbreviations: OR = Odds Ratio; CI = Confidence Interval; AOR = Adjusted Odds Ratio.

Factors associated with low back pain at 1-week, 1-month, and 1-year: At 1-week, engaging in sports (AOR 1.69; 95% CI 1.12–2.55, p=0.013) was associated with a higher likelihood of self-reported low back pain, while weight-lifting, on the other hand, had an apparent protective effect, with a 34% lower odds of perceived back pain (AOR 0.66; 95% CI 0.44–0.99, p=0.042). Consistent with the findings for neck pain, limitation of daily activities (AOR 2.37; 95% CI 1.21–4.64, p=0.012) and emotional depression (AOR 3.77; 95% CI 2.23–6.36, p<0.001) continued to be strongly associated with low back pain at 1-week. Likewise, excessive bending at work remained a significant risk factor for low back pain during this period (AOR 1.65; 95% CI 1.10–2.47, p=0.015) while age, sex, alcohol use, and other lifestyle parameters did not show any significance [Table 6].

For pain reported in the past month, older age(AOR 1.63; 95% CI 1.09–2.45, p=0.017) and obesity (AOR 1.69; 95% CI 1.03–2.76, p=0.037) were significantly associated with increased odds, while no such

associations were observed for sex.Sports participationwas associated with higher odds of pain (AOR 1.53; 95% CI 1.05–2.22, p=0.026), consistent with the findings seen at 1-week. Although weight-lifting, similar to the pattern seen at 1-week, was associated with a 6% lower odds of perceived back pain, this association did not reach statistical significance at 1-month (AOR 0.94; 95% CI: 0.66–1.34, p=0.727). However, as anticipated, the impact of pain onphysical and emotional wellness persisted, with limitation of daily activities (AOR 2.37; 95% CI 1.21–4.64, p=0.012), and emotional depression (AOR 3.76; 95% CI 2.23–6.36, p<0.001) continuing to have significant associations with back pain. Excessive bending at work continued to remain a strong risk factor for pain during this period as well (AOR 1.65; 95% CI 1.10–2.47, p=0.015) [Table 7].

Over12-month recall, obesity (AOR 1.95; 95% CI 1.23–3.07, p=0.004) and female sex (AOR 1.45; 95% CI 1.003–2.085, p=0.048) emerged as the only baseline characters that were significantly associated with low back pain. Likewise, among all other lifestyle, occupational, and psychosocial factors, individuals with back pain were at a threefold higher risk of depression due to pain (AOR 3.30; 95% CI 1.8–6.14, p=0.0001) and were more likely to perceive that the pain was aggravated due to stress (AOR 2.31; 95% CI 1.58–3.38, p=0.0001). Taken together, the results demonstrate that the most consistent independent correlates of neck or back pain across all recall periods were advanced age, female sex, obesity, and bending at work. With respect to functional and psychosocial consequences, self-reported neck or back pain was strongly associated with limitation of daily activities, depression, and aggravation of pain due to increased stress [Table 8].

DISCUSSION

In this nationwide cross-sectional study, we demonstrate that neck and low back pain are highly prevalent among physicians in India, with more than half of respondents reporting pain in either region over the preceding year and approximately one third of the respondents reporting symptoms in the last month. Older age, female sex, obesity, bending at work, stress-related pain exacerbation, and pain-related emotional distress emerged as the most significant factors associated with higher odds of pain across all recall periods. In contrast, smoking, alcohol consumption, caffeine consumption, prolonged commute times, job satisfaction, surgical vs non-surgical specialities, as well as past and family history of back or neck pain were not significantly associated with perceived pain during the study period. Overall, our findings suggest that certain demographic and physical characteristics, in combination with work-related biomechanical and psychosocial stressors, and not individual lifestyle choices or past medical history, are the main drivers of pain in this cohort.[7-9]

Our findings alignwith those reported in similar cohorts in the Indian subcontinent. A cross-sectional study from Western India that was conducted among 120 doctors and 190 nursing officers found that 74.2% of doctors reported pain in the last 12 months, with the neck and lower back being the most commonly affected sites.[10] Notably, this study also identified female sex, obesity, long working hours, and working in awkward postures as important predictors of pain in various sites of the body, mirroring the independent associations observed in our study for female sex, obesity, and excessive bending at work. However, it should be noted that obesity was associated with significantly higher odds of hip pain (AOR 2.83; 95% CI 1.05–7.59)10 and not neck or low back pain, which was the focus of our study. Although we did not find any significant differences in surgical vs non-surgical specialities as risk factors for pain, a survey of 180 spine surgeons found that 74.4% (n=134) experienced neck pain within the last month, with a higher prevalence of pain noted among those who led a sedentary lifestyle compared to those who were active at least three times during the week.[11] In contrast, we did not identify a protective effect of sports or weight-lifting on neck pain during all three recall periods. This apparent discrepancy may reflect important differences in the nature and definition of physical activity between the cohorts, and it is also plausible that differences may emerge if we stratified activity levels among surgeons and non-surgeons in the current study. Furthermore, the very high prevalence of obesity and work-related ergonomic strain in our cohort may have overwhelmed any potential benefit conferred by physical activity alone. Given the scarcity of studies in the literature examining the prevalence of neck and low back pain exclusively among Indian physicians, we looked at data from other professional groups within the Indian medical education and healthcare system to better characterize the burden of neck and low back pain. In a cross-sectional survey of 331 medical students, 58.3% reported neck pain within the last 12 months, and the prevalence of neck pain progressively increased during the first four years of schooling, followed by a decline during internship.[12] Interestingly, the vast majority of participants felt that pain aggravated due to academic workload (OR 3.5; 95% CI 2.1-5.5, p<0.001), which aligns with the findings of our study, wherein we saw an aggravation of neck and low back pain due to work related stressors. Combined together, these results reinforce the amplifying potential of psychological burdens on perceived physical pain, and highlight that healthcare professionals accumulate a ‘background propensity’ towards musculoskeletal disorders very early on in their training. In another study of 250 medical students, 45.6% (n=114) had low back pain and, long hours of sitting (p<0.001), physical inactivity (p=0.002), family history of low back pain (p<0.001), stress (p=0.001), prolonged usage of electronic devices (p=0.016), body mass index (BMI) (p=0.033)

and regular caffeine consumption (p=0.046) were identified to have a significant associations with pain13. These trends were preserved in the logistic regression analysis, which revealed obesity (OR 3.03; 95% CI 1.42–6.50, p=0.004), caffeine consumption (OR 1.77; 95% CI 1.001–3.10, p=0.047), family history of low back pain (OR 5.90; 95% CI 3.18–10.94, p<0.001), and low duration of exercise, defined as 1-2 hours per week, (OR 1.69; 95% CI 1.02–2.80, p=0.041) as the strongest risk factors for low back pain. While obesity was a significant risk factor across pain models and recall periods in our study, we did not find an association for caffeine consumption or family history. One may postulate that the risk factors for back pain may evolve over the course of training. In students, modifiable risk factors such as excessive use of gadgets and caffeine consumption may be associated with pain, but in an older cohort, multiple work-related physical and emotional stressors may overshadow these lifestyle contributions.

Similar to the trends seen above, our results are both in concordance and discordance with worldwide data. A cross-sectional survey of 312 residents in Saudi Arabia found a 64.7% (n=202) prevalence of low back pain and identified BMI (p=0.028), family history of back pain (p<0.001), long working hours (p=0.023), and a history of other chronic health conditions (p=0.020) as significant factors associated with pain.[14] In multivariate log regression models, obesity and family history of back pain were the most significant factors, conferring nearly a six- (AOR 6.18; 95% CI 1.26–30.34, p=0.025) and four-fold (AOR 3.90; 95% CI 2.33–6.52, p<0.001) higher odds of risk, respectively.[14] Once again, although obesity was a significant risk factor in our cohort, family history did not portend adverse risk outcomes for either neck or low back pain. Another study, also from Saudi Arabia, reported a 70.5% prevalence rate of low back pain in the last 12 months among 254 physicians from various specialities.[15] However, in this study, neither age, sex, BMI, nor workload were correlated with back pain and, instead, speciality showed a significant association with low back pain (p=0.014),[15] which was not observed in our study. This could have simply been due to the fact that our binary surgical/non-surgical classification may have been too crude to detect meaningful speciality-specific differences. It is also possible that any within-speciality variability in practice patterns in our sample could have diluted any broader between-speciality effects, but this appears less supportive in light of the existing data. Similar to the patterns seen among Indian medical students, data from surveys administered to students from various parts of the world, including Malaysia, Saudi Arabia, and Hong Kong, also highlighted family history of musculoskeletal pain, irregular or limited exercise, year of study, and psychosocial stressors such as anxiety and depression as significant risk factors of pain.[16-18] Taken together, these results suggest that vulnerability to neck and low back pain begins early in the medical training trajectory and is shaped by an interplay of baseline physical characteristics, suboptimal physical conditioning, academic load, and psychological distress. Although in our cohort of practising physicians, family or past history did not retain statistical significance and the dominant correlates shifted toward obesity, workplace strain, and stress-related pain aggravation, the data nonetheless support the notion that, over time, cumulative workplace exposures and daily habits (such as sports) may overshadow early behavioural influences. This, therefore, lends credence to the argument that prevention efforts should not only target physicians who are well into their practice, but also undergraduate and postgraduate students by means of coordinated strategies that address posture, activity outside of work, mental health, integration of ergonomic-friendly workplace design and instruments, and periodic breaks for all individuals right from the outset of a medical career.

Apart from comparisons with the existing literature, several recurrent patterns in our study need to be explained. First, the consistent association of female sex with pain across most, if not all, models and recall periods, aligns with community-based studies among the general population in India which shows higher musculoskeletal pain prevalence among women.[7,19] Potential explanations for this include sex-related differences in pain sensitivity, especially among menopausal and postmenopausal women, potential disparities in ergonomic preferences for women vs men, as well as the sheer domestic workload that have to borne by them in addition to experiencing all work-related stressors that men do. Likewise, obesity also emerged as a significant correlate of pain in our analysis, which aligns with evidence linking higher BMI to increased back pain risk, possibly mediated through greater mechanical loading on the spine and sustained pro-inflammatory cytokine release.[20-22] Third, occupational biomechanics were consistently associated with both neck and back pain, as evidenced by the elevated odds of pain among those who self-reported excessive bending of these regions at work. This aligns with data indicating that surgeons and other procedural physicians, who frequently maintain static, often straining, postures in already ergonomically deficient environments experience high rates of neck and back pain,[23-25] and also aligns with aligns with broader global consensus that awkward postures are a primary cause of various classes of musculoskeletal disorders.[4] Although our sample included both surgical and non-surgical specialties, the persistence of the “bending” variable as an independent correlate suggests that ergonomics associated with tasks within each speciality, rather than broad specialty labels themselves, may be a more meaningful determinant of risk. Regarding physical activity, we noted that weight lifting was inversely associated with 1-week low back pain, yet sports participation was positively associated. This paradox might stem from the differing natures of these activities since structured strength training,

wherein greater emphasis is placed on form and posture, could build resilience, while competitive or high-impact sports, might predispose to acute injuries. This suggests that the type of physical activity and its interaction with occupational demands are crucial differentiating factors for physicians who are already predisposed to workplace injuries. Lastly, the observed association between psychosocial factors such as stress/depression and pain is self-explanatory and has been well characterized among various healthcare professionals.[26-30]

Limitations and Future Directions: The primary limitation is the non-probability online sampling, which affects the external validity and national representativeness of the data Self-reported pain and exposure measures are subject to recall and reporting biases, which may be more pronounced for the 12 month period. The sampling strategy, based largely on voluntary online participation, may introduce selection bias, with physicians experiencing pain being more likely to respond. Although the sample size is moderate, it may not be fully representative of all Indian physicians, particularly those in rural or under-resourced settings, who likely may not have even received the invites in the first place. Given that the study focussed exclusively on physicians, the results may also not be applicable to other healthcare workers. The study design also precludes the establishment of definitive cause-and-effect relationships/reverse causation. For instance, it is difficult to ascertain whether depression leads to pain or if chronic pain contributes to depression. Similar to exposure, all outcome data were self-reported and the absence of validated disability indices limits comparability with other studies that have used tools such as the Oswestry Disability Index or Neck Disability Index. The absence of standardized disability instruments, such as the Oswestry Disability Index, also limits direct comparison with other clinical studies. Prospective cohort studies of physicians, therefore, might benefit from using validated ergonomic measures, objective stress assessments, and longitudinal symptom tracking to allow for stronger causal inference and better elucidation of mechanistic insights underlying pain. Comparative studies that utilize aforementioned tools across different healthcare systems and cultures could further elucidate variations in prevalence and risk factors. This is of essence because the high prevalence and the pattern of risk factors identified in the present study also have practical implications. Institutions should prioritise ergonomic assessments of common workspaces such as examination rooms, operating theatres, other surgical suites, and clinic workstations. This should be followed by addressing any ergonomic deficits to reduce sustained bending and awkward postures, along with encouraging regular breaks and posture training. With respect to the latter, several posture-correction devices and accessories are available in the market, and it might be a worthy investment for institutions looking to cultivate a healthy workforce. Alongside combating physical stressors with physical devices, medical workplace wellness programs should integrate psychosocial support mechanisms, institutions should provide stress management resources and mental health services to address stress and burnout, which might aid in reducing musculoskeletal symptom burden.

CONCLUSION

Neck and low back pain are highly prevalent among doctors in India, with sex, obesity, psychosocial disorders, and occupational bending identified as the strongest associated risk factors. The Indian physician workforce is already strained by overwhelming clinical demands and systemic pressures and cannot afford to neglect its musculoskeletal health. Institutions should consider these correlates when designing ergonomic interventions and wellness programs Institutions and regulatory bodies must address these challenges through targeted interventions and by fostering a supportive work environment to ensure the sustained welfare of this population. Future prospective studies using longitudinal tracking are needed to better understand the causal mechanisms underlying these associations.

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