Musculoskeletal pain and its associated risk factors among medical students of a public sector University in Karachi, Pakistan

Husna Haroon,[1] Safia Mehmood,[2] Fauzia Imtiaz,[3] Syed Arif Ali,[4] Mohammad Sarfraz[5]

Abstract

Objective: To assess the frequency and anatomical distribution of musculoskeletal pain and its related risk factors.

Methods: This cross-sectional study was conducted at the Dow Medical College, Karachi, from September to November 2016, and comprised medical students. A self-administered questionnaire was filled out by the participants. Data was analysed using SPSS 17.

Results: Of the 360 participants, 268(74.4%)and 140(38.9%)students reported having musculoskeletal pain in at least one of the body sites in the past 12 months and in the past seven days, respectively. Self-reported mental stress (p=0.01) and history of trauma in the neck, shoulder or lower back (p=0.002) were the most significant predictors of musculoskeletal pain during the past seven days. Age, body mass index, gender, academic year, family history of musculoskeletal disorders, hours of clinical practice per day, hours of study per day, smoking and exercise had no significant relation with musculoskeletal pain in neck, shoulder or lower back (p>0.05 each). The use of computer/laptop for more than three hours per day had an increased occurrence of neck pain (p=0.03).

Conclusion: There was a significant risk of musculoskeletal pain for medical students.

Keywords: Musculoskeletal pain, Low back pain, Neck pain, Medical students, Pakistan, Mental stress, Computer use, Trauma. (JPMA 68: 682; 2018)

Introduction

Medicine is a profession that puts insurmountable amounts of stress, both mental as well as physical, on people who choose to study it and excel at it.[1,2]

In the past few years, the factors that lead to the development of musculoskeletal strain have increased drastically.[3] Long hours required for the students to sit and prepare as entailed by demanding medicinal studies, even longer hours for clinical training hours in both students and health care professionals[4] stress as well as increased use of personal computers for the purpose of studying.[5] This also includes a lack of knowledge or understanding of the basic principles and rules of ergonomics as well as the failure to implement them even if the knowledge is there.[6]

Occupational risks are a predominant aetiological factor in the development of musculoskeletal pain (MSP) in both developed as well as developing countries.[7] Several types of studies have been conducted by Derek Smith in order to determine the exact prevalence of MSP in the Asian region, each with their own characteristic findings. While 36.9% of the female nursing students in central Japan reported musculoskeletal pain, which occurred most commonly in the shoulders, 70% of the professional nurses in mainland China reported musculoskeletal pain, with lower back being the most commonly reported site.[2,8]

The development of MSP (chronic pain or injury related) affects the general quality of life[9] as well as a sudden drop in productivity in educational as well as professional life of an individual.[10] The current study was planned to evaluate the frequency of musculoskeletal pain among the medical students, to assess the important risk factors for its development in order to increase awareness and to highlight this issue for the authorities concerned to take appropriate measures.

Subjects and Methods

This cross-sectional study was conducted at the Dow Medical College, Karachi, from September to November 2016, and comprised medical students.

After approval was obtained from the review board of Dow University of Health Sciences, Karachi, a self-administered questionnaire was used to collect data.

[1]4th Year Medical Student, [2]3rd Year Medical Student, [3]Biochemistry Department, Dow Medical College, [4]Department of Research, [5]Institute of Physical Medicine and Rehabilitation (IPMR), Dow University of Health Sciences, Karachi.

Correspondence: Husna Haroon. Email: husna-abbasi@live.com

The questionnaire was in English language and was a modified version of the standardised Nordic questionnaire.[11,12] The questionnaire was divided into two major parts. The first part was sub-divided into two parts (IA and IB). IA inquired about the socio-demographic characteristics of the participants that included age, gender, body mass index (BMI) and academic year. IB questioned multiple risk factors in a YES/NO format; for instance, daily exercise, daily coffee/tea consumption, daily cigarette smoking (those who did not smoke daily were considered in 'NO' category),[13] self-reported mental stress with regards to studies, history of physical trauma or injury, any family history of musculoskeletal disorders (MSDs), usual place of studying, as well as open-ended questions asking about the amount of coffee/ tea consumed per week, minutes of exercise per day, hours of computer/laptop used per day and hours of clinical practice per day. Part two inquired about the musculoskeletal pain, which was briefly defined as pain, ache, discomfort or numbness experienced in any of the various body sites including neck, shoulder, wrist/hands, upper back, lower back, hips/thighs/buttocks, knees, ankles/feet occurring during the past seven days as well as the past 12 months.[14] For ease of understanding it was accompanied by an illustration of a human figure with shaded labelled regions corresponding to the above-mentioned sites. Two more questions about the students' knowledge on the science of ergonomics and whether they apply it in their lives were asked separately. Prior to the survey, a pilot study involving 30 students was conducted to ensure proper comprehension by the students. They had no difficulty filling in the questionnaire and their responses were included in the final data analysis.

Assuming 95% confidence interval (CI) and 5% precision, a sample size of 382 was calculated using OpenEpi version 3.0. Prevalence was estimated from a previous study which was conducted among medical students where 45.7% of all students had at least one site of MSP in the past week.[12]

Convenience sampling was employed to collect the data from each batch. The questionnaires were distributed manually among the students from first to final year. Verbal consent was obtained from all participants. Medical students in their respective years and who were present at the time of data collection were included. Students with any chronic illnesses, known musculoskeletal disease or pregnancy were excluded. There were about 350 students in each batch. After determining the students' schedule from the provided online timetable, the students were approached in their respective lecture halls during their free time before and after lectures. The time of data collection was chosen to ensure no participant had an upcoming semester examination, which would have affected the routine of the students recruited in the study and thereby affected our results. A detailed explanation of the purpose and method of the study was elaborated beforehand.

Data was analysed using SPSS 17. Frequency and percentage for categorical variables, while mean and standard deviation for continuous variables were calculated using descriptive statistics. The frequency of MSP in the past week and past 12 months for each of the body sites was obtained. Depending on the most frequent sites involved, a new variable was created named 'MSP in the neck, shoulder and/or lower back'. This variable, along with variables for each site, was then used as the dependent variable to find out the risk factors for MSP. Chi-square test was used to obtain the crude odds ratio (OR) and 95% CI for the relation between categorical dependent and categorical independent variables. For categorical dependent and continuous independent variables, the univariate binary logistic regression analysis was conducted separately for each dependent variable, that is, for each risk factor. Sub-group analysis was conducted for the risk factors for neck shoulder and lower back pain as they were the most common sites of MSP.

Results

Of the 382 questionnaires distributed, 360(94.2%) were returned completely filled. The mean age of the participants was 20.77±1.47 years and mean BMI was 20.78±3.48. Moreover, 256(71.1%) participants were females (Table-1).

In the past 12 months, 268(74.4%) and in the past seven days 140(38.9%) students reported having musculoskeletal pain in at least one of the body sites mentioned in the questionnaire. Lower back was the most frequently reported site of pain during both time periods, followed by neck, shoulder and knees (Table-2).

In order to find an association between demographic characteristics and musculoskeletal pain, we chose students who reported pain in lower back, neck or shoulder as the dependent variable rather than pain in any site, in order to facilitate comparison with other researches.

Mental stress with regards to studies (p=0.01) and

Table-1: Demographic characteristics of respondents (n = 360).

Variables	Categories	N	%
Gender	Male	104	28.9
	Female	256	71.1
Academic year	1	55	15.3
	2	84	23.3
	3	81	22.5
	4	66	18.3
	5	74	20.6
Family history of MSD	Yes	61	16.9
	No	299	83.1
History of trauma in neck, shoulders or lower back	Yes	18	5.0
	No	342	95.0
Daily exercise	Yes	97	26.9
	No	263	73.1
Smoke	Yes	12	3.3
	No	348	96.7
Mental stress	Yes	250	69.4
	No	110	30.6
Clinical practice (hours per day)	0	143	39.7
	1-2	163	45.3
	>2	54	15.0
Computer/ laptop use (hours per day)	< or equal to 3 hours	265	73.6
	>3 hours	95	26.4
Coffee/tea consumption	Yes	259	71.9
	No	101	28.1
cups of coffee/ tea (per week)	<14 cups/week	255	70.8
	> or equal to 14 cups/week	105	29.2

	Mean	SD
Age	20.77	1.471
BMI	20.78	3.48
Hours of computer/ laptop use per day	2.68	2.44
Hours of study per day	3.35	2.60

MSD: Musculoskeletal disorders
BMI: Body mass index.

history of trauma in the neck, shoulder or lower back (p=0.002) were found to be the most significant predictors of musculoskeletal pain during the past seven days. Mental stress also had a significant relation with MSP in the past 12 months (p=0.01). Age, BMI, gender, academic year, family history of musculoskeletal disorders, hours of clinical practice per day, hours of study per day, smoking, exercise, and coffee/tea consumption were not found to have a statistically significant association with MSP in neck, shoulder or lower back (Tables-3,4).

A total of 112(31.1%) respondents reported having adequate knowledge on the science of ergonomics, whereas only 56(15.6%) reported actually following it in their daily lives. Of them, 10(17.9%) reported having MSP in the neck, shoulder and lower back in the past

Table-2: Frequency of MSP in the past 12 months and in the past 7 days.

Pain, ache or trouble in any of the following regions of the body	In the past 12 months N (%)	In the past 7 days N (%)
Neck	119 (33.1)	49(13.6)
Shoulders	100 (27.8)	43(11.9)
Elbows	29(8.1)	13(3.6)
Wrists/ hands	67(18.6)	26(7.2)
Upper back	83(23.1)	33(9.2)
Lower back	139(38.6)	58(16.1)
Thighs/ hips	67 (18.6)	31(8.6)
Knees	87(24.2)	40(11.1)
Ankle/ foot	56(15.6)	30(8.3)
Any site	268(74.4)	140(38.9)
Neck, shoulder or lower back.	212(58.9)	105(29.2)

MSP: Musculoskeletal pain.

Table-3: Factors associated with MSP during past week among medical students.

Variables	Categories	MSP in neck, shoulder and lower back in the past week		p-value	OR(CI)
		Yes	No		
Gender	Male	57(54.8%)	47(45.2%)	0.316	0.790 (0.499-1.252)
	Female	155 (60.5%)	101(39.5%)		
Year (pre-clinical/ clinical)	preclinical	82(59.0%)	57(41.0%)	0.975	1.007 (0.654-1.550)
	clinical	130(58.8%)	91(41.2%)		
Regular exercise	Yes	55(56.7%)	42(43.3%)	0.608	0.884 (0.552-1.416)
	No	157(59.7%)	106(40.3%)		
Smoke	Yes	7(58.3%)	5(41.7%)	0.968	0.977 (0.304-3.138)
	No	205(58.9%)	143(41.1%)		
Mental stress	Yes	158(63.2%)	92(36.8%)	0.012	1.781 (1.131-2.803)
	No	54(49.1%)	56(50.9%)		
Family history of MSD	Yes	36(59.0%)	25(41.0%)	0.982	1.006 (0.575-1.762)
	No	176(58.9%)	123(41.1%)		
History of trauma in neck, shoulders or lower back	Yes	17(94.4%)	1(5.6%)	0.002	12.815 (1.686-97.394)
	No	195(57.0%)	147(43.0%)		
clinical practice (hours per day)	0	83(58.0%)	60(42.0%)	0.965	
	1-2	97(59.5%)	66(40.5%)		1.062 (.673-1.677)
	>2	32(59.3%)	22(40.7%)		1.051 (.556-1.987)
Coffee/tea	Yes	150(57.9%)	109(42.1%)	0.548	0.866 (0.541-1.386)
	No	62(61.4%)	39(38.6%)		
cups of coffee/ tea (per week)	<14 cups/week	147(57.6%)	108(42.4%)	0.456	1.093 (0.665-1.795)
	> or equal to 14 cups/week	65(61.9%)	40(38.1%)		
		Mean (SD)	Mean (SD)		
Age (years)		20.72(1.481)	20.84(1.460)	0.435	0.945 (.819-1.09)
BMI (kg/m2)		20.98(3.681)	20.50(3.159)	0.197	1.042 (.979-1.108)
Hours of computer/ laptop use per day		2.82(2.661)	2.463(2.084)	0.168	1.065 (.930-1.095)
Hours of study per day		3.38(2.579)	3.31(2.646)	0.827	1.009 (.930-1.095)

MSP: Musculoskeletal pain
MSD: Musculoskeletal disorders
BMI: Body mass index
OR: Odds ratio
CI: Confidence interval.

seven days compared to 17(31.3%) of those who reportedly did not follow the principles of ergonomics (OR=0.48, 95% CI=0.23-0.99, p=0.04). When analysed for pain in individual sites, the use of computer or laptop for greater than three hours per day in the past seven days had a greater occurrence of neck pain 73(20.3%) compared to use of less than or equal to 3 hours 41(11.3%) (OR=1.96, 95%CI= 1.04-3.68, p=0.03). Tea consumption was associated with decreased incidence of lower back pain in the past 12 months when compared to no coffee/tea intake (OR=0.56, 95% CI=0.35-0.90, p=0.02). No other associations were found

Table-4: Factors associated with MSP during past 12 months among medical students.

Variables	Categories	MSP in neck, shoulder and lower back in the past 12 months. Yes	No	P-value	OR (CI)
Gender	Male	27(26.0%)	77(74.0%)	0.394	0.800 (0.479-1.336)
	Female	78(30.5%)	178(69.5%)		
Year (pre-clinical / clinical)	preclinical	44(31.7%)	95(68.3%)	0.410	1.215 (0.764-1.931)
	clinical	61(27.6%)	160(72.4%)		
Exercise	Yes	22(22.7%)	75(77.3%)	0.100	0.636 (0.370-1.094)
	No	83(31.6%)	180(68.4%)		
Smoke	Yes	5(41.7%)	7(58.3%)	0.333	1.771 (0.549-5.713)
	No	100(28.7%)	248(71.3%)		
Mental stress	Yes	83(33.2%)	167(66.8%)	0.011	1.988 (1.163-3.399)
	No	22(20.0%)	88(80.0%)		
Family					
History of MSP	Yes	21(34.4%)	40(65.6%)	0.321	1.344 (0.748-2.413)
	No	84(28.1%)	215(71.9%)		
Trauma in neck, shoulders or lower back	Yes	8(44.4%)	10(55.6%)	0.143	2.021 (0.774-5.272)
	No	97(28.4%)	245(71.6%)		
Clinical practice (hours per day)	0	46(32.2%)	97(67.8%)	0.113	
	>0-2	39(23.9%)	124(76.1%)		.663 (.401 -1.096)
	>2-4	20(37.0%)	34(63.0%)		
					1.24 (.648-2.386)
Coffee/tea	Yes	77(29.7%)	182(70.3%)	0.707	1.103 (0.662-1.838)
	No	28 (27.7%)	73 (72.3%)		
cups of coffee/ tea (per week)	<14 cups/week	73 (28.6%)	182 (71.4%)	0.726	1.093(0.665-1.765)
	> or equal to 14 cups/week	32 (30.5%)	73 (69.5%)		
		Mean (SD)	Mean (SD)		
Age (years)		20.56(1.447)	20.86(1.475)	0.082	0.871 (.745-1.018)
BMI (kg/m2)		20.80(3.732)	20.77(3.379)	0.964	1.001 (.938-1.069)
Hours of computer/ laptop use per day		3.16(3.079)	2.47(2.103)	.750	.997 (.979-1.015)
Hours of study per day		3.70(3.208)	3.21(2.30)	0.118	1.069 (.983-1.162)

MSP: Musculoskeletal pain
BMI: Body mass index
OR: Odds ratio
CI: Confidence interval.

with other risk factors (p>0.05).

Discussion

In this cross-sectional study, around three-fourths of the participants reported having musculoskeletal pain in at least one of the body sites in the past 12 months. This finding was consistent with previous studies conducted among undergraduate Ghanaian nursing students[15] as well as medical students.[12,16] This, however, does not tell about the character, frequency, and duration of the pain.

The region of the highest frequency of musculoskeletal pain was lower back, followed by neck and then shoulders. This occurrence has been maintained in the previous studies among college students as well.[12,17]

The demographic characteristics were not significantly related to musculoskeletal pain as was found in previous studies.[16] For example, a study conducted among Australian nursing students showed musculoskeletal disorder of the shoulder was slightly more common among males when compared to females.[18]

Sedentary lifestyle did not prove to have any role to play in the occurrence of the musculoskeletal pain as was found in one study where lower back pain among medical students was compared with physical education students which yielded no significant difference in the frequency of lower back pain between the two groups even though both showed an alarmingly high prevalence of lower back pain.[19] This finding was further confirmed by a systematic review.[20] However, a previous review found beneficial effects on chronic lower back pain in intervention groups using

exercise compared to a control group or other treatment groups.[21] Another study showed an association between poor physical activity and musculoskeletal pain among Italian X-ray technology students.[12] Furthermore, clinical hours of practice per day were also not found to have any significant association with musculoskeletal pain among medical students. This could be due to the recruitment of students who were posted in different departments such as ophthalmology, medicine, surgery, gynaecology, etc. and the amount and nature of physical tasks they performed as well as their working postures in each during various times of the year led to profound effects on the results.

In our study we found that past history of trauma in the neck, shoulder or lower back and self-reported mental stress were the two factors significantly related to musculoskeletal pain during the past week as well as 12 months as was found in previous studies,[12,17,22] although nature of trauma and its complications were not known.

In the present study, when analysed for individual anatomical sites, the use of these devices for prolonged periods was related to increased occurrence of MSP in the neck region only. In this regard, a study showed that musculoskeletal symptoms caused pain at all anatomical sites and inconvenience to the everyday life of the Finnish adolescent computer users. Daily computer use of two hours or more increases the risk for pain at most anatomic sites.[23]

The finding of decreased lower back pain in the past 12 months related to increased consumption of caffeine in the form of tea or coffee was in sharp contrast with a study that reported high caffeine consumption among patients with low back pain.[24]

The difference of results could be due to inability to quantify the caffeine dose precisely due to varying caffeine content in different caffeinated beverages or other confounding factors that need further investigation. There could have been misclassification due to recall bias and inability to adjust for other confounding factors in the analysis that needs further investigation in our setting.

As with other cross-sectional studies, our study carried the risk of response and recall bias which may limit the generalisation of results. As occurs in all such studies, inability to determine what happened first (for example whether MSP or mental stress occurred first), is another limitation. Furthermore, due to the greater proportion of female students in each year, the sample too included a higher percentage of female students compared to males. Also, sample from just one institute would have affected the generalisability due to various institute-specific factors. Nevertheless, it was assumed that being medical students themselves, the participants understood the instructions and definitions provided and filled the form as accurately as possible. We believe that our study gives a reasonably accurate assessment of the musculoskeletal pain and its associated risk factors among medical students.

Conclusion

There was an alarmingly high occurrence of musculoskeletal pain among medical students.

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