

Prevalence and associated factors of neck, shoulder, and low-back pains among medical students at Jazan University, Saudi Arabia: A cross-sectional study

Yahya Hadi Dighriri¹, Murad Abdullah Akkur²,
Sara Abdullah Alharbi³, Nabeel Ahmed Madkhali⁴, Kholoud Ibrahim Matabi⁵,
Mohamed Salih Mahfouz⁶

¹Department of Anaesthesia, King Abdulaziz Medical City, National Guard Hospital, Western Region, ²Department of Internal Medicine, King Fahad Central Hospital, Jazan, ³Department of Orthopedic Surgery, Aseer Central Hospital, Abha, ⁴Department of Orthopedic Surgery, King Fahad Central Hospital, Jazan, ⁵Faculty of Medicine, Jazan University, Jazan, ⁶Department of Family and Community Medicine, Faculty of Medicine, Jazan University, Jazan, Kingdom of Saudi Arabia

ABSTRACT

Background: Musculoskeletal pain (MSP) in the neck, shoulder, and lower back is common widespread among medical students. The objective of this research is to estimate the prevalence of neck, shoulder, and low-back pains and to explore factors associated with MSP among medical students at Jazan University in southwest of Saudi Arabia. **Methods:** A cross-sectional, self-administered questionnaire-based study was conducted among undergraduate medical students of Jazan University. A total of 440 students were selected by random sampling. Descriptive statistics, a Chi-squared test, and logistic regression were performed to examine the prevalence, associations, and predictors of MSP. **Results:** The overall prevalence of MSP was (53.5%; 95% CI: 49.2–58.4). Neck pain was reported by 197 (44.8%) in the week prior to the study and by 268 (60.9%) in the year prior to the survey. Regarding shoulder pain, it was reported by 231 (52.5%) in the week prior to the study and 175 (39.8%) in the year prior to the study. Regarding low-back pain, it was reported by 147 (33.4%) in the week prior to the study and 270 (61.4%) in the year prior to the study. Factors associated with the risk of MSP include history of trauma (OR = 2.70; 95% CI: 1.36–5.36 depressive symptoms (OR = 1.94; 95% CI: 1.03–3.66) and report of psychosomatic symptoms (OR = 2.98; 95% CI: 1.71–5.18). **Conclusion:** In conclusion, the proportion of medical students with MSP was very high. Factors associated with the increased risk of MSP include history of trauma, depressive, and psychosomatic symptoms. Intervention program may help improving the musculoskeletal health of the medical students and to hence their quality of life.

Keywords: Low-back pain and Jazan, musculoskeletal disorders, neck pain

Introduction

Musculoskeletal disorders (MSDs) affect a significant proportion of individuals from different segments of the society, especially

Address for correspondence: Dr. Mohamed Salih Mahfouz, Department of Family and Community Medicine, Faculty of Medicine, Jazan University, Jazan, Saudi Arabia. E-mail: mm.mahfouz@gmail.com

Received: 30-08-2019

Revised: 17-09-2019

Accepted: 30-10-2019

Published: 10-12-2019

Access this article online

Quick Response Code:



Website:
www.jfmpc.com

DOI:
10.4103/jfmpc.jfmpc_721_19

those whose work require a significant amount of both physical and psychological efforts. According to the Global Burden of Disease (GBD) study 2017, the musculoskeletal conditions were considered as the second highest contributor to global disability. The same report suggested that the lower back pain is the single leading cause of disability globally.^[1,2] Neck pain and low-back pain are major sources of morbidity and a major complain in

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: reprints@medknow.com

How to cite this article: Dighriri YH, Akkur MA, Alharbi SA, Madkhali NA, Matabi KI, Mahfouz MS. Prevalence and associated factors of neck, shoulder, and low-back pains among medical students at Jazan University, Saudi Arabia: A cross-sectional study. J Family Med Prim Care 2019;8:3826-31.

family care settings in all countries and across all segments of the population. The burden of low-back pain is increasing, in low-income and middle-income countries, and affecting health system negatively by increasing healthcare-related costs.^[2]

Studies from around the globe found MSP to be highly prevalent among the general population. For example, the prevalence of MSP among Norwegians was found to be as high as 75–80%.^[3] Owing to the special lifestyle of health workers and students in health colleges, some authors have attempted to study MSP in these populations. In one study, 35–45% of doctors, nurses, and midwives were found to suffer from neck, shoulder, and upper back pains.^[4] In another study, the prevalence was 50–93% among dental personnel, with the shoulder being the most frequently painful area.^[5,6]

In the literature, studies on college students have reported various estimations of the MSP prevalence, with different degrees of severity.^[7,8] These variations could be explained by different populations and methodologies used in different studies. For example, the prevalence of MSP among medical students ranged from 45.7% to 65.1%.^[8] Among dental students, the prevalence was 48% for shoulder pain, 57% for lower back pain, and 64% for neck pain.^[6] Moreover, the prevalence of MSP was found to be high among non-medical students, such as music students (60.4% for neck pain and 38.2% for lower back pain)^[9] and X-ray technology students (37% in any part of the body).^[7] In the Kingdom of Saudi Arabia (KSA), the prevalence of MSP among students at University Hospitals in the central region was found to be 24.1%, 40.5%, 25.6% for neck, low-back, and shoulder pains, respectively.^[10]

Several factors have been cited to be significantly associated with the onset of MSP, such as specific body positions,^[11,12] sports or working activities,^[5] repetitive frequent movement of body parts, and obesity.^[13,14] Computer use for long durations was also found to be significantly correlated with MSP.^[15,16] Other risk factors such as smoking, female gender, advanced age were not found to be associated with low-back pain, but with neck pain in some studies.^[17,18] In addition to physical factors, psychological factors such as depression and psychosomatic symptoms have been also suggested as risk factors for MSP and associated with reduced quality of life.^[5]

Although some literature have documented the pattern and prevalence of MSP in Saudi Arabia, no previous study has been conducted in Jazan region.^[10] The aim of the present study is to measure the prevalence of neck, shoulder, and low-back pains and to detect the associated factors among a sample of medical students at Jazan university, Saudi Arabia.

Material and Methods

Study, design population, and setting

This is an observational cross-sectional survey conducted among medical students of Jazan University. The faculty of medicine,

Jazan University, was established in 2016 and located in Jazan town, southwest of KSA and 70 km from Yemen (south). The study included all medical students registered for the academic year 2017/2018, who were 18 years of age or above and accepted to take part in the study.

Sampling procedures

The students sample for this study was calculated using statistical formula for cross-sectional survey design. The anticipated population proportion (p) of the sample is estimated to be 50% because it is the safest choice for (p) since the sample size required is largest when $P = 50\%$ and no previous study was conducted in Jazan University dealing with musculoskeletal pains (MSPs) among medical students. Other parameters included for sample size calculation included 95% CI, marginal error 5%, non-response rate of 20%. The final sample size was 480 students, who were selected using systematic random sampling from the different classes (from second year to sixth year).

Data collection and study instrument

Self-administered questionnaire was used and distributed by the study team to the participants after stating the study aims and ensuring anonymity and confidentiality. Data collection process took place in the period between April and May, 2018. A standardized questionnaire was adopted and validated by previous studies.^[8,10,19,20] The questionnaire asked about sociodemographic characteristics such as age, sex, exercise, caffeine consumption, smoking status, any history of trauma, depressive or psychosomatic symptoms, and specific questions pertaining to MSP in the neck, shoulders, and low-back areas.

Statistical analysis

Data were analyzed using the Statistical Package of Social Sciences (SPSS) Version 20 (SPSS Inc., Chicago, IL). Data mining was conducted to check the completeness of responses and for coding errors. Categorical variables such as gender, smoking status, coffee consumption were presented as frequency and percentage, and continuous variables such as age were presented as mean and standard deviation (SD). To assess possible risk factors for MSP, bivariate analysis was conducted with the dependent variable being MSP in at least one body site at any time. Significant factors or factors with P value less than 0.1 were then analyzed using multivariate logistic regression analysis. Differences were considered statistically significant if P value was less than 0.05.

Ethical statement

All participants were asked for their willingness to take part in the study and the objectives of the study were thoroughly explained to them at the beginning of the survey. Names and contact details were not included in the survey. The protocol has been approved by Jazan University Ethical Committee (approval number REC 39/9-S044).

Results

Of the 480 college students recruited, 440 completed the questionnaires, with a response rate of 91.7.0%. Two hundred-twenty (50.0%) were males, with a mean age of 22.4 ± 1.6 years. Sociodemographic characteristics of the study population are described in Table 1. Regarding the year of study, students from both sexes were evenly distributed in preclinical years (i.e. before 4th year) and clinical years. Thirty-nine (8.9%) of subjects had obesity grad-I (i.e. BMI = 25.0–29.9), 13 (3.0%) had obesity grade II (BMI = 35.0–39.9), and 7 (1.6%) had obesity grade III (BMI = 40 or more).

Behavioral characteristics of the study sample were examined and are shown in Table 2. There were 167 (38.0%) participants who reported that they exercised less than 1 h weekly and 88 (20.0%) exercised up to 2 h per day, and 103 (23.4%) never exercised. Regarding smoking status, only 7.3% were current smokers. The majority (56.6%) reported that they consumed less than three cups of coffee per week and 179 (40.4) consumed more than three cups of coffee per week. Most of study subjects used computer 1–2 h per day, followed by those who used computer 2–4 h per day. The usual study place for most of participants (44.3%) was both study table and sleeping bed. The vast majority of participants (60.2%) thought that they had depressive symptoms related to study and 44.8% reported psychosomatic symptoms in form of numbness, tingling, or weakness.

Prevalence of neck, shoulder, and low-back pain in the last week, the last year, and at any time is presented in Table 3. The overall prevalence of MSP was (53.5%; 95% CI: 49.2–58.4). Regarding neck pain, it was reported by 197 (44.8%) in the week prior to the study and 268 (60.9%) in the year prior to the study. Regarding shoulder pain, it was reported by 231 (52.5%) in the week prior to the study and 175 (39.8%) in the year prior to the study. Regarding low-back pain, it was reported by 147 (33.4%) in the week prior to the study and 270 (61.4%) in the year prior to the study.

Potential risk factors for MSP in at least one body site at any time were examined separately using bivariate analysis as shown in Table 4. History of trauma (OR = 2.59; 95% CI: 1.54–5.64), history of depressive symptoms (OR = 2.95, 95% CI: 1.54–5.64), and history of psychosomatic symptoms (OR = 3.77; 95% CI: 2.24–6.34) were found to be significantly correlated with MSP. The multivariate logistic regression analysis shows that these variables were significant independent risk factors for MSP. Participants who had history of trauma were 2.7 times more likely to suffer from MSP in any body area at any time (OR = 2.70; 95% CI: 1.36–5.36). Participants who reported depressive symptoms related to study were two times more likely to suffer from MSP (OR = 1.94; 95% CI: 1.03–3.66). Participants who reported psychosomatic symptoms were three times more likely to suffer from MSP (OR = 2.98; 95% CI: 1.71–5.18).

Table 1: Sociodemographic characteristics of the study sample (n=440)

Variable	Male n (%)	Female n (%)	Total n (%)
Age Groups			
18–23	152 (69.0)	169 (76.8)	321 (73.0)
24 and above	68 (31.0)	51 (23.2)	119 (27.0)
Year of study			
2 nd	45 (20.5)	43 (19.5)	88 (20.0)
3 rd	44 (20.0)	45 (20.5)	89 (20.2)
4 th	43 (19.5)	44 (20.0)	87 (19.8)
5 th	44 (20.0)	44 (20.0)	88 (20.0)
6 th	44 (20.0)	44 (20.0)	88 (20.0)
BMI (Kg/m ²)*			
Under weight (<18.5)	27 (12.3)	81 (36.8)	108 (24.5)
Normal (18.5–24.9)	108 (49.1)	73 (33.2)	181 (41.1)
Overweight (25.0–29.9)	49 (22.3)	42 (19.1)	91 (20.7)
Obese class I (30.0–34.9)	24 (10.9)	15 (6.8)	39 (8.9)
Obese class II (35.0–39.9)	6 (2.7)	7 (3.2)	13 (3.0)
Obese class III (40 or more)	5 (2.3)	2 (0.9)	7 (1.6)

BMI: body mass index. The total percentages do not add up to 100 because of missed values

Table 2: Behavioral characteristics of the study sample (n=440)

Variable	Male n (%)	Female n (%)	Total n (%)
Exercise duration per week (hours)			
Less than 1	66 (30.0)	101 (45.9)	167 (38.0)
1–2	55 (25.0)	33 (15.0)	88 (20.0)
2–3	20 (9.1)	6 (2.7)	26 (5.9)
3–4	19 (8.6)	6 (2.7)	25 (5.7)
>4	25 (11.4)	6 (2.7)	31 (7.0)
Never	35 (15.9)	68 (30.9)	103 (23.4)
Smoking status			
Yes	27 (12.3)	5 (2.3)	32 (7.3)
No	193 (87.7)	215 (97.7)	408 (92.7)
Coffee consumption per week (cups)*			
<3	136 (61.8)	113 (51.4)	249 (56.6)
>3	78 (35.5)	101 (45.9)	179 (40.7)
Never	6 (2.7)	6 (2.7)	11 (2.7)
Duration of computer use per day (hours)			
1–2	117 (53.2)	124 (56.4)	241 (54.8)
2–4	60 (27.3)	43 (19.5)	103 (23.4)
4–8	27 (12.3)	34 (15.5)	61 (13.9)
>8	13 (5.9)	16 (7.3)	29 (6.6)
Never	0 (0.0)	3 (1.4)	3 (0.7)
Usual place of study*			
Study table	49 (22.3)	0 (0.0)	81 (18.4)
Bed	59 (26.8)	32 (14.5)	131 (29.8)
Both	91 (41.4)	81 (18.4)	195 (44.3)
Other			
Perceived depressive symptoms			
Yes	113 (51.4)	152 (69.1)	265 (60.2)
No	107 (48.6)	68 (30.9)	175 (39.8)
Perceived psychosomatic symptoms*			
Yes	60 (27.3)	105 (47.7)	165 (37.5)
No	160 (72.7)	115 (52.3)	275 (62.5)

*Including swimming, horse riding, tennis, and a combination of different exercise types. ^bIn form of numbness, tingling, or weakness more than once daily in the past 7 days. *The total percentages do not add up to 100 because of missed values

Table 3: Prevalence of MSPs among the study sample (N=440)

MSP Body site	Prevalence during past week		Prevalence during past 12 months	
	No (%)	95% C.I.	No (%)	95% C.I.
Neck pain	197 (44.8)	(40.0-49.0)	268 (60.9)	(56.0-65.0)
Shoulder pain	147 (33.4)	(29.0-38.0)	175 (39.8)	(35.0-44.0)
Low Back pain	231 (52.5)	(47.0-57.0)	270 (61.4)	(57.0-66.0)
Overall prevalence	237 (53.5) (49.2-58.4)			

Table 4: Evaluation of risk factors for MSP in at least one body site at any time by bivariate and multivariate logistic regression analyses

Variable	Unadjusted			Adjusted		
	OR	95% CI	P	OR	95% CI	P
Sex						
Female	1			1		
Male	1.33	0.65-1.52	0.44			
Year of study						
Preclinical	1			1		
Clinical	1.56	0.95-2.58	0.08			
Exercise						
Not at all	1			1		
Occasional	1.17	0.60-2.29	0.65			
Regular	1.20	0.64-2.23	0.57			
Smoking						
No	1			1		
Yes	1.47	0.50-4.34	0.48			
Coffee						
<3 cups/week	1			1		
>3 cups/week	0.65	0.40-1.08	0.10			
History of trauma						
No	1			1		
Yes	2.59	1.54-5.64	0.001	2.70	1.36-5.36	0.004
History of depressive symptoms						
No	1			1		
Yes	2.95	1.54-5.64	0.001	1.94	1.03-3.66	0.040
History of psychosomatic symptoms						
No	1			1		
Yes	3.77	2.24-6.34	0.00	2.98	1.71-5.18	0.000

MSP: musculoskeletal pain; OR: odds ratio; CI: Confidence interval

Discussion

The aim of this study was to investigate MSP in a sample of medical students in Jazan area in Saudi Arabia. Few studies have addressed prevalence of MSP in undergraduate medical students in Saudi Arabia.^[10] The results of the present study showed that the overall prevalence of MSP in any body area at any time was 83.0%. This finding was supported by a recent study conducted by Algarni *et al.*, 2017, which was conducted among medical students in Central Saudi Arabia, and produced a prevalence of MSP (at least in one body site) of 85.3%.^[10]

When comparing our overall prevalence of MSP with international studies, we found that our estimate is rather very high. Alshagga, *et al.* 2013 in their study of MSP among Malaysian

medical students reported that 45.7% and 65.1% of all students had at least one site of MSP in the past week and in the past year, respectively.^[8] Furthermore, our estimate is higher than the prevalence of MSP (40.1%) reported for Chinese Medical students^[20] and the Australian medical students (53.4%).^[21] Also, Kompal *et al.*, 2017 reported a high prevalence of neck and low-back pain (54%) that occurred with regular frequency in medical students at Pakistan.^[22]

Our study results revealed that shoulder pain was reported the least compared to neck and low-back pain. Also, it is reported that low-back pain is more prevalent than neck pain. This pattern is documented by Hayes *et al.*, 2009^[23] and Lorusso, *et al.*, 2010 who concluded that low-back pain was more prevalent than shoulder and neck pain.^[7] Our study contradicts with Cho *et al.*, 2003 who conducted study among Chinese high school students. They concluded that neck pain and shoulder pain (56%, 45%, respectively) was more reported as compared to low-back pain (37%).^[24]

Regarding the factors associated with MSP and in the context of this study, there was no statistical significant association between academic year and MSP. This result is in contradiction with most literature which revealed that complaint of neck, shoulder, and low-back pain increases as the year of education increases and complaint was more in students studying in higher grades.^[8-10]

The present study did not find a significant association between gender and the MSP. Although this finding is in the same line of Alshagga, *et al.*, 2013 and Algarni *et al.*, 2017,^[8,10] it is in contradiction with many published work.^[18,25]

The significant association between MSP and history of trauma in our study was supported by Alshagga, *et al.*, 2013, as they concluded that people who suffered from trauma to shoulder, neck, and back were in high risk to develop MSP.^[10] The insignificant association between other physical and clinical variables such as exercise, caffeine consumption, smoking, and computer use with MSP is in contrast a group of studies.^[5,10,16-18] Difference may be attributed to studies scales and operational definitions used for in the different studies.

Our results indicated that depressive symptoms are significantly related to increased risk of MSP. This finding is well documented and reported by many studies.^[10,24,26] We found that 60.2% of medical students experienced depressive symptoms, this is further supported by a previous studies in Jazan University, which revealed that 30% of students suffered from problems related to psychological distress^[27] and further supported by another study conducted among medical students of Jazan and reported a high prevalence of stress.^[28]

Musculoskeletal conditions are similar to other noncommunicable diseases as they share the same risk factors like physical inactivity, increased BMI, smoking, and unhealthy lifestyle.

The management of some of musculoskeletal conditions requires increased efforts in the primary healthcare settings through a combination of clinical interventions and promoting awareness regarding behavioral change including exercise, weight management, and mental health.

The implications of results of this study are very important for health interventions that lead to a better quality of life for future doctors. However, this study has some limitations and should be mentioned first; based on the cross-sectional study design, it was not possible to detect the causality and identification of potential risk factors. Second, the use of a self-reported questionnaire may lead to systematic bias.

Conclusions

In conclusion, the proportion of medical students with MSP was very high. Factors associated with the increase risk of MSP include history of trauma, depressive, and psychosomatic symptoms. Intervention program may help improving the musculoskeletal health of the medical students and hence improving their quality of life.

Acknowledgements

The authors would like to thank with much appreciation Dr. Abdulrahman Algarni, Department of Orthopedic Surgery, King Saud University, Riyadh, Saudi Arabia for his support of this study. The authors are grateful to Dr. Ramzi Mohammed Hakami for his statistical advice. Also, we extend our thanks to our colleagues in the Faculty of Medicine, Jazan University who actively participated in the survey. Finally, we are grateful to Mada Jarad, Sadeem Alhussin, Alhassan Kariri, Ali kariri, and Hasan Daghiri for their help in data collection process.

Data availability

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. GBD 2017 Disease and Injury Incidence and Prevalence Collaborators. Global, regional and national incidence, prevalence and years lived with disability for 354 diseases and injuries for 195 countries, and territories, 1990-2017: A systematic analysis for the global burden of disease study. *Lancet* 2018;392:1789-858.
2. Hartvigsen J, Hancock MJ, Kongsted A, Louw Q, Ferreira ML, Genevay S, *et al.* What low back pain is and why we need to pay attention. *Lancet* 2018;391:2356-67.
3. Ihlebæk C, Brage S, Natvig B, Bruusgaard D. Forekomst av muskelog skjelettlidelser i Norge. *Tidsskr Nor Legeforen* 2010;130:2365.
4. Long MH, Bogossian FE, Johnston V. The prevalence of work-related neck, shoulder, and upper back musculoskeletal disorders among midwives, nurses, and physicians: A systematic review. *Workplace Health Saf* 2013;61:223-9.
5. Dajpratham P, Ployetch T, Kiattavorncharoen S, Boonsiriseth K. Prevalence and associated factors of musculoskeletal pain among the dental personnel in a dental school. *J Med Assoc Thai* 2010;93:714-21.
6. Hayes MJ, Cockrell D, Smith DR. A systematic review of musculoskeletal disorders among dental professionals. *Int J Dent Hyg* 2009;7:159-65.
7. Lorusso A, Vimercati L, L'Abbate N. Musculoskeletal complaints among Italian X-ray technology students: A cross-sectional questionnaire survey. *BMC Res Notes* 2010;3:114.
8. Alshagga MA, Nimer AR, Yan LP, Ibrahim IA, Al-Ghamdi SS, Al-Dubai SA. Prevalence and factors associated with neck, shoulder and low back pains among medical students in a Malaysian Medical College. *BMC Res Notes* 2013;6:244.
9. Nawrocka A, Mynarski W, Powerska-Didkowska A, Grabara M, Garbaciak W. Musculoskeletal pain among Polish music school students. *Med Probl Perform Art* 2014;29:64-9.
10. Algarni AD, Al-Saran Y, Al-Moawi A, Bin Dous A, Al-Ahaideb A, Kachanathu SJ. The Prevalence of and factors associated with neck, shoulder, and low-back pains among medical students at University hospitals in Central Saudi Arabia. *Pain Res Treat* 2017;2017.
11. Kamper SJ, Henschke N, Hestbaek L, Dunn KM, Williams CM. Musculoskeletal pain in children and adolescents. *Braz J Phys Ther* 2016;20:275-84.
12. Feldman DE, Shrier I, Rossignol M, Abenhaim L. Risk factors for the development of neck and upper limb pain in adolescents. *Spine* 2002;27:523-8.
13. Fals Martínez J, González Martínez F, Orozco Páez J, Correal Castillo SP, Pernet Gómez CV. Musculoskeletal alterations associated factors physical and environmental in dental students. *Rev Bras Epidemiol* 2012;15:884-95.
14. Gallagher S, Heberger JR. Examining the interaction of force and repetition on musculoskeletal disorder risk: A systematic literature review. *Human Factors* 2013;55:108-24.
15. Kanchanomai S, Janwantanakul P, Pensri P, Jiamjarasrangsi W. Prevalence of and factors associated with musculoskeletal symptoms in the spine attributed to computer use in undergraduate students. *Work* 2012;43:497-506.
16. Angelone AM, Mattei A, Sbarbati M, Di Orio F. Prevalence and correlates for self-reported sleep problems among nursing students. *J Prev Med Hyg* 2011;52:201-8.
17. Stienen MN, Richter H, Prochnow N, Schnakenburg LF, Gautschi OP. Does smoking correlate with low back pain and the outcome of spinal surgery? *Z Orthop Unfall* 2011;149:317-23.
18. Wærsted M, Hanvold TN, Veiersted KB. Computer work and musculoskeletal disorders of the neck and upper extremity: A systematic review. *BMC Musculoskeletal Disord* 2010;11:79.
19. Kuorinka I, Jonsson B, Kilbom A, Vinterberg H, Biering-Sørensen F, Andersson G, *et al.* Standardised Nordic questionnaires for the analysis of musculoskeletal symptoms. *Appl Ergon* 1987;18:233-7.

20. Smith DR, Wei N, Ishitake T, Wang RS. Musculoskeletal disorders among Chinese medical students. *Kurume Med J* 2005;52:139-46.
21. Moroder P, Runer A, Resch H, Tauber M. Low back pain among medical students. *Acta Orthop Belg* 2011;77:88-92.
22. Kompal R, Kashif M, Riaz U, Dastgir A, Irum H, Manzoor N. Prevalence of low back, neck and shoulder pain and associated risk factors among senior semester female students of the university of Faisalabad. *Int J Rehabil Sci* 2017;5:21-7.
23. Hayes M, Smith D, Cockrell D. Prevalence and correlates of musculoskeletal disorders among Australian dental hygiene students. *Int J Dent Hyg* 2009;7:176-81.
24. Cho CY, Hwang IS, Chen CC. The association between psychological distress and musculoskeletal symptoms experienced by Chinese high school students. *J Orthop Sports Phys Ther* 2003;33:344-53.
25. Smith DR, Leggat PA. Musculoskeletal disorders among rural Australian nursing students. *Aust J Rural Health* 2004;12:241-5.
26. Jones EA, McBeth J, Nicholl B, Morriss RK, Dickens C, Jones GT, *et al.* What characterizes persons who do not report musculoskeletal pain? Results from a 4-year population-based longitudinal study (the epifund study). *J Rheumatol* 2009;36:1071-7.
27. Hakami R. Prevalence of psychological distress among undergraduate students at Jazan University: A cross-sectional study. *Saudi J Med Med Sci* 2018;6:82-8.
28. Sani M, Mahfouz MS, Bani I, Alsomily AH, Alagi D, Alsomily NY, *et al.* Prevalence of stress among medical students in Jizan University, Kingdom of Saudi Arabia. *Gulf Med J* 2012;1:19-25.