

Prevalence of Musculoskeletal Disorders among Kasr-Alainy Hospital Medical Students

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ABSTRACT

Background : Musculoskeletal disorders (MSDs) are significant health issues affecting a great majority of individuals and highly prevalent among medical university students. It has various modifiable risk factors. **Objectives:** To assess the prevalence of musculoskeletal disorders among Medical University students and determine their associated factors. **Methods:** A cross-sectional study was conducted from October 2018 until September 2019. It included 370 students selected by stratified random sample. A structured questionnaire was used consisting of socio-demographic characteristics, Nordic Musculoskeletal Questionnaire, and Global Physical Activity Questionnaire. **Results:** Eighty-two percent of the students had musculoskeletal disorders during the past 12 months. These disorders were significantly higher among students with positive family history, practice low level of physical activity or inactive, sitting a long time in stretch position and long study hours $p < 0.01$. **Conclusion :** The prevalence of MSDs among the students was high interfering with their work and attending lectures. It can lead to long-term complications and negatively compromise their quality of life and academic achievement. Authorities have to be aware of this health issue so they can set control measures, cost-effective national interventions, and programs.

Keywords: Low back pain, Medical University Students, Musculoskeletal disorders.

INTRODUCTION

Musculoskeletal disorders (MSDs) are significant health issues affecting a great majority of individuals. The recent analysis of the Global Burden of Disease data revealed that the worldwide prevalence of MSDs is 21.9% affecting all ages with continuous increase. It contributes to 17% of all years lived with disability (YLDs) worldwide ⁽¹⁾. The prevalence of MSDs among university students is increasing with alarming figures. Various researches have reported the prevalence range was between 32.9% and 89.3% in several countries ⁽²⁾. The highest prevalence was among medical university students. They suffer from neck, shoulder, and lower back MSDs in the form of chronic aches, pain, discomfort, or numbness. This high prevalence can be attributed to the various modifiable risk factors ⁽³⁾.

Medical students are exposed to physical stress from the prolonged time of attending lectures, prolonged bad posture, and long clinical training hours. Students spend a long time studying and on computer usage. They have no time to practice physical activity leading to increased BMI and obesity. Students carry heavy backpacks which increase the risk of developing low back pain ⁽⁴⁾. Moreover, it was shown that trauma, positive family history of MSD, and excessive caffeine intake were among the risk factors leading to adverse consequences ⁽⁵⁾.

Musculoskeletal disorders are major causes of chronic pain, illness, impaired educational attainment, reduction of quality productivity, and increased absenteeism which will compromise students' future careers. It negatively affects the mood leading to irritability, anxiety, depression, disability, poor social

interactions, and lowers the overall health status ⁽⁶⁾. Not only MSDs have the quality of life compromising effect but also have a negative economic impact on society and at the individual level ⁽⁷⁾.

The high prevalence of MSDs among Medical University students is of high concern and its impact is extensive. Medical students are the future doctors and will promote the health of the community. Despite the significant burden of MSD and having modifiable, highly preventable risk factors ⁽⁸⁾. It has been underestimated or even ignored. No sufficient studies have investigated MSD in the scientific literature. It hasn't been a focus of health programs, especially in low-income and middle-income countries. In the Eastern Mediterranean Region (EMR), the epidemiological data on MSD are sparse and are not easily comparable ⁽⁹⁾. The current study aimed to assess the prevalence of MSD among medical students and determine its associated factors. This can support policymakers and program planners in planning supportive and preventive measures for enhancing the quality of life for future physicians.

MATERIALS AND METHODS

Study design and study setting

This descriptive cross-sectional was conducted at the Faculty of Medicine, Kasr Alainy from October 2018 until September 2019.

Study population and sampling

The total number of students in all six grades was approximately 12000 students. The sample size was



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estimated as 370 students. It was calculated using epi info 6 assuming the prevalence of musculoskeletal disorder of 45.6% based on a previous study⁽⁴⁾, 95% confidence, and 5% margin of error. A stratified random sample technique was used and 62 students were randomly selected from each grade. They were reached at the end of their lectures period. **Exclusion criteria:** any student who had soft tissue injury or fracture in anybody region in the past 12 months, any student with congenital skeletal malformation, suffers from any skeletal or vascular diseases, experienced psychiatric disorders, or has a long-term utilizer of analgesics.

Data collection tools and techniques

The researcher interviewed the students individually using a structured questionnaire consisting of

- Socio-demographic characteristics including age, gender, chronic diseases, and smoking which was classified as a current smoker or not without the level of consumption.
- The students were asked about the number of daily study hours, and sitting at stretch.
- The valid reliable pretested extended Nordic Musculoskeletal Questionnaire (NMQ-E)⁽¹⁰⁾ was used to measure the onset, prevalence, consequences, and patterns of MSD. It consisted of questions on the history of having trouble (ache, pain, discomfort, or numbness) in nine anatomical regions -that are frequently affected by MSDs- in the last 12 months. These regions were neck, upper back, lower back, shoulder, elbow, hand/wrist, hip, knee, and ankle/foot. The questionnaire contained a clearly labeled anatomical diagram of the human body viewed from the back side for the different body regions for easily understanding and locating the trouble within the shaded area **figure2**. The questions were arranged regarding the student's lifetime experiences, followed by the prevalent questions, then the consequences of the trouble in the whole year. The responses were in the form of "yes" or "no." Students who reported affirmative responses were further asked, if at any time during the past 12 months that trouble interfered with doing their work or attending their lectures. Then the students were additionally asked if they have continuous or episodic pain.
- Global Physical Activity Questionnaire (GPAQ) is a valid reliable questionnaire designed by WHO for the surveillance of physical activity among adults mainly in developing countries. It gathers information on Physical activity participation and sedentary behavior. It assesses different types of physical activity in three domains including activity at work; travel to and from places and recreational activities.

The time and level of physical activity were calculated as follows: Total time spent in physical activity per week, time spent in every domain was calculated by multiplying the number of days per week

in each category with the average duration per day (Days per week X average duration per day) and Minutes /week in each category then multiplied by the metabolic equivalents MET. Activities were measured as moderate activities (4 METs) and vigorous activities (8 METs). The students were classified according to the level of physical in three categories

- Low (Inactive): < 600 MET minutes/Week
- Moderate: 600- 1500 MET minutes/Week
- High :> 1500 MET minutes/Week^(11, 12)

The researcher with help of 2 nurses measured the weight and height of each student and BMI was calculated.

The questionnaire was translated into Arabic language and then retranslated into English to ensure validity. It was pilot tested on 25 participants to check the clarity of the questions, estimate the time needed to be completed, and detect any difficulty. The results of the pilot test were only used for further development of the questionnaire as regards the simplicity and clarity and were not included in the results. The interview took around 15-25 minutes to be completed.

Ethical consideration

The study was approved by Research Ethical Committee, Cairo University. The researcher explained to every student the study objectives, time taken for completion of the interview, and ensured the anonymity and confidentiality of the data. This work has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

Statistical analysis

The data were collected and entered in Microsoft Excel 2016 then it was analyzed in SPSS (SPSS Statistics for Windows, version x.0 (SPSS Inc., Chicago, Ill., USA) program version16. Initially, there were descriptive statistics by frequency and percentage for categorical variables and mean \pm standard deviation for quantitative variables. Chi-square and independent-sample t-tests were used to measure the relation between MSD with demographic and general characteristics of the students. The relation of the MDS with independent predictors was studied using binary logistic regression. The risk was estimated using (Odds Ratio) OR value, with a 95% of a confidence interval. All statistical tests were considered significant at $p \leq 0.05$.

RESULTS

The study included 370 students. Their mean age was 20.1 ± 3.2 . Most of them (58%) were females. Nearly two-thirds were inactive or practice a low level of physical activity. More than half (53.5%) had a positive family history of MSDs **Table 1**.

Table 1: Demographic and general characteristics of the students

Demographic characteristics		No.	%
Gender	Male	155	41.8
	Female	215	58
Physical activity	Low (Inactive)	233	63
	Moderate	78	21
	High	59	16
Chronic diseases	Present	44	12
	Absent	326	88
Family history of MSDs	Positive	198	53.5
	Negative	172	46.5
Smoking	Smoking	70	19
	Not smoking	300	81
		Mean (SD)	
Age		20.1(3.2)	
Body Mass Index		27.2 (5.1)	
Height		163.6 (6.3)	
Weight		62.6 (13.1)	
Hours of study/day		5.4 (3.7)	
Hours of sitting in a stretch		4.2(2.3)	

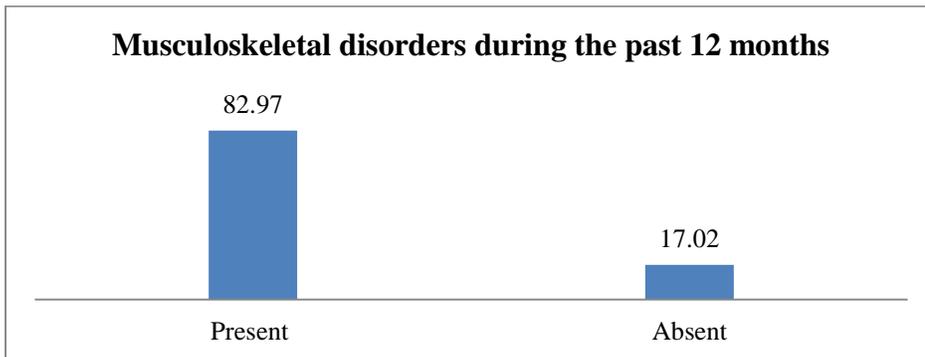


Figure 1: Percent distribution of the musculoskeletal disorders during the past 12 months

The figure shows that the majority of the students (82.97%) had musculoskeletal disorders during the past 12 months

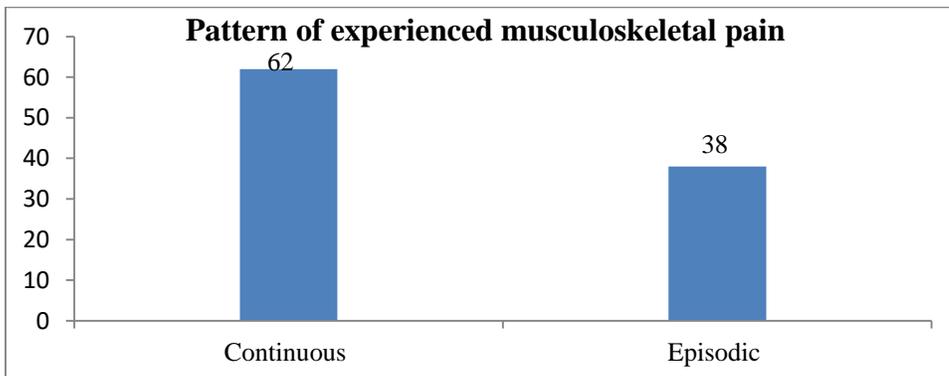


Figure 2 pattern of the experienced musculoskeletal pain

As shown in figure 2 most of the students (62 %) suffered from continuous musculoskeletal pain

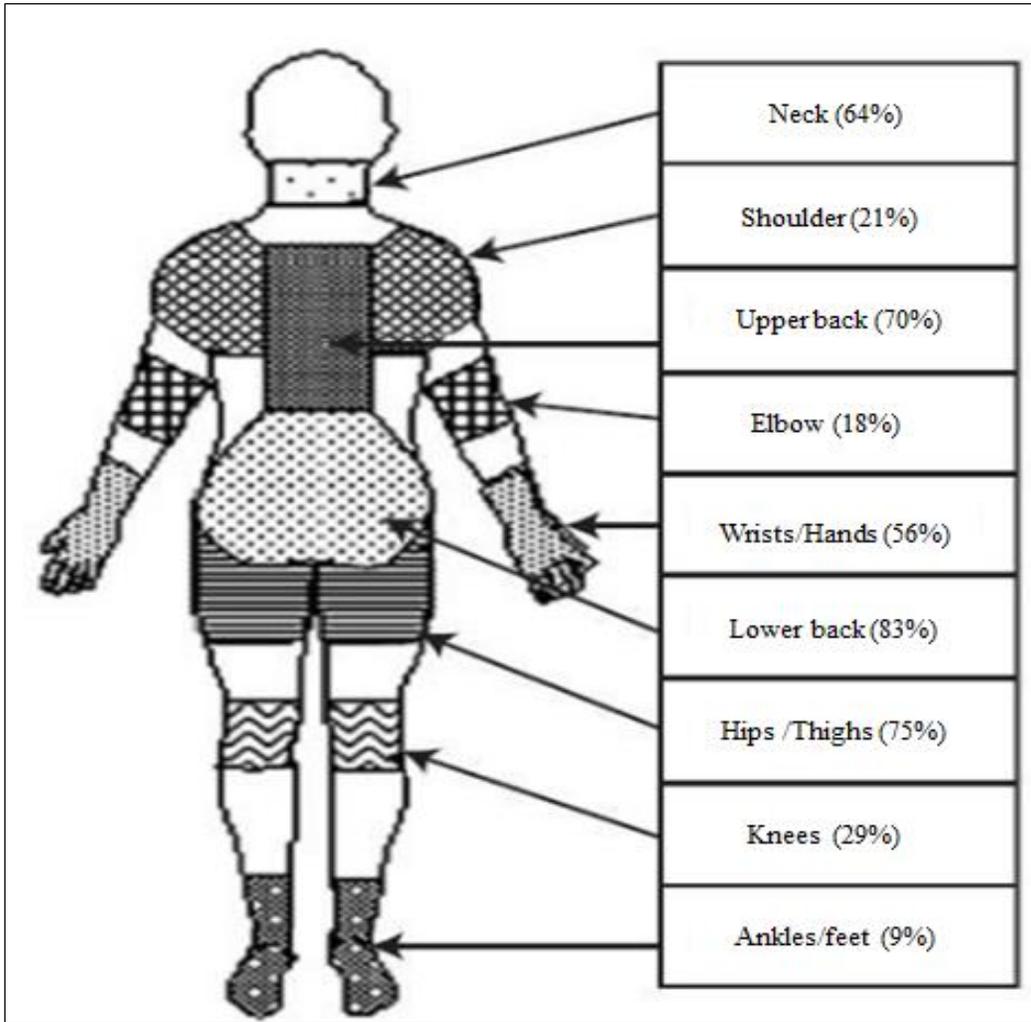


Figure3: Prevalence of musculoskeletal disorders during the past 12 months according to the anatomical region
The figure adapted from Nordic Musculoskeletal Questionnaire (NMQ-E)(2)

According to the Nordic Musculoskeletal Questionnaire **Figure 3** illustrates the human body, from the backside. It is divided into 9 anatomical regions which are frequently affected by MSDs.

It shows the prevalence of MSDs during the past 12-month in the nine regions. The majority of the students (83%) had lower back pain. Most of them (70%) and (75%) had pain at hips/thighs and upper back respectively.

Nearly two-thirds (64%) had neck disorders and, only a minority (9%) reported pain at ankles/feet.

The highest percentage of the students who reported that their musculoskeletal disorder interfered with work during the past 12 months was among those who had lower back pain (78%), then upper back pain (64%), followed by hip/thighs (59%) then neck pain (52%).

Table 2: Percent of students where MSDs in the past 12 months interfered with work

Anatomical region	NO	%
Neck	123	52
Shoulder	8	10
Upper back	166	64
Elbow	1	2
Wrist and hand	66	32
Lower back	240	78
Hip/thigh	164	59
Knee	19	18
Ankle and feet	2	7

As shown in **table 3** Most of the students who had musculoskeletal disorders were females (67.1%), the majority were inactive or practice a low level of physical activity (72%), more than half had a positive family history of MSDs (52.4%). The mean age, BMI, daily study hours, and hours of sitting stretch were significantly higher among students with MSDs compared with those who had no MSDs, $p < 0.01$.

Table 3: Relation between musculoskeletal disorders during the past 12 months and students' characteristics

Demographic characteristic	Musculoskeletal disorders during the past 12 months				P-value	
	Yes		No			
	NO.	%	NO.	%		
Gender	Male	101	32.9	54	85.7	<0.01*
	Female	206	67.1	9	14.3	
Chronic diseases	Present	32	10.4	12	19	0.05
	Absent	275	89.6	51	81	
Level of physical activity	Low (Inactive)	221	72	12	19	<0.01*
	Moderate	67	21.8	11	17.5	
	High	19	6.2	40	63.5	
Family history of MSDs	Positive	146	47.6	52	82.5	<0.01*
	Negative	161	52.4	11	17.5	
Smoking	Smoking	54	17.6	16	25.4	0.14
	Not smoking	253	82.4	47	74.6	
Age	21.4 (2.1)		19.8 (1.16)		<0.01**	
Body Mass Index (Mean (SD))	26.7(6.2)		24.1(2.9)		<0.01**	
Hours of study/day	6.9(1.8)		4.3(3.3)		<0.01**	
Hours of sitting in stretch	5.6 (1.02)		3.2(1.5)		<0.01**	

*Chi-square test

**Independent sample t-test

The prevalence of MSDs during the past 12 months was higher among inactive students or practice low level of physical activity (OR = 10, 95% CI 3.25-34.9, $p < 0.01$), the students with a positive family history of MSDs compared to students with negative family history (OR = 7.02, 95% CI 1.34-35.6, $p=0.003$). Moreover the factors associated with MSDs during the past 12 months were increasing study hours (OR = 1.32, 95% CI 1.082-1.185, $p < 0.01$) and hours of sitting in stretch (OR = 3.803, 95% CI 1.501-9.635, $p=0.005$) **Table 4**.

Table 4: Binary logistic regression of factors associated with MSDs during the past 12 months

Category	OR	95% CI	P value	
Physical activity	Low (Inactive)	10	3.25-34.9	<0.01
	Moderate	8.62	2.62-28.31	<0.01
	High			
Family history of MSDs	Positive	7.02	1.34-35.6	0.003
	Negative			
Hours of study/day	1.32	1.082-1.185	<0.01	
Hours of sitting in a stretch	3.803	1.501-9.635	0.005	

DISCUSSION

The current study assessed MSDs among Egyptian medical students and their associated factors. It was reported that the majority of the students (82.97%) suffered from musculoskeletal pain or discomfort in at least one anatomical body region during the past 12 months and most of them (62%) were having continuous pain. This prevalence was higher than that reported in previous

studies. A study among Malaysian medical students depicted that the prevalence of MSDs was 50%⁽⁴⁾, and it was 64% among health specialty students in Taif University⁽⁸⁾.

The most commonly affected body region among the students in the current study was lower back pain as reported by 83% of the suffering students and that interfered with their ability to study and attend their lectures. Similar results were reported with lower prevalence among Australian dental health students⁽¹³⁾, medical students at university hospitals in Saudi Arabia⁽¹⁹⁾, and Malaysian medical students⁽¹⁴⁾. The elevated prevalence of MSDs among medical students can be explained as the medical students spend a long time sitting and in a stretch position during studying or attending lectures. They also stand for a long time in their strenuous clinical training which negatively impacts their musculoskeletal system. This was confirmed by depicting the highest prevalence of MSD among medical students when compared with students from other universities^(4, 14).

Musculoskeletal disorders in the present study were significantly higher among female students which were similar to other studies^(8, 13). Ekpenyong and his colleagues found that MSDs were common in male and female Nigerian students, but it was highly associated with females⁽¹⁵⁾. The higher prevalence among females may be related to their smaller body size, and reduced muscle tone compared to males⁽¹⁶⁾. On the contrary, Abledu and Offei reported that there was no significant difference in the prevalence of MSDs among male and female freshmen nursing students in Ghana⁽¹⁷⁾.

Positive family history was shown to be a significant contributor to MSDs among the students in the current study. The musculoskeletal disorders were significantly higher among students with positive family history compared with negative family history. That was similar to the study of Lier and his colleagues⁽⁵⁾. This could be explained by the same environmental conditions and habits. A highly important factor is genetic heritability which can lead not only to MSD but also to high vulnerability to MSD risk factors such as physical inactivity and obesity⁽¹⁸⁾.

Most of the students in the current study 63% were inactive or practice a low level of physical activity (PA). A study in Saudi Arabia showed that nearly half of the

medical students had a low level of PA and only 16.6% had a high level of PA⁽⁸⁾. This may be attributed to the lifestyle of medical students as they have no time to practice PAs as a result of their studying and frequently evaluating exams⁽¹⁹⁾. Physical activity can prevent MSDs or reduce their occurrence. On the other hand, physical inactivity contributes to the development of MSDs as well as worsens its complications⁽²⁰⁾. That was obvious in the present study as the majority of the students suffering from MSDs were physically inactive or practice a low level of PA. This finding contradicts the study of Hendi and his colleagues who found that the prevalence of MSDs was higher among students with a moderate level of PA and less among students with a low level of PA. They explained that PA level wasn't the only factor contributing to MSDs among medical students in their study as psychosocial stress might be a major contributor as it was high among the students⁽⁸⁾.

It was depicted from the current study that studying long hours and sitting in a stretch was significantly related to MSDs. That came in agreement with the literature as long sitting duration and low loading in static positions are hazardous for musculoskeletal and were significantly associated with low back pain⁽²¹⁾.

The mean BMI of the students was 27.2 ± 5.1 . That elevated BMI may be related to their sedentary life and low level of practicing PA. Body mass index was shown to be significantly related to MSDs. Similarly, other studies found a significant association between BMI and MSD^(22, 23).

CONCLUSION

Findings from the current study showed that the prevalence of MSDs among the students was high. The highest prevalence was among inactive students, positive family history, and sitting a long time studying in a stretch position. Musculoskeletal disorders interfered with their work and attending lectures. The prolonged suffering from MSD can compromise their quality of life and negatively impact their academic achievement. It can lead to long-term complications which extend to the future affecting their medical role and performance. Authorities have to be aware of this health issue. They can set control measures, cost-effective national interventions, and programs. These can include increasing the students' awareness of a healthy lifestyle, encouraging PA practice; incorporating it into their curriculum and rescheduling their lecturers to allow for break time.

FUNDS

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflict of Interests

There was no conflict of interests

REFERENCES

1. **Andrew M, Anthony D, Dreinhöfer K et al. (2018):** Reducing the global burden of musculoskeletal conditions. *Bulletin of the World Health Organization*, 96:366-368.
2. **Tantawy S, Abdul Rahman A, Abdul Ameer M (2017):** The relationship between the development of musculoskeletal disorders, body mass index, and academic stress in Bahraini University students. *Korean J Pain*, 30(2):126-133.
3. **Dighriri Y, Akkur M, Alharbi S, Madkhali N, Matabi K, Mahfouz M (2019):** Prevalence and associated factors of the neck, shoulder, and low-back pains among medical students at Jazan University, Saudi Arabia: A cross-sectional study. *J Family Med Prim Care*, 8(12):3826-383.
4. **Alshagga M, Nimer A, Yan L, Ibrahim I, Al-Ghamdi S, Radman Al-Dubai S (2013):** Prevalence and factors associated with neck, shoulder, and low back pains among medical students in a Malaysian Medical College. *BMC Res Notes*, 6:244.
5. **Lier R, Mork P, Holtermann A, Nilsen T (2016):** Familial Risk of Chronic Musculoskeletal Pain and the Importance of Physical Activity and Body Mass Index: Prospective Data from the HUNT Study, Norway. *PLoS One*, 11(4):e0153828.
6. **Daneshmandi H, Choobineh A, Ghaem H, Alhamd M, Fakherpour A (2017):** The effect of musculoskeletal problems on fatigue and productivity of office personnel: a cross-sectional study. *J Prev Med Hyg.*, 58(3): E252-E258.
7. **Rosenfeld S, Schroeder K, Watkins-Castillo S (2018):** The Economic Burden of Musculoskeletal Disease in Children and Adolescents in the United States. *J Pediatr Orthop.*, 38(4):e230-e236.
8. **Hendi O, Abdulaziz A, Althaqafi A, Hindi A, Khan S, Atalla A (2019):** Prevalence of Musculoskeletal Disorders and its Correlation to Physical Activity Among Health Specialty Students. *Int J Prev Med.*, 10:48.
9. **Moradi-Lakeh M, Forouzanfar M, Vollset S et al. (2017):** Burden of musculoskeletal disorders in the Eastern Mediterranean Region, 1990-2013: findings from the Global Burden of Disease Study 2013. *Ann Rheum Dis.*, 76(8):1365-1373.
10. **Dawson A, Steele E, Hodges P, Stewart S (2009):** Development and test-retest reliability of an extended version of the Nordic Musculoskeletal Questionnaire (NMQ-E): a screener instrument for musculoskeletal pain. *The Journal of Pain*, 10(5), pp. 517-526.
11. **Armstrong T, Bull F (2006):** Development of the World Health Organization Global Physical Activity Questionnaire (GPAQ). *J Public Health (Bangkok)*, 14(2):66-70.
12. **Chu A, Ng S, Koh D, MüllerRiemenschneider F, Brucki S (2015):** Reliability and validity of the self-and interview administered versions of the Global Physical Activity Questionnaire (GPAQ). *PLoS One*, 10(9).
13. **Ng A, Hayes M, Polster A (2016):** Musculoskeletal Disorders and Working Posture among Dental and Oral Health Students. *HEALTHCARE*, 4 (1),1-15.
14. **Algarni A, Al-Saran Y, Al-Moawi A, Bin Dous A, Al-Ahaideb A, Kachanathu S (2017):** 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.*, 2017:1235706.
15. **Ekpenyong C, Daniel N, Aribo E (2013):** Associations between academic stressors, reaction to stress, coping strategies, and musculoskeletal disorders among college students. *Ethiop J Health Sci.*, 23(2):98-112.
16. **Khan S, Chew K (2013):** Effect of working characteristics and taught ergonomics on the prevalence of musculoskeletal disorders amongst dental students. *BMC Musculoskelet Disord.*, 14:118.
17. **Abledu J, Offei E (2015):** Musculoskeletal disorders among first-year Ghanaian students in a nursing college. *Afr Health Sci.*, 15(2):444-449.
18. **Oppermann U (2013):** Why is epigenetics important in understanding the pathogenesis of inflammatory musculoskeletal diseases?. *Arthritis Res Ther.*, 15, 209.
19. **El-Gilany A, Badawi K, El-Khawaga G, Awadalla N (2011):** Physical activity profile of students in Mansoura University, Egypt. *East Mediterr Health J.*, 17(8):694-702.
20. **Nawrocka A, Niestrój-Jaworska M, Mynarski A, Polechoński J (2019):** Association Between Objectively Measured Physical Activity And Musculoskeletal Disorders, And Perceived Work Ability Among Adult, Middle-Aged And Older Women. *Clin Interv Aging.*, 14:1975-1983.
21. **Baker R, Coenen P, Howie E, Williamson A, Straker L (2018):** The Short Term Musculoskeletal and Cognitive Effects of Prolonged Sitting During Office Computer Work. *Int J Environ Res Public Health*, 15(8):1678.
22. **Viestar L, Verhagen E, Oude Hengel K, Koppes L, van der Beek A, Bongers P (2013):** The relation between body mass index and musculoskeletal symptoms in the working population. *BMC Musculoskelet Disord.*, 14:238.
23. **Higgins D, Buta E, Heapy A, Driscoll M, Kerns R, Masheb R et al. (2020):** The Relationship between body mass index and pain intensity among veterans with musculoskeletal disorders: Findings from the MSD Cohort Study. *Pain Med.*, 21(10):2563-2572.