MEDICAL SCIENCE

The prevalence of myalgia and arthralgia and their associated risk factors among female Saudi medical and paramedical students in Al-Rayan Medical Colleges in Al-Madinah Al-Munawara

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ABSTRACT

Acute or persistent pain that affects the bones, muscles, ligaments, tendons, and nerves is referred to as musculoskeletal pain. It is a widespread medical and socioeconomic issue worldwide. This study was planned to find the prevalence of MSP in female students from the health science department of Al-Rayyan College, Al-Madinah Munawara. It included students from human medicine, pharmacy, anaesthesia, and nursing majors. A survey questionnaire was distributed among participants. A total of 356 students took part in the study; statistical analysis of responses showed that 271 (76%) of students had complaints of MSP. The most prevalent pain was back pain (64.9%), then neck pain (64.6%), Shoulder pain (63.5%), leg pain (33.9%), wrist pain (26.6%) and elbow pain (12.2%). As per the marital status, 77% of students were unmarried and other 23% were either married or divorced, average married students have 3 kids. A positive and significant association had been found between marital status, the number of children, sleeping hours and muscular pain. Only 17% of the students reported having disabling pain per the Orebro pain questionnaire criteria. Further studies should be conducted to study other risk factors that can cause muscular pain in students.

Keywords: Musculoskeletal pain, MSP, Medical & para medical female students, Back pain

1. INTRODUCTION

Background

Musculoskeletal pain (MSP) is a common disability worldwide. The musculoskeletal system is the locomotor system that directly affects every routine work. According to the recent Global Burden of Disease, around the globe, approximately 1.71 billion human beings are suffering from MSP. It affects not only a single region of the human body but around 150 disabilities and conditions in the MSP category (Lin et al., 2019). Pain of the musculoskeletal system are often categorized as the limitation of mobility, dexterity, functional capacity of muscles and overall reducing people's working ability. Low back pain (LBP) is considered as one of the main contributors to the overall burden of MSP.

Other contributors include fractures, osteoarthritis, other injuries, neck pain, amputations and rheumatoid arthritis respectively (Schmitt et al., 2011). MSP affects many regions of body such as limbs, shoulders, back, neck and joint pains. Sometimes this pain not only affect one region but encompasses around all parts of body. MSP is complicated and far-reaching pain (Wong and Kirk-Sanchez, 2021). As per the cause of MSP, several factors have been investigated and associated with it. In youths it is especially because of the over-activity, wrong sitting posture, and sport activities. MSP can also result from obesity and overweight, and aging aggravate musculoskeletal issues (Dighriri et al., 2019).

Recent studies have found a high prevalence of MSP in undergraduate students. Comparing MSP's risk in undergraduate students shows its high rate in medical students (Hasan et al., 2018). If comparing the medicine, allied health and pharmacy students the prevalence is found to be higher in medicine students (Hendi et al., 2019). Another study compared the onset of MSP in both genders and it was concluded that females report 3.4 times more Muscular pain than males (Smith and Leggat, 2007). In Saudi Arabia there are 30 universities with medical colleges and by the year 2019, about 20840 students were enrolled in those colleges (Madadin et al., 2016).

Medical and Allied health students of Saudi Arabia also pass through a number of different stress and anxiety problems during their study and training tenure (Alshagga et al., 2013). Now the use of technology such a computer and virtual learning systems have increased the stress. These factors are considered modifiable MSP in Saudi students (Hendi et al., 2019). Algarni et al., (2017) conducted a study in central Saudi Arabia, taking a sample of 469 medical students. The onset of pain was divided into three categories. Students were asked if they had MSP at least on one site at any time, in past week, in past year. The prevalence of pain was recorded as 85.3%, 54.4% and 81.9%, respectively (Morais et al., 2019).

In 2018, another study was conducted in Al-Taif, where the prevalence of MSP was studied among 640 medical students. Results concluded that MSP was more prevalent in females, as 54.1% of females reported to have muscular pains whereas 45.9% males reported MSP. Studying the region of pain showed that neck pain was most common in students (Algarni et al., 2017). In 2019 another study was conducted at Jazan University where 440 medical students were assessed 53.5% of the students responded positive to have pain. Upon asking the recent onset of pain in last year, highest prevalence was found that most of the students had shoulder pain. Factors associated with the risk of MSP include history of trauma, depressive symptoms and report of psychosomatic symptoms (Dighriri et al., 2019).

There has yet to be a study conducted in Madinah Munawara that directly links prevalence of MSP in medical students and in all studies previously conducted both genders have been taken as sample. This study intent to assess the prevalence of musculoskeletal pain considering the whole body and its associated risk factors among female Saudi medical and paramedical student in Al-Rayan medical colleges in Al-Madinah Al-Munawara.

Rational of Study

To the best of researcher's knowledge, no study has yet been conducted in Al-Madinah Al-Munawara on this topic.
The researchers have seen a lot of medical and paramedical student in Al-Rayan medical colleges complaining of musculoskeletal pain.
The researchers are interested in the preventive measures of musculoskeletal pain.

Objectives

General objective

To determine the prevalence of musculoskeletal pain and its associated risk factors among female Saudi medical and paramedical student in Al-Rayan medical colleges in Al-Madinah Al-Munawara.

Specific objective

To find out the association of musculoskeletal pain and its risk factor.

To find out the most affected part of the body among female Saudi medical and paramedical student.

2. METHODOLOGY

Study design

This study followed cross sectional study design.

Study area

In Al-Rayan medical colleges in Al-Madinah Al-Munawara in the western region of Saudi Arabia.

Study duration

The study was conducted from June 2022 till February 2023.

Study Population

All Saudi female Saudi medical and paramedical student in Al-Rayan medical colleges in Al-Madinah Al-Munawara.

Inclusion criteria

Saudi female Saudi medical and paramedical student in Al-Rayan medical colleges in Al-Madinah Al-Munawara.

Exclusion criteria

Male student.

Non-Saudi student.

Sample size

To calculate the sample size the researchers obtained the number Saudi female medical and paramedical student in Al-Rayan medical colleges in Al-Madinah Al-Munawara. The minimum sample size required in this study is 297 (calculated through sample calculator.net) 20% extra sample was taken to keep the study more valid and to reduce the chances of missing data so total sample of 356 students was taken under study.

Population size

According to the Admission and registration department of Al-Rayan College, there are total 1300 students enrolled in college with specialty of Human medicine, Pharmacy, Nursing and anesthesia.

Expected frequency: 5%

Confidence intervals: 95%

The calculated sample size: 297 with 20% extra of 356 students

Sampling technique

Convenient sampling technique was used. Starting with finding the female leaders of each year in medical and paramedical student in Al-Rayan medical colleges and sending them the questionnaire on WhatsApp, to send it to their groups.

Study tool

The data was collected using an online-based questionnaire and was applied to all participants.

The Questionnaire

The questionnaire was validated and investigated in Darwish and Al-Zuhair, (2013) and Reuter and Fichthorn, (2019). The questionnaire consists of three parts: The first part of the questionnaire was to collect respondent's socio-demographic which include: Age, weight, marital status and Psycho-social factors such as number of children, sleeping hours, studying variables included: Studying daily hours, number of classes per day. The second part of the questionnaire was planned to investigate the

pattern of musculoskeletal problems. Classification of Nordic questionnaire was used to determine site of pain. It was translated to Arabic language, validated and modified in light of available literature.

Standardize Nordic questionnaire was used for the analysis of musculoskeletal symptoms in an occupational health context. The questions were forced choice variants used in survey. The reliability of the questionnaires has been shown to be acceptable. Specific characteristics of work strain are reflected in the third part of the questionnaire to assess the severity of musculoskeletal pain. A modified Orebro musculoskeletal pain questionnaire was used. The Orebro Musculoskeletal Pain Questionnaire which is a screening questionnaire used to predict long term disability and failure to return to work following a musculoskeletal pain.

A cut-off score of 105 has been found to predict those who had no disabling pain (with 95% accuracy), and those who had disabling pain (with 67% accuracy). It was also translated to Arabic, validated, modified in light of literature review. The score was modified based on Likert Scale with (0, 1) for "never" = 0, (2, 3) for "rarely" = 3, (4, 5, 6) for "sometimes" = 5, (7, 8) for "often" = 7 and (9, 10) for "always" = 10. This modification was made for easier understanding and interpretation by participants and for easier statistical analysis and data interpretation. The female leaders of each year met with the researcher and the questionnaires was send to them by WhatsApp. Both English and Arabic questionnaires are included in the Appendix.

Data entry and analysis

The data were entered and analyzed in a personal computer using statistical package for social sciences (SPSS) software, version 26. Data were presented using descriptive statistics in form of frequencies and percentages for qualitative variables, and mean and standard deviation (SD) for quantitative variables. Chi-square test was used as appropriate to determine association. Anova was applied to compare means of a continuous variable between two different groups with 95% confidence interval (CI). The results were considered to be statistical significance if p-value was less than 0.05.

Pilot study

A pilot study was conducted on 20 students – different from the target group– to check understanding and clarity of the questionnaire. The data collected from those students was not included in the study.

Ethical consideration

This study was approved by Al-Rayan Research Ethics Committee (registered with the National Bioethics Committee in KACST Saudi Arabia). The study ID was HA-03-M-122-047. A consent was obtained from every participant and data was confident. A letter from supervisor general of the training program was issued to director of the department of education in Al-Madinah.

Limitation

Shortage in time and resources were important limitation.

Service

The researcher hopes to increase the preventive measures of MSP by this research.

3. RESULTS

Descriptive analysis

Educational Specialization

This study is conducted on the female students of Al-Rayan College from different medical specializations. In a sample of 356 individuals, 72.5% were from human medicine, 8.4% from Anaesthesia, 11% from Nursing background and 8.1% from pharmacy as stated in (Table 1).

Marital Status

In section one, students were further asked about their marital status. Out of 356 students 274 students were unmarried, 76 were married and 6 were divorced. The data is presented in (Table 2).

Table 1 Data distribution as per educational specialization

Educational background	Frequency	Percentage
Human Medicine	258	72.5%
Anaesthesia	30	8.4%
Nursing	39	11%
Pharmacy	29	8.1%
Total	356	100%

Table 2 Data distribution according to participant marital status

Marital Status	Frequency (percentage)
Unmarried	274 (77%)
Married	76 (21.3%)
Divorced	6 (1.7%)
Total	356 (100%)

Demographic details

Further the students were asked about their weight and it was found that mean student weight was 60.16 kg with standard deviation of 13.22 kg. Average students were sleeping for 6.20±2.4 hours. The classes they were attending per day were 5.27±2.17. Upon the question of average studying hours in a day the average calculated hours were 4.25±2.40. Data is summarized in (Table 3).

Table 3 Descriptive analysis

Variables	Mean ± STD
Weight	60.16±14.22
Number of sleeping hours	6.20±2.4
Number of classes	5.27±2.17
Studying hours	4.25±2.40
Sick leaves	1.80±2.36
Duration of pain	2.0517±0.85

Prevalence of Muscular Pain

In Section two of the questionnaire students were asked if they have any muscular pain. Total there were 356 students out of which 271 responded yes and 85 responded no to the question. Spliting in groups as per the educational specialization, out of 258 human medicine students 199 (77%), 23 (76.7%) anaesthesia students, 28 (71.8%) nursing students and 21 (72.4%) pharmacy students reported to have muscular pains. Data is summarized in (Table 4).

**Table 4** Prevalence of Muscular pain as per education specialization

Muscular Pain		
Education Specialization	Yes	No
Human Medicine	199	59
Anesthesia	23	7
Nursing	28	11
Pharmacy	21	8
Total	271	85

MSP in different regions

Students who reported not to have any musculoskeletal pain were asked to skip further questions. So only 271 participants were then asked about their region of pain. Out of 271 students, 175 had neck pain, 172 reported to have shoulder pain, 33 had elbow pain, 72 had wrist pain, 188 were having back pain and 92 participants were having leg pain. So, the most prevalent pain among students was back pain. Data is summarized in (Table 5) (Figure 1).

Table 5 Prevalence of muscular pain indifferent regions

Pain Region	Yes Frequency (%)	No Frequency (%)
Neck pain	175 (64.6%)	96 (35.4%)
Shoulder pain	172 (63.5%)	99 (36.5%)
Elbow pain	33 (12.2%)	238 (87.8%)
Wrist pain	72 (26.6%)	199 (73.4%)
Back pain	188 (69.4%)	83 (30.6%)
Leg pain	92 (33.9%)	179 (66.1%)
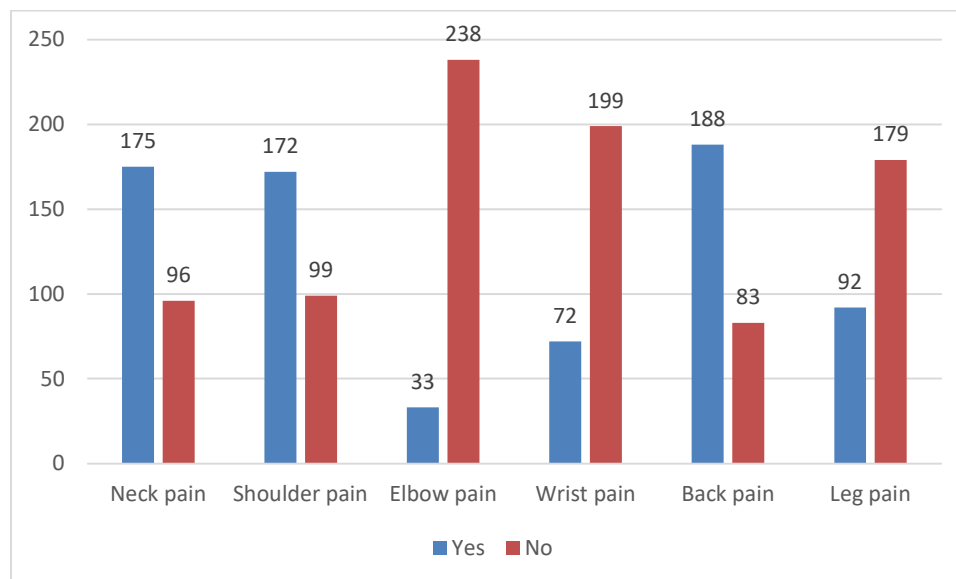
Figure 1 Muscular pain prevalence in different regions

Association between Muscular pain and associated factors

According to study objective, it was studied if there was a significant link between muscular pain and associating factors such as number of children, number of classes in a day, number of sleeping hours.

Number of Children and Muscular pain

To find the association between number of children and muscular pain cross tab analysis was done where chi square test result helped to calculate the association between these factors as per the (Table 5). It can be seen that majority of students were unmarried so they had no children but most of the students with children complaint of muscular pain. There had been a positive association found but as p value is more than 0.05 so number of children are not significantly affecting muscular pain. Data is shown in (Table 6) (Figure 2).

Table 6 Association between number of children and muscular pain

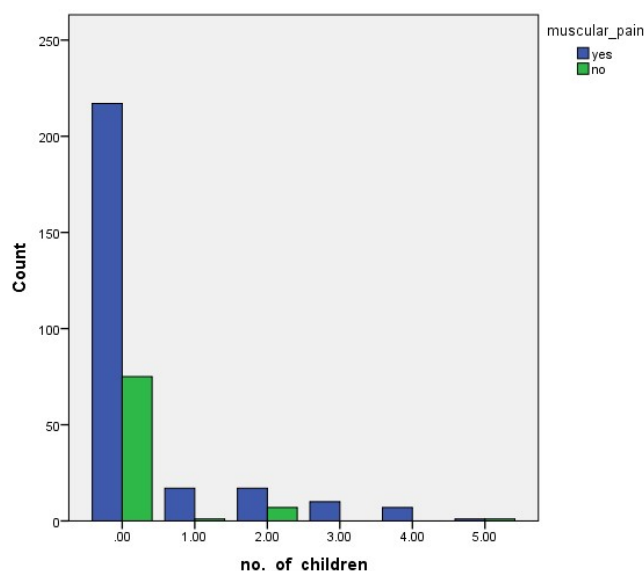| Number of children	Muscular_pain		p-value
	yes	no	
.00	217	75	
1.00	17	1	
2.00	17	7	0.67
3.00	10	0	
4.00	7	0	
5.00	1	1	

Figure 2 Prevalence of Muscular pain in reference to number of children

Number of children and region of pain
Further, the region of pain was tested to find association of pain with number of children. In married students who had children, the complaints of neck pain (p=0.018), shoulder pain (0.017) and leg pain (0.006) were found significant. Results are summarized in (Table 7).

Table 7 Association between number of children and region of pain

Chi square test-Number of Children and region of pain	
Region of pain	p-value
Neck pain	0.018
Shoulder pain	0.017
Elbow pain	0.109
Wrist pain	0.4
Back pain	0.66
Leg pain	0.006

Association between Muscular pain and sleeping hours
In next part, the sleeping hours were compared with muscular pain and regions of pain. Students sleeping for six hours were found to have more muscular pain as compared to others. According to recorded data, students having more sleeping hours complaint of more muscular pain (p=0.029), neck pain (p=0.03). For other region there was no significant association. Data is summarized in (Table 8) (Figure 3).

Association between Muscular pain and number of classes per day
Students were asked for the number of classes they attend per day and the association of classes was analysed with muscular pain. As per the number of cases, the highest muscular pain was found in students taking six classes a day. Based on region of pain, only the association of wrist pain (p=0.001) was found. It means that with the increase in classes, students bear more wrist pain. Data has been summarized in (Table 9) (Figure 4).

Association between Muscular pain and studying hours per day
According to the data recorded, there was a significant association found between number of studying hours with muscular pain (p=0.027). Significant association was also found between study hours and neck pain (p=0.04), wrist pain (p=0.012). Data is summarized in (Table 10).
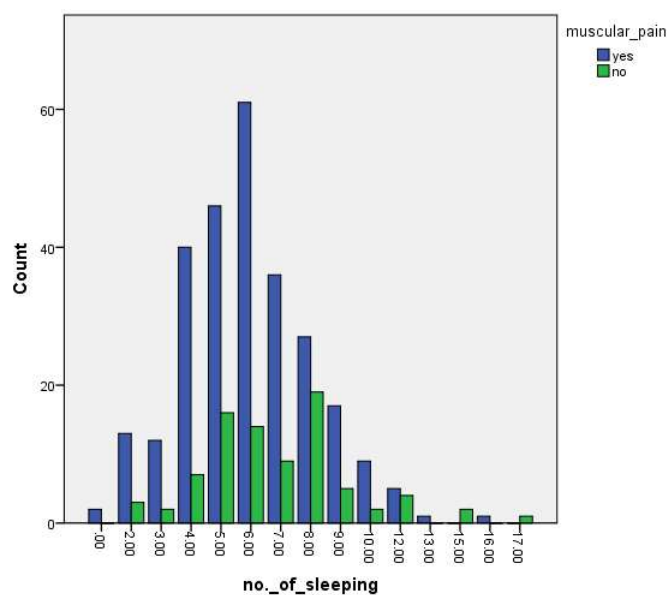
Figure 3 Prevalence of Muscular pain in reference to number of sleeping hours

Table 8 Association between sleeping hours and MSP

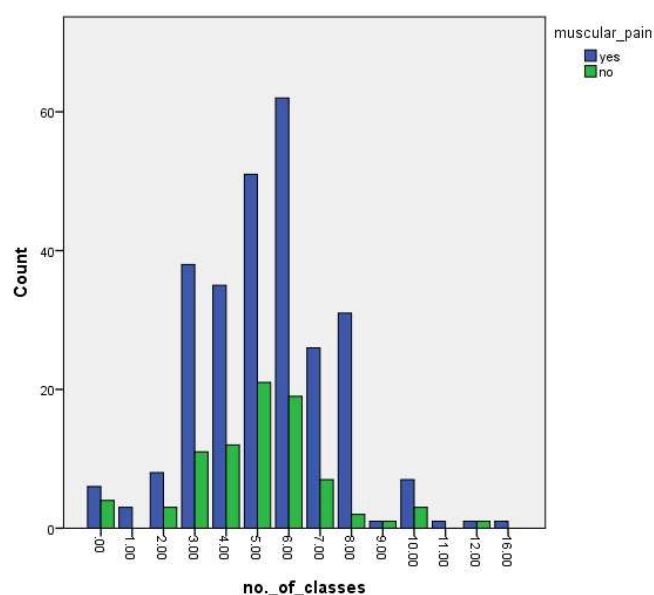| Chi square test-Number of Sleeping hours and muscular pain	
Region of pain	p-value
Muscular pain	0.029
Neck pain	0.03
Shoulder pain	0.375
Elbow pain	0.293
Wrist pain	0.655
Back pain	0.619
Leg pain	0.5

Figure 4 Prevalence of Muscular pain in reference to number of classes

Table 9 Association between number of classes and MSP

Chi square test-Number of classes and muscular pain	
Region of pain	p-value
Muscular pain	0.53
Neck pain	0.198
Shoulder pain	0.68
Elbow pain	0.13
Wrist pain	0.001
Back pain	0.393
Leg pain	0.529

Table 10 Association between studying hours and muscular pain

Chi square test-Number of studying hours and muscular pain	
Region of pain	p-value
Muscular pain	0.027
Neck pain	0.83
Shoulder pain	0.04
Elbow pain	0.93
Wrist pain	0.012
Back pain	0.20
Leg pain	0.42

Association between Muscular pain and Duration of pain

Lastly, the duration of onset of pain was compared with the region of pain and analysed using chi square. There was a strong association found between duration of muscular pain with shoulder pain (0.039), Back pain (0.07) and Leg pain (0.02). Data has been summarized in (Table 11).

Table 11 Association between duration of pain and region of pain

Chi square test-Duration of pain and muscular pain	
Region of pain	p-value
Neck pain	0.13
Shoulder pain	0.039
Elbow pain	0.16
Wrist pain	0.71
Back pain	0.07
Leg pain	0.02

Orebro Pain Scale

According to the modified Orebro musculoskeletal pain scale the cut off value was 105. As out of 356 students 271 reported to have musculoskeletal pain, in those 271 students only 46 scored more than 105 which means their muscular pain was on the level of disability. Other 225 scored less than 105 which means they had non disabling pain. It can be graphically seen in pie chart 3.3.1. There was no significant association found between Orebro score and educational background (p=0.492), Year of study (p=0.160), Marital status (p=0.757), number of children (p=0.112), number of sleeping hours (p=0.27) but number of classes were closer to significant value (p=0.06). Data is summarized in (Table 12) (Figure 5).
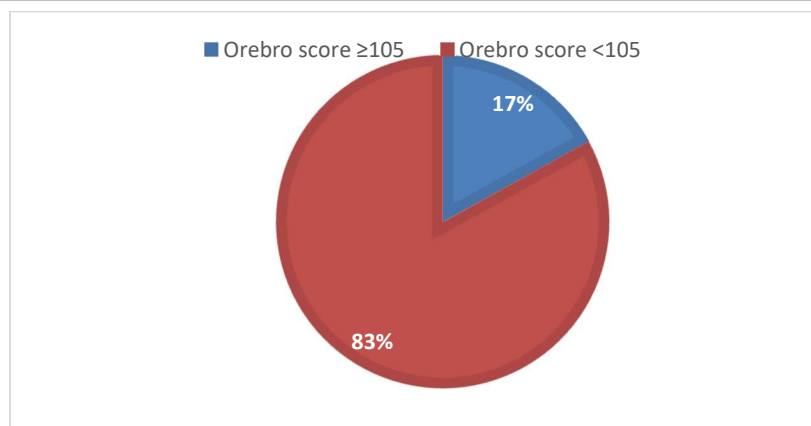
Figure 5 Orebro pain disability score

Table 12 Anova test- Orebro score and associating factors

Factors	F	Sig.
Educational Background	.996	.492
Year of Degree	1.205	.160
Marital Status	.862	.757
Number of children	1.255	.112
Number of sleeping hours	1.118	.271
Number of classes	1.335	.061

4. DISCUSSION

The study investigated the prevalence of musculoskeletal pain in female medical students of Al-Rayan College, Madina Al-Munawara. The study also assessed possible associated factors that can cause muscular pain in students. The data collection and analysis methodology was planned and associated with available literature (Reuter & Fichthorn, 2019; Algarni et al., 2017). Several studies have been previously done in Saudi Arabia that focused on musculoskeletal pains in medical students.

A study was conducted back in 2017 in central Saudi Arabia, where 85% of students, both female and male, stated to have musculoskeletal pain once in their lifetime (Morais et al., 2011), whereas in the current study asking 76% female students, the students responded positively to have musculoskeletal pains. In Al-Taif university 2018, 54.1% of female students had musculoskeletal pain (Algarni et al., 2017).

Comparing these statistics with international studies, Brazilian undergraduate students had a high prevalence (74.9%) of back pain in 2017 (Chan et al., 2020). Whereas in the current study, 69.4% of the students who had the complaint of MSP stated to have back pain. Another study on American university students stated that the intensity of chronic musculoskeletal pain in the neck and back region is more profoundly found in females (Borg-Stein et al., 2005). In Hong Kong, the study was conducted on undergraduate students, and 59.9% reported neck pain (Kumar et al., 2014). The difference in the prevalence of muscular pain in different body regions can be because of many modifiable and non-modifiable factors. The difference in statistics could come from geographical reasons, stress management and workload.

The current study has somehow linked musculoskeletal pain in female students with their marital status and the number of children, too, as it cannot be overlooked in the case of females of childbearing age. These results are consistent with Borg Stein's study (2005), which states that approximately all women in pregnancy go through some musculoskeletal discomfort and pain (Hendi et al., 2019). Wrist pain was significantly found to be associated with a more significant number of classes in a day, which means that more work and activity can cause wrist pain. An Indian researcher did such investigations; they also pointed out that the more students have to work in class as per the year of their degree, the more they complain of wrist and hand pain (Abdulmonem et al., 1969).

In section three of the current study, the Orebro pain questionnaire was used, and the cut-off value was followed as in the study (Reuter and Fichthorn, 2019); according to the data, one-third of school teachers in that study had disabling pain, whereas medical students of Al-Rayan college it was found among only 17% of the students. In contrast, the other students were having non-disabling pain, not affecting their routine work and activities. It means that the pain is still in control and can be handled correctly

so that the students can overcome minute pains and not suffer from chronic lifetime pains that affect their lifestyle and effectiveness.

In students of Al-Rayan college, the prevalence of muscular pains was calculated as back pain (69.4%), neck pain (64.6%), Shoulder pain (63.5%), Leg pain (33.9%), Wrist pain (26.6%) and Elbow pain (12.2%). Similarly, a study conducted on medical speciality students of Al-Taif university found the highest prevalence of muscular pain in the back region (19). However, another study conducted on Al-Taif university medical students showed that neck pain was the highest, followed by back pain (Algarni et al., 2017).

Further studies should also be conducted in Saudi Arabia targeting students from different educational backgrounds, and the government should take notice of the increasing prevalence of pain in undergraduate students. These musculoskeletal pains can cause several deformities and health concerns in future for young individuals. Steps should be taken primarily to control this rising health problem.

5. CONCLUSION AND RECOMMENDATION

Musculoskeletal Pain (MSP) is a complex health problem with around one hundred and fifty health concerns. MSPs were first thought to be linked with age, but nowadays, MSP is rapidly increasing in young individuals. This study was planned to find the prevalence of MSP in female medical students of Madinah Munawara enrolled in Al-Rayyan College and to study the associated risk factors. This study included 356 individuals, out of which 76% of the students had MSP. Six regions were highlighted in the study where 69.4% reported having back pain, so it was the most prevalent pain.

Female students who were married and had children complained significantly of musculoskeletal pains. So, it can be concluded that marriage and childbearing can be one of the associated factors of musculoskeletal pain in females. This study has filled the gap in the literature related to the prevalence of muscular pain in students of Madina Munawara. No study has directly correlated marital status and the number of children with the onset and adversity of muscular pain. Further studies should involve some interventions to improve the MSP of young individuals. Students' physical activity and diet should also be considered for a holistic overview. These studies can help policymakers develop an educational system where students are not too burdened and overworked, leading them to muscular strains and pain.

Author Contributions
Dr Khaled Shahat was the principal investigator. They supervised the research proceedings at every step and helped to get approval from the ethical board. The work was distributed among researchers so that everyone contributed equally. All the researchers helped in collecting, compiling, and analyzing data. Then further, the documentation of the research paper was also distributed among all researchers.

Ethical approval
This study was approved by Al-Rayan Research Ethics Committee (registered with the National Bioethics Committee in KACST Saudi Arabia). The study ID was HA-03-M-122-047.

Informed consent
Virtually informed consent was obtained from all individual participants included in the study.

Conflict of interest
The authors declare that there is no conflict of interests.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

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