Musculoskeletal disorders associated with depression and psychosocial risk factors among female teachers in Riyadh region, Saudi Arabia

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Abstract

Background: Teachers have the highest musculoskeletal disorders (MSD) rates worldwide because of stressful working conditions. MSD is likely to be linked to psychosocial elements such as need for social help, loss of job control, performance concerns, repetitive work, and feeling burdened and stressed. Objectives: To determine the prevalence and anatomical distribution of MSDs and the associated psychosocial risk factors, primarily depression, among female teachers in the Riyadh region of Saudi Arabia. Settings and Design: An observational, quantitative, cross-sectional study was done. Material and Methods: Data was collected from female teachers in Riyadh region, Saudi Arabia, via a questionnaire. All the participants completed the Patient Health Questionnaire (PHQ-9) and Nordic Musculoskeletal Questionnaire (NMQ). The data was analyzed using Statistical Package for the Social Sciences software. Results: Of the 372 questionnaire responses obtained from the teachers, the prevalence of depression was 65.6% and of MSD was 86%. The main site of pain was the neck (62.9%), followed by the lower back (53.8%). There was a significant relationship between the prevalence of MSD and the prevalence of depression. MSD occurred in 64.1% of participants without depression, in 95.9% of those with mild depression, and in 100% of those with more severe depression (P ≤ 0.001). Conclusions: A high prevalence of MSD pain was found among the female teachers, especially among older women, those teaching at elementary schools, and those with a higher number of pregnancies. The coexistence of MSD and depression affects the work ability of the teachers and reduces their efficiency.

Keywords: Depression, female, musculoskeletal disorder, pain, Riyadh, Saudi Arabia, school teachers

Introduction

Pain manifested by musculoskeletal disorders (MSDs) reflects musculoskeletal system damage from various causes, including physical and psychosocial stress. These disorders can be acute or chronic and cause disability, resulting in higher healthcare costs, especially for chronic pain. Occupations that expose individuals to increased physical and mental strain are associated with MSDs, and teachers have the highest MSD rates worldwide because of stressful working conditions, such as extensive classes, lack of educational facilities, and low pay. A close relationship exists between MSDs in teachers and years of teaching experience, age, sex, obesity, type of school and number of students, school infrastructure, working conditions, high stress, and psychosocial factors in both urban and rural settings. Research in both developed and developing countries shows a high frequency of MSDs in specific body parts: the lower back, neck, shoulders, and upper limbs. And psychosocial factors and depression were found to be significant predictors of MSD among teachers.
Limited information is available on the prevalence of MSDs in Riyadh region, Saudi Arabia[17,33]; only data from five regions of Saudi Arabia have been reported to date. According to the study, the most common MSDs among Saudi teachers are severe low back pain (38.1%), followed by knee pain (26.3%), heel pain (24.1%), shoulder pain (20.6%), upper back pain (17.7%), hip pain (16.5%), ankle pain (12.3%), and neck pain (11.3%). The least reported MSDs were acute pain in the elbow (5.6%) and in the wrist (7.4%). Pain affected work in 46.1% of teachers[32]; and data showed that approximately 46% of school teachers in Saudi Arabia had MSDs.[17] The severity depended on the education level,[28] age,[4] and comorbidity with a chronic illness.

Psychosocial factors, defined as psychological feelings or experiences related to an individual’s physical and social condition, have also been shown to influence the development and exacerbation of MSDs.[17,24,25] Among teachers, psychosocial factors such as feeling a burden, stress, need for social assistance, decreased work control, performance issues, and repetitive work are likely to be associated with MSDs.[13,26]

Depression is one of the most common mental health disorders. The World Health Organization (WHO) reported that depression is the fourth leading cause of disability globally.[27] Many studies have demonstrated an association between mental health and physical, especially in MSDs,[13,28] with poor mental health increasing the risk of developing MSDs.[28] Good mental health and physical health are important,[28] and mental health has a positive effect on dissatisfaction with work stress.[29] A study by Mukundan and Khandehroo[30] found that female teachers’ emotional fatigue was significantly higher among 120 English teachers in Malaysia, and English teachers with <26 years of teaching experience had significantly higher levels of emotional exhaustion. It has also been shown that a mental health indicator such as depression is associated with MSDs.

Among female teachers in the Riyadh region, significant gaps remain in evidence for work-related MSDs. These teachers may be exposed to unique cultural and social environments and psychosocial factors that can contribute to the development of MSDs.[18] Despite much research on MSDs, few studies have focused on the parameters and underlying psychosocial risk factors, mainly depression.

Little is known about the symptoms, scope, and severity of MSDs among female teachers and the implications of this disorder for those already affected.[31] Currently, there is a considerable lack of epidemiological studies on the prevalence and impact of MSD among female teachers and the associated psychosocial risk factors, mainly depression.[17] The study focuses exclusively on female teachers in the Riyadh region. In addition, no studies have tested and demonstrated concrete interventions for MSDs.

Primary prevention strategies that aim at minimizing the risks of the occurrence of symptoms of work-related musculoskeletal complaints and secondary prevention strategies that aim at reducing the comorbid health problems associated with work-related musculoskeletal disorders need to address different sets of risk factors.[32] In addition, a multifactorial approach to prevention of these disorders among teachers is more effective than addressing single risk factors, both in primary prevention and in rehabilitation.[33]

These risk factors should be considered by primary care physicians when attending to patients suffering from depression and musculoskeletal disorders. Recognizing the relationship between depression and MSDs will help in arranging, planning or actualizing preventive intervention programs for teachers with the hope of lessening the incidence of MSD.[34]

The present study aims to contribute to the wealth of knowledge regarding MSDs and serve as an influential authority for the implementation of reliable intervention mechanisms within a specific social and cultural setting.

**Material and Methods**

This study employed an observational, quantitative, cross-sectional research method to collect raw data by observation of female teachers in Riyadh region, Saudi Arabia. Female teachers outside Riyadh region were excluded. For reliability, the required sample size was ≥ 383 to obtain a 95% confidence interval (CI) with a real value within ± 5% of the measured value (based on calculations from calculator.net/sample-size-calculator).

Data were collected using a questionnaire that included the participants’ socio-demographic characteristics (age, educational level, occupation, and marital status), monthly income, weight and height, and medical history. All the participants completed the Patient Health Questionnaire (PHQ-9) and Nordic Musculoskeletal Questionnaire (NMQ), and the data (musculoskeletal and mental health symptoms) was analyzed. Standard NMQ was used to determine the prevalence of symptoms related to the musculoskeletal system, including the presence, severity, and frequency of MSDs related to the neck, shoulder, elbow, wrist, upper and lower back, hip, knee, and ankle in the past 12 months.[36] For clarity, the participants were given a diagram of the female back with the name and position of the organs. The questionnaire was divided into three sections to assess 1) prevalence and frequency, 2) severity of pain, and 3) impact of the pain on work.

The PHQ-9 is a nine-item depression scale. It is one of the most validated tools in mental health and is used to assist clinicians in diagnosing depression and monitoring the treatment response. The nine items of the PHQ-9 are directly based on the nine diagnostic criteria for major depressive disorder in the Diagnostic and Statistical Manual of Mental Disorders, fourth edition. For each response, the score options and ranges were: not at all (0), several days (1), more than half of the days (2), and nearly every day (3). The range of scores was 0–27, and scores of 0–4 indicated normal, 5–9 indicated mild depression, 10–14 indicated moderate...
depression, 15–19 indicated moderately severe depression, and >20 indicated severe depression.

The questionnaire was distributed among teachers using online social media. Microsoft Excel was used for data entry, and Statistical Package for the Social Sciences (SPSS) software was used for data analysis. Categorical variables were expressed as frequency and percent; continuous variables were expressed as mean and standard deviation. The Chi-squared test was used to determine the relationship between the prevalence of MSDs and demographic factors and the prevalence of depression. Significance was defined as $P \leq 0.05$.

The study was approved by the ethical committee and the procedures followed were in accordance with the ethical standards and with the Helsinki Declaration of 1975, as revised in 2000. The anonymity and confidentiality of the participants were preserved, ensured, and maintained and not used except for the study purpose.

**Results**

A total of 372 responses were collected. Most of the participants were aged 40–50 years (54.3%), and 28% were aged 30–40 years. Most (82.8%) had university education. Most of them (79.6%) were married, among whom 14% had no previous pregnancy, 45.2% had 4–6 previous pregnancies, and 14.5% had >6 pregnancies. Of the mothers, 44.1% reported 4–6 pregnancy deliveries. The monthly income ranged from 10,000–15,000 Saudi riyals for 43% of the participants. The school setting was intermediate for 49.5% and elementary for 41.4% of the participants. Most participants worked in the western Riyadh region (53.8%) and 23.1% worked in the southern region.

Regarding the participants’ body mass index (BMI), 37.2% had obesity, 41.0% were overweight, and 20.8% had normal weight. Moreover, 30.1% reported having a medical history of different diseases, including asthma and diabetes mellitus.

The PHQ-9 tool showed a depression prevalence of 65.6%; depression was mild in 39.8%, moderate in 17.2%, moderately severe in 4.8%, and severe in 3.8% [Figure 1]. In terms of depression symptoms affecting daily activities, 41.4% experienced no effect, 50.5% had some difficulty, and 8.1% had severe difficulty.

Regarding the prevalence of MSDs, MSDs were prevalent in at least one site in 86% of the participants with the neck being the main site of pain [Figure 2].

In Table 3, the frequency of pain at each site is presented. Most participants reported a frequency of pain of once or twice weekly (36.2%–59%). A high frequency of pain, defined as more than once daily, was present at the following sites: right knee (17.4%), lower back (14%), left arm (13.6%), left shoulder (13.5%), left foot (11.9%), right shoulder (11.1%), and neck (11.1%).

In terms of severity, most participants complained of slight pain at different sites: 79.2% in the right thigh and 79% in the left thigh and left wrist. Regarding low back pain, however, only 34.2% had slight pain, whereas 23.3% had severe pain. Other sites of severe pain were the hip (16.2%), left foot (16.1%), right foot (13.6%), left shoulder (13.1%), and right (11.3%) and

| Table 1: Sociodemographic characteristics of the participants (n=372) |
|--------------------------|-----------------|
| Education level            | Number | Percent |
| Intermediate school        | 2      | 0.5%    |
| Secondary school           | 24     | 6.5%    |
| University                 | 308    | 82.8%   |
| Postgraduate education     | 38     | 10.2%   |
| Marital status             |        |         |
| Single                     | 44     | 11.8%   |
| Married                    | 296    | 79.6%   |
| Divorced                   | 28     | 7.5%    |
| Widow                      | 4      | 1.1%    |
| Number of pregnancies      |        |         |
| None                       | 52     | 14.0%   |
| 1-3 pregnancies            | 98     | 26.3%   |
| 4-6 pregnancies            | 168    | 45.2%   |
| >6 pregnancies             | 54     | 14.5%   |
| Number of labors           |        |         |
| No previous delivery       | 66     | 17.7%   |
| 1-3 delivery               | 112    | 30.1%   |
| 4-6 delivery               | 164    | 44.1%   |
| >6 deliveries              | 30     | 8.1%    |
| Monthly income             |        |         |
| 5000-10000                 | 110    | 29.6%   |
| 10,000-15,000              | 160    | 43.0%   |
| 15,000-20,000 SR           | 94     | 25.3%   |
| >20,000 SR                 | 8      | 2.2%    |
| Place of work              |        |         |
| Elementary school          | 154    | 41.4%   |
| Intermediate school        | 184    | 49.5%   |
| Secondary school           | 34     | 9.1%    |
| Other                      | 0      | 0.0%    |

| Table 2: Sociodemographic characteristics of the participants (n=372) |
|--------------------------|-----------------|
| Location of school       | Number | Percent |
| North of Riyadh region   | 48     | 12.9%   |
| South of Riyadh region   | 86     | 23.1%   |
| East of Riyadh region    | 38     | 10.2%   |
| West of Riyadh region    | 200    | 53.8%   |
| Body mass index           |        |         |
| Underweight               | 4      | 1.1%    |
| Normal                    | 76     | 20.8%   |
| Overweight                | 150    | 41.0%   |
| Obese                     | 136    | 37.2%   |
| Medical history           |        |         |
| No                        | 260    | 69.9%   |
| Yes                       | 112    | 30.1%   |
MSDs are an important factor associated with a teacher’s mental and physical health. The aim of this study was to determine the prevalence of MSD among female teachers in Riyadh region, Saudi Arabia, as well as to determine if there is an association between the prevalence of MSD and the prevalence of depression. The prevalence of MSDs among the teachers was 86%, primarily at the neck, lower back, left shoulder, upper back, right shoulder, and left knee. These results are similar to those 30–40 years, 92.1% of those aged 40–50 years, and 100% of those aged > 50 years. Pregnancy increased the risk of MSDs: 100% of participants with > 6 pregnancies reported MSDs versus 53.8% of those with no previous pregnancy ($P = 0.000$). The prevalence and severity of MSDs were significantly higher in elementary school teachers compared with those in secondary and intermediate school teachers ($P = 0.036$), as well as among teachers in west and east Riyadh region than in those in north and south Riyadh region ($P = 0.038$). No significant difference was noted between the prevalence of MSDs and body mass index; however, participants with normal weight appeared to have the lowest prevalence of MSDs.

Finally, we found a significant relationship between the prevalence of MSDs and the prevalence of depression; MSDs occurred in 64.1% without depression, 95.9% with mild depression, and 100% with more severe depression ($P < 0.001$). An increase in the severity of MSDs increased the severity of depression; 20.9% of participants with mild depression had pain in >12 sites compared with 31.3%, 44.4%, and 57.1% of participants with moderate depression, moderately severe depression, and severe depression [Table 5]. Furthermore, any type of MSDs increased the risk of depression by 65 times (odds ratio = 65; 95% CI, 26.9–158.7; $P = 0.0001$).

**Discussion**

Table 5 shows the relationship between prevalence of MSDs and the prevalence of multi-site pain in the context of demographic factors and the prevalence of depression. The prevalence of MSDs was significantly associated with age ($P \leq 0.001$), that is, the prevalence increased with age, as follows: 47.4% of those aged 20–30 years had pain compared with 84.6% of those aged 30–40 years, 92.1% of those aged 40–50 years, and 100% of those aged > 50 years. Pregnancy increased the risk of MSDs: 100% of participants with > 6 pregnancies reported MSDs versus 53.8% of those with no previous pregnancy ($P = 0.000$). The prevalence and severity of MSDs were significantly higher in elementary school teachers compared with those in secondary and intermediate school teachers ($P = 0.036$), as well as among teachers in west and east Riyadh region than in those in north and south Riyadh region ($P = 0.038$). No significant difference was noted between the prevalence of MSDs and body mass index; however, participants with normal weight appeared to have the lowest prevalence of MSDs.
of a study by Ng et al.\cite{14} who reported a prevalence of MSDs in the previous six months of 80.1% among female teachers. In a study by Brulin et al.\cite{13} on female music teachers in Sweden, the prevalence of MSDs was 82%. A study by Darwish et al.\cite{17} on secondary school teachers (both government and private schools) in Al-Khobar, Saudi Arabia, reported that the prevalence of MSDs was 79.1%.

However, other studies reported much lower rates. Cardoso et al.\cite{40} reported that the overall prevalence of musculoskeletal pain was 55%; however, the sample included both women and men, and the study assessed the prevalence of MSD at three body segments: lower limbs (41.1%), upper limbs (23.7%), and back (41.1%). In addition, a study by Durmus et al.\cite{37} on teachers in Turkey, found a prevalence of MSD of 48% and work-related musculoskeletal pain (WRMSP) was present among 74.9% of the participants. The main affected parts were the shoulder (55.9%), neck (47.9%), upper back (42.7%), and knee (30.9%). In contrast, a study in China by Chong et al.\cite{38} reported a very high prevalence of MSD (95.1%) among primary and secondary school teachers.

In the present study, the prevalence of depression was 65.6% and 3.8% had severe depression. This prevalence was much higher than that reported by Silva et al.\cite{39} who reported a prevalence between 15.9% and 28.9%, and that by Desouky et al.\cite{18} who reported a prevalence of depression of 23.2% among Egyptian female teachers. Rodrigues et al.\cite{41} reported that the prevalence of depression among female teachers was 79.8%, which is similar to our results.

We found that age, number of pregnancies, and type of school were significant factors in determining the prevalence of MSD, with a higher prevalence and severity in those who were older, had more pregnancies, and worked in elementary schools. These results were also reported by other studies.\cite{14,15,40}

This study had several limitations. First, data were collected from a self-reported questionnaire regarding the diagnosis of depression and MSD, which, despite being a tool that was previously validated, the need for clinical examination was continuous. In addition, the need for participants to remember their symptoms during the past 12 months could have led to memory bias.

![Figure 3: Impact of musculoskeletal disorders on the participants' work](image)

| Table 4: Severity of pain at each site |
|--------------------------------------|
| **Slight** | **Moderate** | **Severe** |
| Neck      | 46.8%       | 46.0%      | 7.2%       |
| Right shoulder | 51.3%       | 40.3%      | 8.4%       |
| Left shoulder | 44.3%       | 42.6%      | 13.1%      |
| Upper back | 53.9%       | 38.3%      | 7.8%       |
| Right humerus | 73.3%       | 23.8%      | 3.0%       |
| Left humerus | 73.7%       | 20.2%      | 6.1%       |
| Lower back | 34.2%       | 42.5%      | 23.3%      |
| Right arm | 75.8%       | 20.2%      | 4.0%       |
| Left arm | 69.0%       | 23.0%      | 8.0%       |
| Right wrist | 75.5%       | 22.4%      | 2.0%       |
| Left wrist | 79.0%       | 18.0%      | 3.0%       |
| Hip | 59.0%       | 24.8%      | 16.2%      |
| Right thigh | 79.2%       | 15.1%      | 5.7%       |
| Left thigh | 79.0%       | 17.1%      | 3.8%       |
| Right knee | 52.6%       | 36.0%      | 11.4%      |
| Left knee | 48.7%       | 40.0%      | 11.3%      |
| Right leg | 69.8%       | 20.8%      | 9.4%       |
| Left leg | 71.8%       | 20.0%      | 8.2%       |
| Right foot | 60.0%       | 26.4%      | 13.6%      |
| Left foot | 59.8%       | 24.1%      | 16.1%      |

| Table 5: Relationship between the prevalence of MSDs and demographic characteristics and prevalence of depression |
|---------------------------------------------------------------|
| **Prevalence of any type of pain** |
| **P** |
| None | 1-5 types | 6-12 types | >12 types |
| of pain | of pain | of pain |
| Age (years) | | | |
| 20-30 | 52.6% | 26.3% | 10.5% | 10.5% | <0.001 |
| 30-40 | 15.4% | 36.5% | 26.9% | 21.2% | <0.001 |
| 40-50 | 7.9% | 41.6% | 29.2% | 21.3% | 7.1% |
| >50 | 0.0% | 64.3% | 28.6% | 7.1% | 0.0% |
| Number of pregnancies | | | | |
| None | 46.2% | 34.6% | 15.4% | 3.8% | <0.001 |
| 1-3 pregnancies | 12.2% | 38.8% | 28.6% | 20.4% | <0.001 |
| 4-6 pregnancies | 9.5% | 40.5% | 29.2% | 20.8% | 20.8% |
| >6 pregnancies | 0.0% | 48.1% | 25.9% | 25.9% | 25.9% |
| Place of work | | | | |
| Elementary school | 9.1% | 42.9% | 29.9% | 18.2% | 18.2% |
| Intermediate school | 14.0% | 41.3% | 24.5% | 16.8% | 16.8% |
| Secondary school | 17.6% | 23.5% | 23.5% | 35.3% | 0.036 |
| Location of school | | | | |
| North of Riyadh region | 16.7% | 37.5% | 33.9% | 12.5% | 12.5% |
| South of Riyadh region | 18.6% | 48.8% | 23.3% | 9.3% | 0.038 |

We found a significant relationship between the prevalence of MSD and the prevalence of depression; the prevalence of MSD increased from 64.1% in those without depression to 95.9% in those with mild depression and 100% in those with a higher degree of depression. Importantly, having any type of MSD increased the risk of depression by 65 times. These results are consistent with those in the literature and indicate that MSD is a risk factor for mental disorders, psychological stress, and diminished biopsychosocial quality of life among teachers,
especially female teachers. Chronic pain and depression often occur simultaneously, that is, individuals who experience pain have a higher risk of depression, and individuals who experience depression have an increased risk of experiencing pain.

**Conclusion**

The prevalence of MSD pain among female teachers in Riyadh region, Saudi Arabia, was high, especially among older females, those with more pregnancies, and those teaching at elementary schools. There was a significant relationship between the prevalence of MSD and the prevalence of depression, which could affect the teachers’ work ability and reduce their efficiency.

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**Conflicts of interest**

There are no conflicts of interest.

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