



Prevalence of Scoliosis Among Majmaah University Physical Therapy Students-Saudi Arabia

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ABSTRACT

Scoliosis is the deviation in the normal vertical spine. Although there are numerous studies available about treatment approaches for scoliosis and screening schoolchildren, the numbers of studies that screen university student are limited. The present study aimed to investigate the prevalence of scoliosis, and to examine the correlation between scoliosis prevalence and increasing level (year) of study among physical therapy students in Majmaah University, Saudi Arabia. One hundred and fifty-two physical therapy students between 20 and 24 years of age were investigated. Ninety-two of these students were females and 60 were males. Spinal mouse (SM) was used to evaluate the frontal plane curvature of the student's spine. There was a high prevalence of scoliosis (31.5%) among physical therapy students at Majmaah University, particularly among female students, with the female-male ratio of 3:1. There were significant association between the scoliosis prevalence and the level of study in female students. It is obvious that female physical therapy students tend to develop scoliosis more than male students during the different levels of study for physical therapy program.

Keywords: Majmaah University, scoliosis, physical therapy students, spinal-mouse.

INTRODUCTION

Scoliosis refers to a spinal deformity characterized by lateral curvature with rotation of the involved vertebrae around a vertical axis.^[1,2] It is considered as one of the musculoskeletal disorders affecting adolescent, especially girls for unknown cause. It was noticed in Riyadh, the capital of Saudi Arabia, that such pathology occurred in 2.5% of schoolgirl and subsequently impact their daily life.^[3] Several risk factors may have a role in changing posture and developing such case. These factors include inherent factors like age, sex^[4,5] and job-related factors.^[6,7] Moreover, physical therapy is a highly physical fitness job-demanding and may require assuming a faulty posture especially when dealing with paediatric and neurologic disorders cases. Therefore, physical therapy practice can lead to work-related musculoskeletal disorders.^[7] Consequently, activities related to physical therapy practice may affect posture and alter subjects' balance. Bettany-Saltikov et al.^[8] confirmed that carrying the load on the right shoulder significantly increased the thoracic lateral curvature in the frontal plane and decreased the thoracic kyphosis in the sagittal plane, especially a 17% load carrying causes significant changes in spinal alignment.

In the same context physical therapy students are likely at risk of functional scoliosis due to their job characteristics, e.g. lifting and transferring a patient, handling techniques. Such manoeuvres may excessively load the body mechanics and put unnecessary strain on the spine. Therefore, screening could alert students about the possible spinal problem and increase their awareness about the postural care. Postural evaluation is an important assessment procedure for clinicians. Scoliosis screening is considered as a part of the primary care management of adolescent health. This primary care is very important for improving the quality of university life. Screening programs can identify most cases of previously undiagnosed orthopaedic abnormalities, improve our knowledge of the prevalence and pattern of musculoskeletal disorders, especially scoliosis, with early diagnosis can alter the natural progression of the disease.^[9,10] Previous studies have focused on risk factors or prevalence of scoliosis in schoolchildren,^[3,4,11,12] or the pattern of scoliosis in spinal unit in Saudi Arabia.^[13] Other research studied the work-related musculoskeletal

disorders in physical therapists.^[7,14] Little data is known about the prevalent rates of scoliosis in physical therapy students in Saudi Arabia.

So, purposes of our study were (i) to investigate the prevalence and classify types of scoliosis among physical therapy students in Majmaah University, KSA (ii), to determine the correlation between scoliosis prevalence and the level (year) of study. We hypothesized that, the prevalence of scoliosis in female students might be more than in males, and a positive correlation might be present between the scoliosis prevalence and level (year) of study.

MATERIALS AND METHODS

Design

A cross-sectional study was conducted to assess the prevalence of scoliosis among physical therapy students, and to test the relationship between scoliosis prevalence and the level (year) of study at Majmaah University.

Sample Characteristics

We assessed hundred and fifty-two physical therapy students aged between 20 and 24 years old. Ninety-two of students were females and 60 were males. The students examined were at study level from level 4 to level 8, in addition to internship students. The number of subjects was determined a priori based on statistical power analysis to ensure type I error did not exceed 0.05 and type II error did not exceed 0.20. This analysis indicated that 132 subjects were required to find a power of 96% and level of significance of 95%. Exclusion criteria included a student who had spine related accidents or has been treated with spinal operation or those with permanently limited mobility of the spine. The study was applied in Department of Physical Therapy, Faculty of Applied Medical Sciences, Majmaah University, Saudi Arabia. Ethical approval was obtained before the commencement of the study, and consent was obtained from each participant.

Measuring devices

The frontal plane curvature of the student was evaluated by spinal mouse (SM) (Fig. 1). The device provides data to the computer with Bluetooth and the measured curvatures are shown on the computer display. The method has no medical risk or danger. The device has two rolling wheels follow the spinous processes of the spine, and distance and angle measures are transferred from the device to a personal computer. Data are sampled every 1.3 mm as the mouse is rolled along the spine, giving a sampling frequency of approximately 150 Hz. This information is then used to calculate the relative positions of the each vertebra, angles between the vertebrae and total angle of frontal and sagittal plane curvatures with using its own software. Spinal Mouse is a validated and reliable tool for measuring spinal curvatures in the frontal and sagittal planes.^[15-17] The software is characterized by absence of X-ray, small dimension, ergonomic design and compatible Microsoft Office for the execution of the recording.

The measurements were made in a quiet and well-lit environment where there was nothing to distract the subject or the examiner. The students were asked to stand symmetrically, dividing their weight equally between the two feet as much as possible. The position was first described, demonstrated and practiced by the examiner for each student before the measurement. The C7–S3 vertebral spinal processes were determined and marked with a marker while the student was standing up straight in the anatomical position. The SM was then moved downwards over the spinal criteria points. The measurements were made early in the day to prevent positional differences of the patient due to fatigue, stress, psychological factors, etc.

Statistical analysis:

The data transferred to the computer through the SM are analyzed and the angular deviation between each vertebral segment pair is provided as an angle. The prevalence of scoliosis among physical therapy students was analyzed using the Statistical Package for Social Sciences (version 20.0 for Windows; SPSS Inc., Chicago, IL). The level of significance was set at $P < 0.05$ for all statistical tests. A Chi-square test was used to determine the relationship between scoliosis prevalence and increasing the study level.

RESULTS

A total of 152 (92 females, 60 males) physical therapy students were included in the study (Table 1). Forty-eight of the participants had scoliotic deformity (31.5%), 36 of them were females and 12 were males, with female-male ratio of 3:1. The prevalence of scoliosis was substantially high among female students (39%), while it was 20% among male students. The highest curvature deformity was thoracolumbar in 101 students (66.4%), thoracic in 34 students (22.4%) and lumbar in 17 students (11.2). There were 77.6% right sided curve and 22.4% left sided curve. With regard to the correlation of scoliosis prevalence and level of study in physical therapy, Chi-square demonstrated a significant association between level of study and the scoliosis prevalence ($p = 0.011$) (Table 2). However, there was no significant association in male students. Results show that, most of the students with scoliosis were in level 6 (third year of study) (Fig. 2,3).

DISCUSSION

This is the first study investigating the prevalence of scoliosis in a population of physical therapy student at Majmaah University. In this study, where physical therapy students were dealing with patients in various settings, we found a high prevalence of scoliosis; particularly in female students. The results of the current study is in agreement with other studies.^[4,18,19] The prevalence of scoliosis may be due to job-related risks that are relevant to physical therapy. Cromie et al.^[7] reported that therapists' job include activities that contribute to their injury. These activities like lifting or transferring patients who were heavy and dependent on therapists for transfer may load body mechanics and putting their back under strain. In addition, the major contributing factor in the development of their work-related symptoms may be the inadequate training in injury prevention. In this study, the highest prevalence of scoliosis was observed in females confirming the results of studies by Al-Arjani et al.^[13]; Lee et al.^[20]; Baroni et al.^[12] in which the authors reported female-male ratios of 2:1, 4.5:1 and 3.8:1; respectively. This may be due to the spine of female physical therapist become at high risk when lifting or transferring larger patients.^[6] Moreover, this reflects the lack of awareness about back deformity, or being in a conservative community, where the females do not participate in sports.^[13] Therefore, they had a high prevalence of work-related musculoskeletal disorder.

The findings of current study indicated that level of study was significantly associated with the scoliosis prevalence ($p = 0.011$) in female students. This can be attributed to that the level 6 female students subjected to high stress on their spine. Such level is considered the beginning of clinical practice and dealing with patients. Then, with higher level of study, the females become have a good awareness about the injury prevention. However, the internship demonstrated high percent of scoliosis that may be due to the large number of patients treated or performing more activities that generate high spinal stresses. On the other hand, no association was found in male students, which may contribute to more adaptation to correct posture in routine life. In addition, the results may reflect that male students become more concerned about their health.

Table 1: Demographic and anthropometric characteristics of physical therapy students

| Groups | Male <i>n</i> = 67 | Female <i>n</i> = 92 |
|---------------------------|-----------------------|-------------------------|
| Age (years)* | 21.25 ± 1.37 | 21.69 ± 1.24 |
| Height (cm)* | 171.85 ± 7.19 | 156.65 ± 6.02 |
| Weight (kg)* | 68.22 ± 9.74 | 52.96 ± 6.83 |
| BMI (kg/m ²)* | 22.77 ± 3.17 | 21.65 ± 3.13 |

*Values are expressed as mean ± SD.

Table 2: The study level distributions of students with and without scoliosis and association with scoliosis prevalence

| Variable | Females (<i>n</i> = 92) | | Chi-square test (<i>P</i> value) | Males (<i>n</i> = 60) | | Chi-square test (<i>P</i> value) |
|---------------------------------|------------------------------------|---------------------------------------|--------------------------------------|---|--|--------------------------------------|
| | With scoliosis (<i>n</i> = 36) | Without scoliosis (<i>n</i> = 56) | | With spinal deformity (<i>n</i> = 12) | Without spinal deformity (<i>n</i> = 48) | |
| Level of study, <i>n</i> (%) | | | 0.011* | | | NS† |
| Level 4 | 4 (11.1) | 4 (7.1) | | 2 (16.7) | 5 (10.4) | |
| Level 5 | 4 (11.1) | 0 (0) | | 0 (0) | 4 (8.3) | |
| Level 6 | 12 (33.3) | 28 (50.0) | | 4 (33.3) | 11 (22.9) | |
| Level 7 | 8 (22.2) | 8 (14.3) | | 2 (16.7) | 15 (31.3) | |
| Level 8 | 0 (0) | 8 (14.3) | | 1 (8.3) | 9 (18.8) | |
| Internship | 8 (22.2) | 8 (14.3) | | 3 (25) | 12 (25) | |

*Significant, $p < 0.05$.

†NS: not significant



Fig. 1.: Spinal mouse apparatus

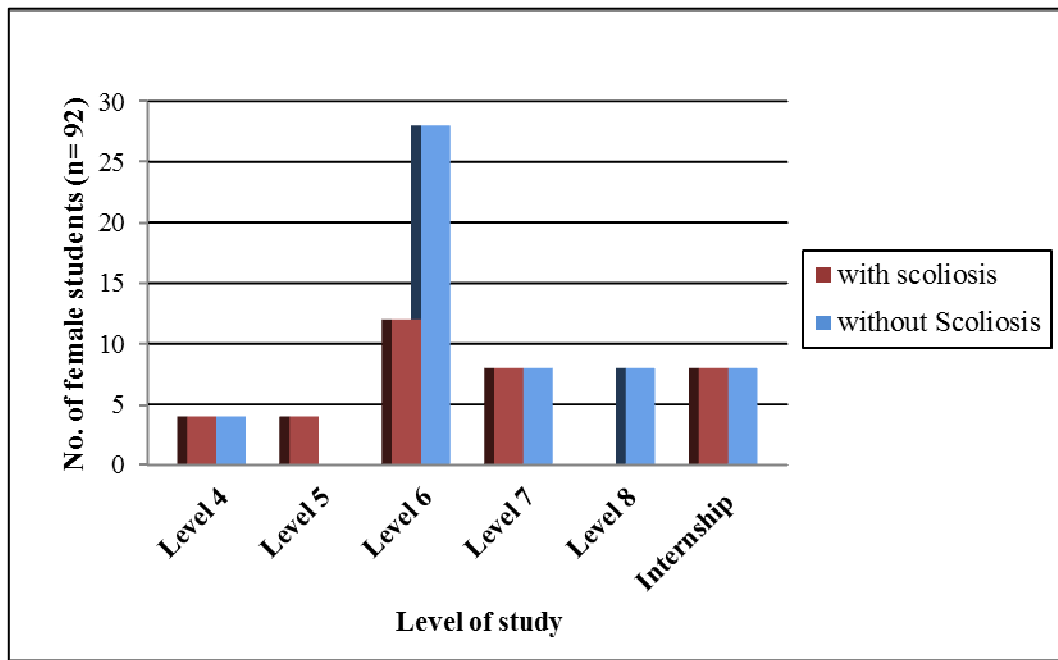


Fig. 2.: Study level distribution of female students with and without scoliosis

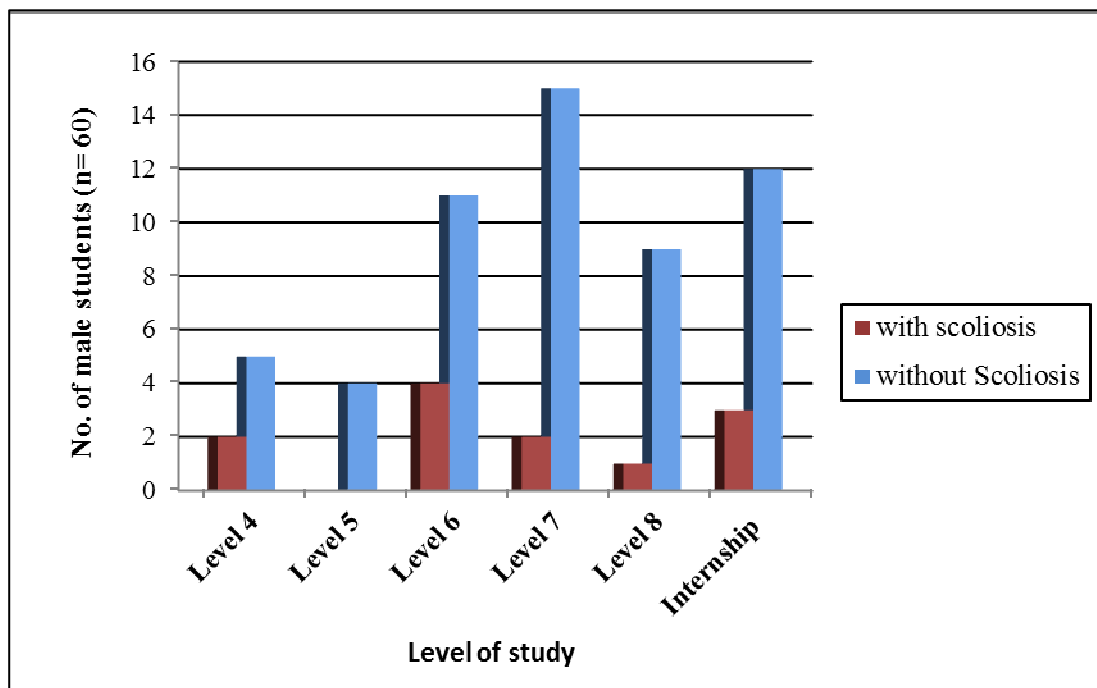


Fig. 3.: Study level distribution of male students with and without scoliosis

CONCLUSION

Female physical therapy students at Majmaah University were found to be a high-risk group for job-related spinal deformity, especially scoliosis (39%). Furthermore, gender, the physical demands of physical therapy practice and inadequate training in injury prevention were found to be risk factors for occupational spinal deformity (scoliosis). Therefore, training program should be admitted to physical therapy students before the beginning of clinical practice aiming to decrease the spinal stresses and back deformities.

Acknowledgements

The authors would like to thank the deanship of scientific research, Majmaah University, Saudi Arabia, for funding this work.

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