

# Postural discomfort among right and left-handed University students of Rawalpindi and Islamabad

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## Author's Contribution

<sup>1</sup> Conception, synthesis, planning of research and manuscript writing

<sup>2</sup> Interpretation and discussion

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## A B S T R A C T

**Objective:** Musculoskeletal discomfort is common in people working in poor ergonomic designs with prolonged poor posture. The main purpose of this study was to compare the postural discomfort among right and left-handed university students of Rawalpindi/Islamabad.

**Methodology:** A cross-sectional survey was carried out using standardized Nordic Musculoskeletal Discomfort Questionnaire. Samples were collected by simple convenient sampling technique from 221 students (53.8% females and 46.2% Males) comprising of 110 left and 111 right-handed University students.

**Results:** The comparison of percentages among left and right-handed participants at hip, knee and ankle were as follows: hip (left-handed 19% and 5.42% right-handed), knee (left-handed 17.19%, right-handed 9.04%), ankle (left-handed 9.50%, right-handed 8.14%). The prevalence of chronic musculoskeletal discomfort was significant in left-handed participants as compared to right-handed participants. The highest frequency of discomfort was found in the neck and shoulder region of left-handed participants. Chi square test showed a significant difference in frequencies of discomfort in left and right-handed participants ( $p < 0.01$ ), whereas there was as such no significance in ankle region ( $p > 0.05$ ).

**Conclusion:** Postural discomfort was more prevalent among left-handed university students as compare to right-handed students. The highest frequency of discomfort was found in the neck and shoulder region of left-handed participants. Further research and attention should be directed towards the relation of handedness with musculoskeletal discomfort and factors influencing postural discomfort in left-handed students.

**Keywords:** Postural discomfort, comparison, handedness, musculoskeletal discomfort, University students.

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## Introduction

Posture is defined as the position of our body parts in relation to each other at any given time. Posture can be static such as standing, lying or sitting. It can be dynamic as the body moves from one position to another. Posture whether static or dynamic is very significant for proper functioning as it can impact our body in many ways. Certain movements or exercises like extreme twisting of spine and cumbersome position of the hands and spine

may result in development of poor posture, as the normal alignment of the body disrupts which results in excessive stress and tension on muscles.<sup>1</sup> Handedness likewise has a huge part in impacting stance as the preferred hand is utilized more and is greater in strength than the other hand, consequently entire body is slanted towards the preferred hand. The relationship between writing hand posture and lateral preference for hand was examined by

Searleman A, Porac C, and Coren S in a sample of 3709 college undergraduates. A markedly different pattern of lateral preferences was observed in left-handed males and females as a function of hand posture. Left-handed male inverters displayed a tendency toward more left lateral preferences while it was found that hand inversion during writing in left-handed females reflected more tendency toward right lateral preferences.<sup>2</sup>

Contributing factors to bad posture includes: lack of awareness regarding good posture, sedentary life style, poor ergonomics (work place designs), occupational demands, prolonged computer use and abnormal positioning of neck, elbow and forearm. Any manual activity while adapting leads to improper body positions and faulty biomechanics.<sup>3</sup> Musculoskeletal discomfort is common in people working in poor ergonomic designs with prolonged poor posture. As discussed above, left handers are disregarded in terms of equipment and hand ergonomics, its assumed left handers to be more prone towards musculoskeletal aches and discomfort. It is commonly seen among school going children, left handers mostly do not have a proper chair design, they have to adopt according to the right-handed chairs commonly available hence with time the muscles of their neck and shoulders ache and cause discomfort due to prolonged awkward posture causing pressure and straining of the muscles. Most of the time, left handers adapt to right hand instruments which may be annoying and frustrating.<sup>4</sup>

As the majority of activities like writing, playing, using scissors or any other activity may be a bit demanding for them and need adaptation which is not the case for right handers. Proficiency, speed accuracy of tasks and body posture while performing mechanical tasks involving hand use is influenced by handedness and there is a difference between the task performed by right and left handers as all skills, and ergonomic designs are according to the right handers.<sup>4</sup>

The main objective of the present study was to compare postural discomfort among right and left-handed University students of Rawalpindi / Islamabad.

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## Methodology

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A Cross-sectional survey was conducted using simple convenient sampling technique. A total of 221 students were included in the study. Sample size was calculated through the standard software "Raosoft". The study was approved by the Institutional Review Board (IRB) of Shifa Tameer-e-Millat University. Informed consent was obtained from each participant prior to the filling of questionnaire. Standard Nordic Musculoskeletal Discomfort Questionnaire was used to collect data from students. This questionnaire has already been used in many countries like Sweden, Finland, Norway and Denmark. The questionnaire was distributed personally among the university students of Rawalpindi and Islamabad. The questionnaire inquiries about the frequency of pain or musculoskeletal discomfort in left-handed students as compared to right-handed students during last 12 months or while performing ADLs (activities of daily living).

Data analysis was conducted through Statistical Package for Social Sciences (SPSS) version 20.0. Descriptive analysis was done to obtain frequencies, mean, and standard deviation. The questionnaire included all the body regions from neck to ankle. Chi square test was applied to find out the association between handedness and musculoskeletal discomfort of different regions on Nordic scale. p-value <0.05 was considered significant.

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## Results

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A total 221 students (49.80% left-handed and 50.20% right-handed) were included; out of these 53.8% were female participants and 46.2% were male. The (mean  $\pm$  SD) age of the participants was  $22.23 \pm 2.29$ . The frequency of neck discomfort during 12 months for left-handed students were 43.80% and for right-handed students were 17.64% as shown in Figure 1. The prevalence of chronic musculoskeletal discomfort was significant in upper extremity as compared to lower extremity. The highest frequency of discomfort was found in the neck and shoulder region of left-handed participants as shown in Figure 2 and 3.

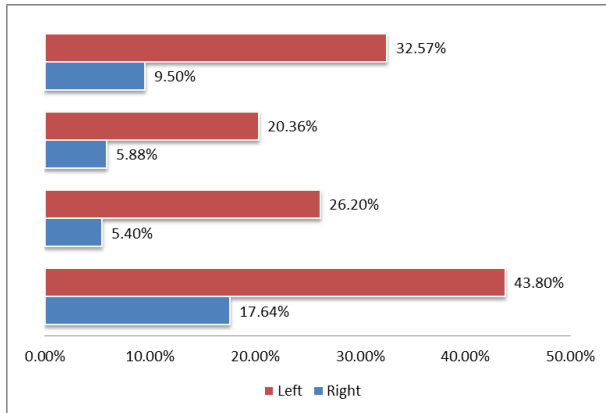


Figure 1: Neck discomfort during 12 months among left and right-handed students

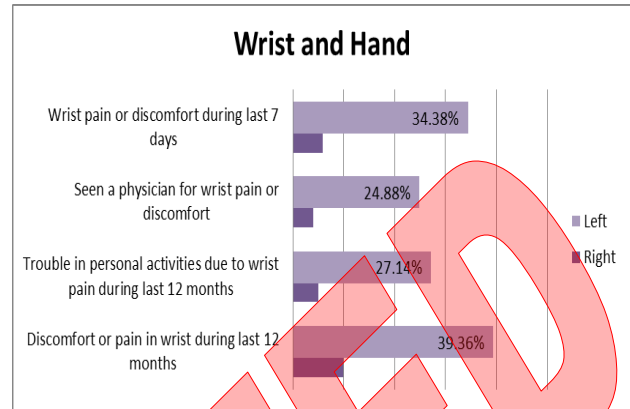


Figure 4: Prevalence of muscular discomfort in wrist and hand during last 12 months among left and right-handed students

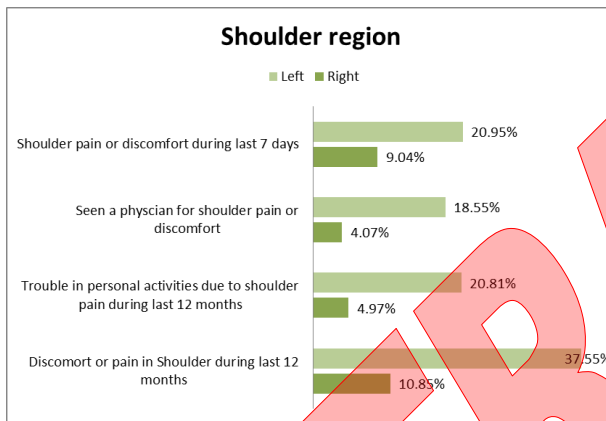


Figure 2: Shoulder discomfort during 12 months among left and right-handed students

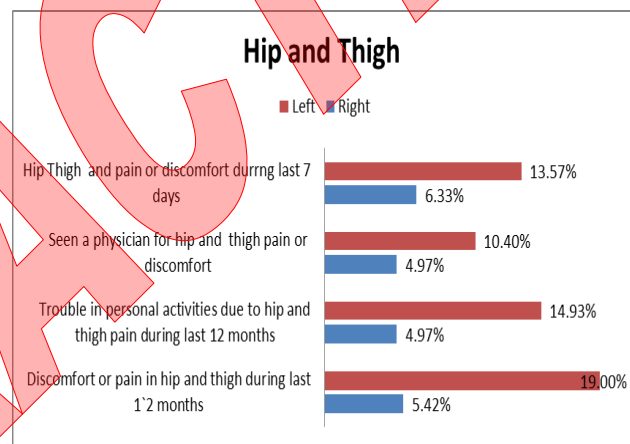


Figure 5: The percentages of discomfort in hip and thigh during last 12 months among left and right-handed students

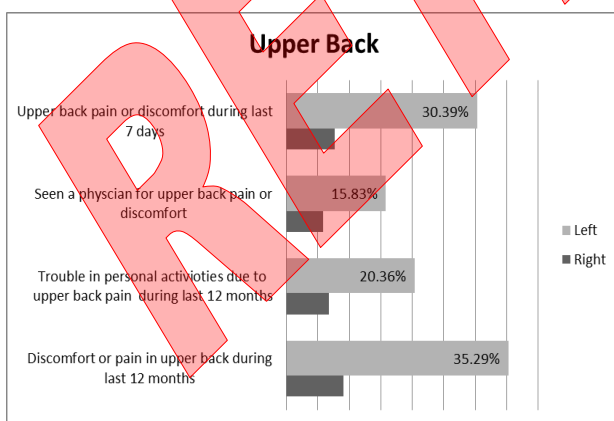


Figure 3: Percentages for upper back discomfort during last 12 months among left and right-handed students.

Chi square test was applied to find out the association between handedness and musculoskeletal discomfort of different regions on Nordic scale. According to Chi Square Results (table 1) there was significant association of handedness with musculoskeletal discomfort including neck ( $p < 0.01$ ), shoulder ( $p < 0.01$ ), wrist ( $p < 0.01$ ), hand ( $p < 0.01$ ), upper back ( $p < 0.01$ ), lower back ( $p < 0.01$ ), knee ( $p < 0.01$ ), thigh and hip ( $p < 0.01$ ). No association was documented in ankle and feet region ( $p > 0.05$ ).

**Table1: Association between handedness and musculoskeletal discomfort of different regions on Nordic scale**

Region	Variables	Chi-square (p-value)
Neck	Neck pain or discomfort during last 12 months	<0.01
Shoulder	Shoulder pain or discomfort during last 12 months	<0.01
Upper back	Upper back pain or discomfort during last 12 months	<0.01
Elbow	Elbow pain or discomfort during last 12 months	<0.01
Wrist and Hand	Wrist and hand pain or discomfort during last 12 months	<0.01
Low back	Low back pain or discomfort during last 12 months	<0.01
Hip and Thigh	Hip and Thigh pain or discomfort during last 12 months	<0.01
Knee	Knee pain or discomfort during last 12 months	<0.01
Ankle and Feet	Ankle and feet pain or discomfort during last 12 months	0.351

## Discussion

The results of this study imply a high prevalence of postural discomfort in left-handed participants as compared to the right-handed participants. Discomfort is predominantly high in neck 43.80%, shoulder 37.55%, wrist 39.36% and upper back 35.29% region. These frequencies signify that left-handed University students were in general more prone to postural discomfort which may be due to several factors including poor ergonomic, poor work station design, improper equipment, and lack of appropriate left-handed chair. This results in strained or poor posture which gradually leads to postural or musculoskeletal discomfort. The students sat for more than 5 hours consistently and the high frequency for neck and shoulder discomfort in lefties indicates the compromises they have to make in their posture daily for

hours. Right-handed participants also had postural discomfort but their frequencies were less than the left handers. Overall results of the current study are somehow different from the previous studies, in terms of frequencies, population considered and variables (parameters) studied.

Golchamani carried a study among dentists in Iran to find out the prevalence of musculoskeletal discomfort between left and right-handed dentists. They also used Nordic Questionnaire to assess the discomfort body region from neck to ankle. The prevalence of neck pain was 46.4%, wrist pain 37.2%, back pain 62.7% and shoulder pain 31.8% during the last 12 months.<sup>5</sup> The prevalence of the postural discomfort between right and left-handed students were found to be similar to the present study. In another study carried out by Tezel et al in Turkey, prevalence and distribution of musculoskeletal disorders were found out to be significantly more in the left-handed as compared to the right-handed dentists. These findings were in accordance with the findings of the present study.<sup>4</sup>

Similar findings were reported in a cross-sectional survey by Kapoor et al in India. They conducted this study to determine the dental practice perspectives, the hand preference, and discomfort level among the left-handed clinical dental students. About one-third (37%) reported that their institution was not properly equipped to accommodate left-handed students. Majority felt that left-handed dentists were at a higher risk of developing musculoskeletal complications. Mouth mirror handling showed equal distribution for handedness as compared to the other dental activities, whereas discomfort levels were negligible (“without any difficulty”). Dental practice perspective scores significantly correlated with the difficulty levels ( $p < 0.01$ ).<sup>6</sup> These findings were in accordance with our results.

On the contrary, Sami Alnassar et al conducted a study in 2016 at King Saud University, Saudi Arabia in which they compared the psychomotor skills among left and right-handed medical students. They concluded that the performance of students was independent of their innate dexterity but depend on the environment in which they were trained and assessed.<sup>7</sup> Interestingly, a study conducted at Amity Institute of Physiotherapy, Noida demonstrated no correlation between handedness and

hand related mapping but a significant correlation was found between right hand performance and handedness in Indian population.<sup>8</sup>

Another study was conducted in this regard by Malkoc et.al who identified the association between left handedness and bone mineral density in patients with osteoporosis. They also assessed the relationship between handedness and various injuries i.e. head injuries, brain injuries, sports related injuries and fractures. The results showed that right-handed patients with osteoporosis had higher bone mineral density than the left handedness patients with the same disease. Hence, it was concluded that left-handed patients with osteoporosis had more risk of having traumas and accidents.<sup>9</sup>

In our study we demonstrated the significant correlation of handedness with postural discomfort and its occurrence between the right and left-handed University students of Rawalpindi and Islamabad. The gross difference between values of left and right handers indicated high prevalence in left handers. However, further studies need to be carried out for further investigations.

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## Conclusion

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Postural discomfort was more prevalent among left-handed university students as compare to right-handed students. The highest frequency of discomfort was found in the neck and shoulder region of left-handed participants. Further research and attention should be directed towards the relation of handedness with musculoskeletal discomfort and factors influencing postural discomfort in left-handed students.

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