ABSTRACT

Background and Objectives: Work-related musculoskeletal disorders are increasing due to poor posture adaptation. Increasing the use of technologies in the office settings is one of the main reasons behind muscle and soft tissue strains. The objective of the study was to determine the pattern of posture-related musculoskeletal pain in office workers.

Methods: This observational study was conducted from 15th May, to 25th June, 2021. Data were collected by convenient sampling. The Nordic Musculoskeletal questionnaire on body postural habits was filled by 150 office workers from different universities of Lahore. Statistical Package for the Social Sciences software version 25 was used for statistical analysis.

Results: There were 79 (52.7%) male and 71 (43.7%) female participants, with a mean age of 35.7 ± 5.14 years. Majority (51.3%) of the subjects reported sitting tilted forward, while a few used backrests and footrests for support. Prolonged crossed legs and twisted spine posture were also adopted by many subjects. Neck, lower back, and shoulder were the most affected regions, with increased musculoskeletal pain reported over the last 12 months. Due to recurrent pain in the neck, shoulder, and upper back, difficulty in carrying out routine jobs, housework, and hobbies was reported by 38.7%, 34.7%, and 30% of the subjects, respectively.

Conclusion: Failure to adopt a good ergonomic approach leads to frequent musculoskeletal pain and difficulty in carrying out routine office and household work.

Keywords: Posture, musculoskeletal pain, ergonomics, office workers, university.
office workers.10 The aim of this study was to find out the postural habits and prevalence of musculoskeletal pain in office workers at different universities. This study can help to create an awareness regarding the importance of good posture and ergonomics for acquisition of the better well-being of employees and to gain better performance at their workplaces.

Methods
This cross-sectional study was conducted from 15th May to 25th June 2021 after getting approval from the Ethical Review Committee of the University of Management and Technology (UMT), Lahore, Pakistan. Informed consent from the participants was taken after explaining the purpose of the study.

A total of $n = 150$ office workers from 4 universities (UMT, University of Lahore, University of South East Asia, and University of Central Punjab) in Lahore were recruited. The inclusion criteria were the employees who were involved primarily in computer-related jobs for at least 7 hours a day, for at least 5 years, aged between 30 and 45 years, and of both genders. Workers having any muscular deformity, chronic systemic disorders, and red flag signs, or who refused to participate in the study were excluded.

A self-designed validated questionnaire on ergonomic and posture habits during work was administered. In addition, the standardized Nordic musculoskeletal questionnaire was filled by 150 office workers.11 The questionnaire had different questions about body posture among computer users. The variables were age, gender, working hours, questions regarding their posture, and musculoskeletal pain.

Statistical Analysis: Statistical Package for the Social Sciences software version 25.0 was used to analyze the data. Mean and standard deviation were calculated for numerical variables like age and working hours, while frequencies were determined for variables like gender. Chi-square test was applied to determine the relationship between the musculoskeletal regions involved and the duration of morbidity.

Results
There were 79 (52.7%) male and 71 (43.7%) female participants, with a mean age of $35.7 \pm 5.14$ years. The mean working hours for all participants were $8.26 \pm 3.268$ hours.

Among the 150 participants, 51.3% used to sit tilted forward, only 23% used backrests for support, 26% used to sit with the upper body twisted, 32% used footrests only, 32.7% used to sit with crossed legs, and only 23.3% used to carry out movements, including stretching, during working hours. Participants rarely adopted good postural habits and about half of the included population was not following a proper ergonomic approach in their workplace (Table 1).

Neck (88, 58.7%), lower back (75, 50%), and shoulders (73, 48.6%) were the most commonly involved regions with reported musculoskeletal pain experienced within the last 12 months ($p = 0.021$). Same complaints were reported in the last 7 days. Pain in neck (38.7%), shoulder (34.7%), and upper back (30%) caused difficulty in carrying out jobs, housework or hobbies among the office workers. Ankle (28, 18.7%), knee (32, 21.3%), and elbow (32, 21.33%) were least affected in office workers in the last 12 months and 7 days ($p = 0.419$) (Table 2).

Discussion
According to the current study, most of the participants were not following proper ergonomics at the workplace, which has caused both short- and long-term morbid conditions affecting their musculoskeletal regions. According to an Indian study,

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Questions regarding body posture while working on a computer</th>
<th>Never</th>
<th>Rarely</th>
<th>Frequently</th>
<th>Always</th>
<th>Do not remember</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sit with your body tilted forward</td>
<td>15 (10%)</td>
<td>12 (8%)</td>
<td>77 (51%)</td>
<td>44 (29.3%)</td>
<td>2 (1.3%)</td>
</tr>
<tr>
<td>2</td>
<td>Sit with your back well supported on the backrest</td>
<td>45 (30%)</td>
<td>48 (32%)</td>
<td>38 (25.3%)</td>
<td>15 (10%)</td>
<td>4 (2.7%)</td>
</tr>
<tr>
<td>3</td>
<td>Sit with upper body twisted</td>
<td>47 (31.3%)</td>
<td>42 (28%)</td>
<td>39 (26%)</td>
<td>19 (12.7%)</td>
<td>3 (2%)</td>
</tr>
<tr>
<td>4</td>
<td>Sit with your buttocks slipping forward</td>
<td>51 (34%)</td>
<td>45 (30%)</td>
<td>31 (20%)</td>
<td>20 (13.3%)</td>
<td>3 (2%)</td>
</tr>
<tr>
<td>5</td>
<td>Sit with your buttocks well supported without slipping forward</td>
<td>32 (21.3%)</td>
<td>43 (28.7%)</td>
<td>43 (28.7%)</td>
<td>28 (18.7%)</td>
<td>4 (2.7%)</td>
</tr>
<tr>
<td>6</td>
<td>Sit with both feet firm on the floor</td>
<td>27 (18%)</td>
<td>48 (32%)</td>
<td>43 (28.7%)</td>
<td>30 (20%)</td>
<td>2 (1.3%)</td>
</tr>
<tr>
<td>7</td>
<td>Sit with feet unsupported</td>
<td>39 (26%)</td>
<td>45 (30%)</td>
<td>40 (26.7%)</td>
<td>20 (13.3%)</td>
<td>2 (1.3%)</td>
</tr>
<tr>
<td>8</td>
<td>Sit cross-legged</td>
<td>40 (26.7%)</td>
<td>40 (26.7%)</td>
<td>49 (32.7%)</td>
<td>16 (10.7%)</td>
<td>5 (3.3%)</td>
</tr>
<tr>
<td>9</td>
<td>Stand with equal support on both legs</td>
<td>34 (22.7%)</td>
<td>24 (16%)</td>
<td>45 (30%)</td>
<td>45 (30%)</td>
<td>2 (1.3%)</td>
</tr>
<tr>
<td>10</td>
<td>Stand with more supported on one leg</td>
<td>41 (27.3%)</td>
<td>40 (26.7%)</td>
<td>42 (28%)</td>
<td>23 (15.3%)</td>
<td>4 (2.7%)</td>
</tr>
<tr>
<td>11</td>
<td>Carry out body movements</td>
<td>25 (16.5%)</td>
<td>24 (16%)</td>
<td>57 (38%)</td>
<td>34 (22.7%)</td>
<td>10 (6.7%)</td>
</tr>
</tbody>
</table>
39% of office workers were dissatisfied with the chair designs they were using, 20% with the keyboard, and 20% with the number of rest breaks that led to their poor positioning and contributed to musculoskeletal pain.\textsuperscript{12}

The current study reported neck, lower back, and shoulder regions as the most affected with pain in the last 12 months and 7 days. The overall prevalence of MSDs as reported in university workers of Nigeria was 71.9%, with lower back, wrists/hands, and shoulders being the most reported body regions for these disorders.\textsuperscript{13} Factors like drawn-out sitting at work or inappropriate positioning of the head during work may have an extraordinary function in neck torment event among office representatives, especially among individuals who work with PCs for longer hours.\textsuperscript{8} Pain and its related MSDs are closely associated with various risk factors, such as physical inactivity, prolonged working hours, high body mass index, poor education, and counseling on ergonomics at workplace, etc. Massive computer usage during the COVID-19 lockdown has also contributed to a significant increase in musculoskeletal burden on the society.\textsuperscript{14,15} Levy\textsuperscript{16} reported MSDs associated with certain risk factors like desk height, reaching for items, inappropriate chairs, and leg positioning in 96% of the librarians. The most affected regions were neck (55.9%), head (49.2%), shoulders, upper arm (55.9%), and leg and knees (49.2%), which is quite similar to the present study.

In the present study, 50% of the participants were suffering from lower back pain in the last 12 months and 42.7% suffered the same in the last 7 days. Akulwar-Tajane et al.\textsuperscript{17} found lower back pain as the most prevalent complaint, followed by neck, upper back, and shoulder region pain because of improper postural pattern. Shift works and rest breaks are important for the prevention of MSDs.\textsuperscript{18} Appropriate health education of professionals and students regarding ergonomics and adoption of good posture during online learning is imperative to prevent chronic MSDs in children and younger population.\textsuperscript{19-21}

**Conclusion**

Poor postural habits and lack of education on ergonomics lead to chronic MSDs and compromised efficiency in office workers who have major tasks related to the use of desks and computers. Neck, shoulder, and lower back regions are the most commonly affected areas in such employees.

**Limitations of the study**

The major limitation of the study was its questionnaire-based design, which could have led to recall or response bias. Workplace ergonomics and posture were not assessed by any trained professional. In addition, interventions and post-intervention results could have been compared. More studies should be conducted on a larger scale to spread awareness about the effect of body posture on the musculoskeletal system in the community.

**Acknowledgement**

The authors would like to thank all the participants and colleagues from all the above mentioned universities for their logistic and technical support during execution of this study.

**List of Abbreviations**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSDs</td>
<td>Musculoskeletal disorders</td>
</tr>
<tr>
<td>PC</td>
<td>Personal computer</td>
</tr>
</tbody>
</table>

**Conflict of interest**

None to declare.

**Grant support and financial disclosure**

None to disclose.

**Ethical approval**

The Institutional Ethical Review Board of the University of Management and Technology, Lahore, Pakistan, approved the study with ethical approval number RE-004-2021, dated 14-04-2021.
Authors’ contributions
SR: Conception and design of the study, data collection important intellectual input, and drafting of the manuscript.
RJ: Acquisition, analysis and interpretation of the data, and drafting of the manuscript.
HAN, AH, IA, SS: Acquisition and analysis of the data.
ALL AUTHORS: Approval of the final version of the manuscript to be published.

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References