Musculoskeletal Disorders among Healthcare Network Staff using Rapid Office Strain Assessment (2019)

A B S T R A C T

Aim: Work-related Musculoskeletal Disorders (MSDs) are one of the most common complaints among staff doing static or repetitious tasks using the upper limbs and individuals who work with computer for hours. The aim of this study is to evaluate the prevalence of MSDs among computer users in the office department of Healthcare Network of Iran.

Method and Instruments: This descriptive-analytic study was conducted on 105 computer users in the Healthcare Network who were selected through census sampling method in 2018. The data collecting tools included the Cornell Musculoskeletal Discomfort Questionnaires (CMDQ) and the Rapid Office Strain Assessment (ROSA) checklist. To investigate the relationship between demographic variables and the final ROSA score, Analysis of Variance (ANOVA) and T-test were used.

Findings: Totally, 105 computer users with mean age of 38.7 ± 7.1 years and mean work experience 7.4 ± 14.7 years were assessed. Discomfort and musculoskeletal pain in the neck and hip were more common than the other parts. The results of the ROSA method showed that the final mean ROSA score was 5.38 ± 1.07. About 37.1% of the cases need just notification and 62.9% of them need ergonomic intervention. Moreover, gender and work experience had a significant effect on the final ROSA score (P<0.001).

Conclusion: A high prevalence of MSDs was observed in the neck and hip regions of computer users. Given the ROSA score, which was at notification area, a series of ergonomic and managerial measures are needed to improve the conditions of the workstations and reduce the prevalence of MSDs.

Keywords: Musculoskeletal Disorders, Healthcare Workers, Rapid Office Strain Assessment.

Introduction

Despite the fact that science and technology lead occupational duties towards automation, physical activities, such as carrying stuff, still cause pressure on the body in almost all occupations, which is mostly due to improper body posture. Work-related Musculoskeletal Disorders (WMSDs) are one of the most important factors affecting job satisfaction. The WMSDs are a series of disorders that can affect various parts of the body, including muscles, tendons, joints, and nerves. According to Office of Occupational Safety and Health’s report in 2010, Musculoskeletal Disorders (MSDs) are one of the the most common health problems in workplaces affecting millions of people, with an estimated prevalence of 61-70% among office staffs. In spite of significant efforts made to reduce the prevalence of MSDs, they still account for high economic and social costs and a major factor in reducing productivity. The prevalence of these disorders increase dramatically with increase of exposure to risk factors in workplaces. Major MSDs risk factors include physical risk factors (e.g. adverse postures, repetitive movements, and prolonged sitting), organizational/psychosocial risk factors (e.g. work stress, work load, and work shift duration), environmental risk factors, and individual risk factors. Researchers have referred...
to the work shift duration (sitting behind the
desk or using a computer) as the main MSDs-
associated factor. These disorders generally
occur in the upper limbs, head, neck, and back
regions of computer users \(^{9}\). Using Rapid Office
Strain Assessment (ROSA) method, Farasati et
al. investigated MSDs in Video Display Terminal
(VDT) users. The results showed that ROSA can
be used as a useful tool for identifying and grading
ergonomic risks in modern office environments
\(^{10}\). In another study in Iran, Nasiri et al. evaluated
the MSDs risk factors and implemented ROSA
using the ergonomic intervention program
in Bank Sepah employees. In this study, the
prevalence of MSDs was significantly decreased
nine months after interventions \(^{11}\). In other
previous study, it was also suggested that
computer works as one of the most dangerous
occupations leading to MSDs \(^{12}\). The staff of the
health networks are exposed to MSDs due to
their daily and continuous work with computers,
repetitive works, and high workload.

Today, various methods have been developed
to assess occupational exposure to the risk
factors involved in these disorders. Each of
these methods calculates the final score based
on deviation of the body from the natural
posture, factors such as static and dynamic
forces affecting the body, a repetitive posture,
duration of work, and other environmental,
organizational, and individual factors. They
also determine the type of intervention
needed based on the obtained score. Rapid
Upper Limb Assessment (RULA), Quick
Exposure Checklist, and ROSA are among
these methods.

In order to determine the risk of ergonomic
factors and provide reports for the
implementation of interventions and thus to
preserve the health of human resources, all
of these methods function based on posture,
industry, and the occupation in question, and
the users \(^{13}\). Various studies have shown that
computer work can cause MSDs and injuries
in various parts of the body, including neck,
shoulder, elbow, wrist, and fingers \(^{14,15}\).

However, adverse work posture and its
relationship with the risk factors of
occupational environments is always an
important health concern for office staff.
Therefore, considering the prevalence of
occupational risk factors among computer
users and the frequency of MSDs as well as
the high population of computer users on one
hand, and the importance of preventing such
disorders and injuries in work environments
on the other, is essential to study MSDs in
order to control the disorder and improve
the work condition of office staff.

In light of these justification, the aim of this
study is to investigate the risk factors for the
MSDs in the workplace of office staff who
are required the use of computers for hours
every day in a static and sitting positions.

**Method and Instruments**

This descriptive-analytic study was
conducted in 2018 on 105 staffs of the
healthcare network in Ardabil Province-
Iran. The participants were selected using
census sampling. Inclusion criteria included
all healthcare staff who had worked with
computers for at least one year and three
hours per day. Exclusion criterion was a
history of MSDs. All subjects performed their
tasks in the sitting position and their tools
equipments included computers, monitors,
keyboards, mouse, telephones, and office
letters.

The data collecting tools included Cornell’s
Musculoskeletal Discomfort Questionnaire
(CMDQ) and the ROSA checklist. The
CMDQ is an effective tool for evaluating
musculoskeletal discomforts based on self-
reporting data on the severity of pain and
discomfort in the neck, shoulder, upper back,
upper arm, lower back, forearm, wrists, hips,
thighs, and knees.

The tool has acceptable validity and reliability
for ergonomic evaluations \(^{16}\). The ROSA
is a pen-paper and observational method introduced in 2012. It focused on the activity of office users, especially office activities in the jobs that frequently include working with a computer. The tool has been developed based on the earlier assessment methods. This method has a good reliability to evaluate MSDs. The assessment process in this method consists of three main sections and the obtained scores for the following sections were placed in the respective tables including chair and sitting posture, screen and phone, mouse and keyboard, the persons’ posture when using these tools, and the duration of using each of these tools per day. The final ROSA score is determined by summing up scores obtained in each section. The final ROSA score is between 6 and 16 that scores 3-5 and above 5 indicate warning and the need to intervention, respectively. To determine the relationship between demographic variables with final ROSA score, Analysis of variance ANOVA, T-test, and Chi-square tests were used in SPSS.22.

Findings
In total, 63 (60%) men and 42 (40%) staff participated in the study. The mean age of the subjects was 38.7 ± 7.1 years and the average years of work experience of the staff was 14.7 ± 0.7 years (Table 1).

Table 1 Demographics of participants

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age(y)</td>
<td>38.7</td>
<td>7.1</td>
<td>25</td>
<td>52</td>
</tr>
<tr>
<td>BMI (kg/m2)</td>
<td>26.5</td>
<td>3.4</td>
<td>17.1</td>
<td>33.2</td>
</tr>
<tr>
<td>Work experience (y)</td>
<td>14.7</td>
<td>0.7</td>
<td>1</td>
<td>30</td>
</tr>
</tbody>
</table>

The results of ROSA method used to determine the level of risk at the workstations. This test showed that the mean ROSA score was 5.38±1.07, which means 37.1% of sample group were in the notification area (score 3 to 5) and 62.9% need ergonomic intervention (5<). These results are presented in Table 2.

Table 2 The final ROSA score for determining the prioritization of corrective measures

<table>
<thead>
<tr>
<th>Score</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>3 (8.6)</td>
</tr>
<tr>
<td>5</td>
<td>10 (28.6)</td>
</tr>
<tr>
<td>6</td>
<td>16 (45.7)</td>
</tr>
<tr>
<td>7</td>
<td>2 (5.7)</td>
</tr>
<tr>
<td>8</td>
<td>4 (11.4)</td>
</tr>
<tr>
<td>Total</td>
<td>35 (100)</td>
</tr>
</tbody>
</table>

Table 3 The prevalence of MSDs based on the responses of users to the Cornell

<table>
<thead>
<tr>
<th>Area</th>
<th>Pain and discomfort N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neck</td>
<td>22 (63)</td>
</tr>
<tr>
<td>Shoulder</td>
<td>13 (37.1)</td>
</tr>
<tr>
<td>Upper back</td>
<td>14 (34.4)</td>
</tr>
<tr>
<td>Lower back</td>
<td>12 (32.4)</td>
</tr>
<tr>
<td>Forearm</td>
<td>9 (25.7)</td>
</tr>
<tr>
<td>Wrist</td>
<td>9 (21.2)</td>
</tr>
<tr>
<td>Hip</td>
<td>26 (45.7)</td>
</tr>
<tr>
<td>Thigh</td>
<td>9 (25.7)</td>
</tr>
<tr>
<td>Knee</td>
<td>8 (18.2)</td>
</tr>
<tr>
<td>Lower part</td>
<td>10 (28.6)</td>
</tr>
</tbody>
</table>

ANOVA test was used to investigate the relationship between years of work experience, final ROSA score and BMI at...
level of \( p < 0.05 \). Independent t-test was also used to compare the mean scores of men and women. Results of the both statistical tests were reported in Table 5.

**Discussion**

The risk factors of MSDs were examined using ROSA method for different parts of the body of office staff working in healthcare network. It was observed that musculoskeletal discomforts and pains were more common in the neck and hip regions than the other organs. Dormohammadi et al. reported that pain in the neck and waist was more frequent \(^{(17)}\). This can be due to inappropriate design of workstations, adopting adverse postures while working with computers, and spending many hours in sitting position. Moreover, office work often requires static posture and sitting on a chair for a long time. In a study on 1428 office staff, Janwantanakul et al. found a high prevalence of MSDs in the practitioners, with highest rates of MSD in the neck, waist, and back regions; which is consistent...
with the present study \(^{(18)}\). In contrast, the lowest pain level was observed in knees, which is consistent with Moom et al. (2015) \(^{(18)}\). The effect of the years of work experience on the final ROSA score showed that individuals with higher years of work experience were more exposed to workplace risk factors, which indicates the aggregative nature of factors affecting the occurrence of MSDs, which is consistent with the results of other the studies \(^{(10, 19)}\). The results of present study also showed the significant effect of gender on the final ROSA score. Previous studies have shown the effect of gender on the final score of otherergonomics evaluation methods \(^{(20, 22)}\). This effect may be explained by the fact that most of workstations are designed for men’s anthropometric dimensions and smaller body and muscle size of women increases the risk factors for the women are exposed to these workstations at workplace.

The findings of this study also showed that the final ROSA score was not significantly related to education level and BMI. In a study on musculoskeletal injuries and associated risk factors in the office work environment, Choobineh et al., found no significant relationship between education level and the incidence of these disorders, which is consistent with the present study. This difference may be due to the dispersion of education levels and BMI values among participants \(^{(23)}\).

In the present study, it has been shown that all the participants who had skeletal musculoskeletal discomfort and pain in one of their organs were in the notification and need areas for ergonomic intervention. The disproportion between workstations and physical dimensions of operators, the use of non-ergonomic desks and chairs, and inappropriate postures can cause premature fatigue or musculoskeletal injuries. Analyses of the ROSA scores showed that the condition of work stations was inappropriate. However, Chi-square test did not show a significant relationship between the final ROSA score and the prevalence of MSDs.

**Conclusion**

Overall, the findings showed a high prevalence of MSDs in the neck and hips of computer users and the need for corrective measures to ease the pains that the staff suffered. The ROSA assessment method is a useful tool for determining the work postures based on office equipment and computer workstations. The ROSA scores can be a basis for corrective measures to improve the ergonomic conditions of the work environment. Hence, a series of ergonomic and managerial measures can be effective in improving workstation conditions to reduce MSDs.

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**Ethical Permission**

This study was approved by ethical committee of Ardabil University of Medical University with code IR.ARUMS.1397.076

**Conflicts of interest**

None of the authors has any conflict of interest in this manuscript.

**Author Contribution**

AL designed the study.
MFA analyzed and interrelated the data
HEG participated in collecting and managing the data.
NR participated in collecting and managing the data.
BE participated in collecting and managing the data.
AB approved the study design and manage
the conducting process and wrote the paper. All authors read and confirmed the paper.

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**Reference**


