A survey on Prevalence of Musculoskeletal Disorders in Dentists of Tehran and their posture assessment by RULA method

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ABSTRACT: Musculoskeletal disorders (MSDs) are the most common occupational diseases in the world. Awkward posture is one of the factors affecting the prevalence of musculoskeletal disorders in dentists. Dentists are at high risk associated with musculoskeletal disorders because of the nature of their job. This study aims assessment of musculoskeletal disorders prevalence among dentists in Tehran and their posture assessment by RULA method and it’s done in 2014. This cross-sectional study on 98 dentists of 22 districts of Tehran by RULA postural assessment method was performed in 93. Methods of collecting information, go to the dental clinics and take pictures and film. After collecting data for kernel Questionnaire, postures was evaluated in two ways: manual method and using the software and finally, the data were analyzed with SSPS version 22. The prevalence of musculoskeletal problems in the neck, shoulder, wrist, back, knee and elbow equal 78.3, 76.4, 68.5, 55.4, 48.7 and 47.6, respectively. Results of posture assessment Images showed the highest level of risk on the 3rd level and the lowest level of risk was on levels 1 and 2, respectively. Statistical analysis showed that there is no significant correlation between sex, height, weight, number of patient visits per day, obesity and Marital status with the prevalence of musculoskeletal disorders (p > 0.05), but there is a significant correlation between the amount of work hours per week, work experience and training the ergonomic issues with the prevalence of musculoskeletal disorders (p < 0.05). The findings implement appropriate interventions including Redesigning the workplace and tools used, the need to establish a database of physical dimensions of Dentists, Dentists trained in connection with the posture role and body biomechanics in prevalence of musculoskeletal disorders and The necessity of passing Ergonomics unit for dental students in order to reduce the incidence of musculoskeletal disorders and Increase the efficiency of Dentists is essential.

Keywords: Musculoskeletal Disorders, dentist, Nordic questionnaire, level of risk, Postural assessment method RULA

INTRODUCTION

Today, musculoskeletal disorders (WMSDs) is one of the most common occupational diseases and causes of disability in Industrialized countries and developing countries. The most important causes of the disorder can be awkward postures, repetitive and rapid movements, excessive force, psychological factors, genetic and generally Inappropriate body condition and workstations (da Costa and Vieira, 2010). Damage or injury can be defined as a disorder of the musculoskeletal system (muscles, ligaments, tendons, joints, nerves, blood vessels and soft tissues), including pain, tension, stress and inflammation (Chung et al., 2013). Prevention of these problems requires workplace assessment and correction based on ergonomic principles. Postural analysis is one of the most
effective and powerful techniques for evaluating the work activities from the view of ergonomics (Oakman, 2014). Studies have shown that the best strategy to prevent WMSDs is interventions to reduce exposure to risk factors such as repetitive movements, excessive force, awkward postures, vibration, and static work. This means that the risk factors for WMSDs should be assessed in the work stations (Burdorf, 2010, Silverstein and Clark, 2004). One of the jobs that are at high risk for work-related musculoskeletal disorders is a provider of health care - medical and it is headed by dentists. Factors such as placement of people in awkward and asymmetrical postures, work in a confined space, static postures, trunk rotation and stretching, bending the neck, asymmetric lighting, excessive force and... has put dental jobs at high risk for musculoskeletal disorders (Kumar et al., 2012, Vora et al., 2014). Observational methods for assessing exposure to risk factors for musculoskeletal disorders due to the ease and low cost are still the most commonly used method (David, 2005). Among the most famous of these methods is OWAS, QEC, RULA, REBA, OCRA, ROSA, SI, ACGIH TLV, NIOSH LIFTING, ISO 11228-3, and... Despite advances in the variety of new treatment and Entry New instruments to dentistry tools The same old way of duty performed and This is a very big problems for the health care community and is Cause of enormous damage and cost to today society (Hayes et al., 2012). Alexopoulos and Partners In 2004, the prevalence of musculoskeletal disorders were noted in 62% of dentists Greek (Alexopoulos et al., 2004). Shaik and partners (2011) stated that 70% of dentists sometimes suffer from neck pain, And 23% of severe suffering from neck pain, 83% suffer from occasional back pain And 73 percent suffer from chronic back pain (Shaik et al., 2011). Given the dominant role of the dental community to improve community health, Identify problems in the cortex and the prevention of musculoskeletal disorders can be an effective step towards increasing the efficiency and productivity of employees in this field (Kierklo et al., 2011) (Sharma and Golchha, 2011). This study aimed to identify risk factors for musculoskeletal disorders among dentists in Tehran and identify its effective risk factors, in order to reduce musculoskeletal problems and is designed to improve the work environment in 2014.

MATERIALS AND METHODS

This study was a cross-sectional study of descriptive - analytical study was performed in Tehran in 93. Access to dentists were simple random selection method. After determination of the subjects began to collect data such as taking a brief biography of dentists surveyed and recorded demographic characteristics to take photos and record video in different postures work and identification (Sub TASK) of this job. After gathering all the Intended information postures was evaluated In two ways: manual method and using the software. Generally coding techniques used in evaluating posture that RULA is the most widely accepted Inclusion criteria include at least one year of experience in the dental profession and no history of trauma and surgical noted. Coding some postural assessment procedures for members of the upper (Upper Limb) is very general, while the major musculoskeletal disorders associated with dentists job procedures such as cumulative trauma injuries (CTDs) and injuries the repetitive motions (RMs) are generally members of the upper body, especially in the wrist (Wrist) shoulder, (Shoulder) neck, waist (Low Back) occurs. Therefore, given the job essence and engaged members of dentists were selected for evaluation.

This technique was introduced in 1993 by McAtamney and Corlett. In order to analyze working postures based on the displacement of any part of the body to its natural state is evaluated Thus, in accordance with the increase in the deviation of its normal state numeric code posture as it is assigned. After combining the obtained codes for different parts of the body and estimate the external forces and muscle through the final code tables that indicate the severity of the risk posture and urgent reform is being determined (Table 1). This method involves several steps in which the body into two groups) A contains wrist, arm, forearm) and group) B contains the neck, trunk, and legs), divided. RULA implementation method has three steps: record of work status, scoring system and Determine the level of Actions (Action Level).

First evaluation of the work done by direct observation of individual tasks over several duty cycle begins. In this way, the right side or left side is evaluated separately and can also be monitored and recorded after the film examines the other half of the body. The assessment must be recorded observations directly (observer's) within a specified time, observations After 15 minutes of work, Record the most frequent and worst posture, 30-40 minutes time sampling interval of 30 seconds should be noted.
Table 1. Classification of Risk Guide RULA method

<table>
<thead>
<tr>
<th>Final score</th>
<th>Level of risk</th>
<th>Corrective action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2</td>
<td>One</td>
<td>If the posture for a long time or be repeated in that case remains acceptable.</td>
</tr>
<tr>
<td>3-4</td>
<td>Two</td>
<td>Research should be done accurately and more on posture and possibly some changes are necessary.</td>
</tr>
<tr>
<td>5-6</td>
<td>Three</td>
<td>Should soon change and reform, as well as take a closer investigation.</td>
</tr>
<tr>
<td>More than 7</td>
<td>Four</td>
<td>More detailed studies should be carried out quickly with changes and reforms.</td>
</tr>
</tbody>
</table>

To determine the prevalence of musculoskeletal disorders kernel questionnaire was used. Mentioned Questionnaire like other questionnaires assessing musculoskeletal disorders, pain in different organs of the body are evaluated (Çalık et al., 2013). This tool show discomfort and pain in the neck, shoulder (left and right), upper back, arms (right and left), lower back (lumbar), forearm (right and left), wrist, hip, thigh (right and left), knee (right and left), leg (right and left) and leg (right and left) during the last week and It is a pain scale of three grades and The questionnaire will also be working on the impact of the discomfort and pain measures (Figure 1) and Has already been used in several studies (Stanton et al., 2004) (Fagarasanu and Kumar, 2006). Finally, data entered into SPSS version 22 was analyzed To determine the priority of corrective actions and the prevalence of descriptive statistics for the variables studied the relationship between the prevalence of musculoskeletal disorders by Chi square test and logistic regression tests were used.

![Cornell Questionnaire](Image)

**RESULTS**

6 of 98 questionnaires returned questionnaires due to lack of inclusion of the experience of less than one year and not fully completed questionnaires were excluded. The statistical tests were used to analyze data of 92 dentists. The prevalence of musculoskeletal disorders of the neck with 78.3% showed the highest prevalence. The incidence of musculoskeletal problems in the shoulder, wrist, back, knee and elbow respectively equal 76.4, 68.5, 55.4, 48.7 and 47.6, (Figure 1)
The highest and lowest levels of risk related to corrective measures 3 and 4 to 54 and zero percent obtained (Chart 2). Average scores for mentioned dentists was 6.4 between Different risk levels obtained in the left with the right there is not a significant correlation (p value > 0.05). Average final score was 6.1 for the right and 6.7 for the left that are not statistically significant difference. The risk level is obtained between the two groups did not differ between men and women. But as slight higher prevalence among women, especially in the neck. The results of the job analysis showed that the dental profession has 12 main duty (examination, canal, filling, scaling, periodontal surgery, prosthetics etc.) And has 18 sub-task (polishing, filing, cutting, molding, cutting, prosthetics, rivet, stitching, etc.) the highest level of cutting and cutting makes The highest level of risk for the individual. The general relationship between environmental factors and musculoskeletal disorders are statistically highly significant (p = 0.01).
Chi-square tests, t-tests and regression coefficients showed that the sex, height, weight, number of patients seen per day, obesity, and marital status were not significantly associated with the prevalence of musculoskeletal disorders ($p > 0.05$). But the amount of hours worked per week, work experience and training ergonomic issues with musculoskeletal disorders there is a significant correlation ($p < 0.05$). The results show that the neck and shoulders as members of high-risk for developing musculoskeletal disorders is in a way that reduces pain in the limbs and severe disability at $28 \pm 4.2\%$ of the dentists and in 46.5 and 25.3 percent of dentists, respectively. Causes mild or no impact on their ability

**DISCUSSION AND CONCLUSION**

The present study was performed aimed to assess the prevalence of musculoskeletal disorders and Postural evaluation of job tasks in Tehran with RULA method in 93. The highest prevalence of musculoskeletal disorders was in the neck and after it was found in the shoulder. These results are consistent with Alexopoulos and kierklo studies (Alexopoulos et al., 2004) (Kierklo et al., 2011). The high prevalence of musculoskeletal disorders among dentists certainly reduces efficiency and quality of the healthcare system. These results confirm implement appropriate interventions and workplace redesign of equipment and tools used to reduce musculoskeletal disorders. The results of this study confirms the effect of environmental factors on the prevalence of musculoskeletal disorders. But between every single one of environmental factors such as atmospheric parameters, color and genus of work place, job satisfaction, noise with musculoskeletal disorders there is a significant correlation. These results are somewhat consistent with results from Huang and partners (Huang et al., 2002) Thus attention to environmental parameters and design work on the principles of ergonomics and consider the physical aspects of the use of dental equipment can effectively reduce musculoskeletal disorders in mentioned people. According to the authentic database associated with anthropometric dimensions dentists are not available. The need to establish a database of physical dimensions, construction and equipment design to fit the physical dimension, the role of this factor in the reduction of musculoskeletal disorders, it is imperative (Perdana and Santoso, 2014) (Konz and Johnson, 2004). Posture assessment results show that most of the 92 dentists studied the level of risk (corrective action) 3 with a frequency of 54% and the lowest risk level 1 and 2. 6.4 points for the final score indicates a high risk of exposure to musculoskeletal problems in the future. The main reason for the awkward postures can be a lack of awareness of the biomechanics of the body, contributing to the lack of knowledge about the impact of musculoskeletal disorders, the nature of work, little space to maneuver in relation to the mouth and posture in the state of a neutral, the exact nature of work and lack of knowledge about the issues of workplace ergonomic. To educate dentists and The necessity of passing Ergonomics unit for dental students in order to reduce the incidence of musculoskeletal disorders and Increase the efficiency of Dentists is essential.

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