Do dental students have a neutral working posture?

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Abstract.

BACKGROUND: Dentists are susceptible to Musculoskeletal Disorders (MSDs) due to prolonged static postures. To prevent MSDs, working postures of dental students should be assessed and corrected in early career life.

OBJECTIVE: This study estimated the risk of developing musculoskeletal disorders in dental students using Rapid Upper Limb Assessment (RULA) tool.

METHODS: A number of 103 undergraduate dental students from fourth and fifth academic years participated. Postures of these students were assessed using RULA tool while working in the dental clinic. They also answered a questionnaire regarding their knowledge about postural dental ergonomic principles.

RESULTS: The majority of the students (66%) were at intermediate and high risk levels to develop MSDs and their postures needed to be corrected. There was no significant correlation between RULA score and gender, academic year and different wards of dental clinics. And there was no significant correlation between knowledge and RULA scores.

CONCLUSIONS: Dental students did not have favorable working postures. They were at an intermediate to high risk for developing MSDs which calls for a change in their working postures. Therefore students should be trained with ergonomic principles and to achieve the best results, ergonomic lessons should be accompanied by practice and periodical evaluations.

Keywords: Dentistry, RULA, posture, ergonomics, musculoskeletal disorders

1. Introduction

Musculoskeletal disorders (MSDs) refer to disorders affecting bones, muscles, and joints that are usually caused by prolonged static postures [1,2]. Work-related risk factors such as strained and awkward working postures, extrinsic stress (e.g. working in cold environments) and individual risk factors (e.g. being overweight) are involved in MSDs development [1–4].

Based on a national study in Iran on burden of diseases, MSDs were known as the second most common diseases of the country. The multilateral costs of MSDs due to direct costs accounting for medical treatments, indirect costs as loss of production and the significant socioeconomic burden, implies the importance of identifying individuals at risk for developing MSDs or maybe more importantly, preventing them from developing [5].

MSDs are one of the most prevalent health problems for medical workers especially dental care workers as indicated in many studies. MSDs are a significant burden to dentistry [6–10]. Dentists that usually work with a prolonged static posture are susceptible to MSDs particularly in neck, back and shoulders. Over 64% of
dental personnel suffer from at least one MSD symptom [8,9,11–16]. One of the most common occupational health problems (78%) among dentists in Thailand was musculoskeletal pain [17]. Studies showed high prevalence of MSDs in Iranian dentists [18,19].

As strained working posture is the greatest risk factor for MSDs and considering that in dental practice sometimes these postures are inevitable, high prevalence of MSDs among dentists is expected [20–22]. Significant MSDs risk factors specific to dental practice are: prolonged static postures, non-neutral body postures, vision-demanding tasks, precise hand and wrist movements, working with vibrating tools, and repetitive movements [12–14,23–25].

Some researchers suggest that MSDs in dental practitioners begin as early as clinical training period at dental school [26–28]. In two separate studies in Iran and Spain, near 80% of dental students reported body pain in at least one body region [29,30]. Given the above and considering the increasing number of dental students in Iran in recent years it seems that further research in this area is needed.

The attention paid to ergonomics in dentistry has increased in recent years. In ergonomics, working postures are assessed using screening tools. One of these tools is the Rapid Upper Limb Assessment (RULA) that has been introduced by McAtamney and Corlett in 1993 [31]. RULA is used to make a quick assessment on neck and upper limb loading in mainly sedentary tasks. Postures of body segments, forces/loads, handled and static/repetitive nature of the postures are the factors considered by this assessment tool. A coding system is used to generate an action list which indicates the level of intervention required to reduce the risks of injury due to physical loading on the operator [32].

High prevalence of musculoskeletal pain reports among dental students implies importance of ergonomic studies in this particular group. Previous researchers have reported mainly the incidence of MSDs and the relation between MSDs and working postures usually among dentists. Despite the increasing attempts in educating dentists about ergonomic principles in recent years, the MSDs complaints among dental practitioners remain high. The relevance between students’ awareness of ergonomic principles and their postures during dental practice is not known clearly. The purpose of this study was to ergonomically evaluate body postures of dental students at workplace, to determine the risk of acquiring musculoskeletal disorders by an observational assessment tool (RULA), and to determine the level of awareness about ergonomic principles.

2. Materials and methods

In this analytic cross-sectional study, dental students at the Mashhad University of Medical Sciences in Mashhad/Iran were assessed in 2013. The research protocol was approved by the Ethical Committee of the University. Using a related study [33], the sample size was calculated with sampling size formula as 100 subjects. The sampling method was stratified; the population was divided into fourteen strata: fourth-year and fifth-year students working in seven different wards of dental school clinics including: restorative dentistry, endodontics, maxillofacial surgery, periodontics, fixed prosthodontics, removable prosthodontics and pedodontics. The participants were then selected randomly from each stratum. The gender variable was post stratified. Exclusion criteria were unwillingness to participate, ages under 21 and above 25, BMI beyond normal ranges (18.5–25), medication usage, congenital anomalies of spinal column, and collagen vascular diseases. Finally a total of 103 students participated in the study; 42 males (40.8%) and 61 females (59.2%). 50 subjects were fourth-year students (48.5%) and the remaining 53 were fifth-year students (51.5%).

The research consisted of two main parts: observational assessment and a questionnaire.

To assess postures during dental practice the observational assessment tool “RULA” was used. The observer was an occupational health specialist. Students’ postures were directly observed for about 20 minutes and recorded in RULA scoring worksheet. For each subject, positions of individual limbs were observed while operating and according to the most prolonged posture, a subscore was attributed to each body segment; upper arms, lower arms, and wrists (group A), and trunk, neck and legs (group B), giving additional points to the subscores if the positions were mainly static or highly repetitive, and points for the amount of force/load on the engaging muscles. These two subscores were then combined and transformed to a final postural score. The scores were calculated separately for the right and left sides of the body. The final scores were compared to the table of “Level of MSD Risk” which shows the level of risk of acquiring MSDs and the action needed for each level (Table 1). A larger deviation from neutral posture resulted in a higher score which indicated a higher risk of developing MSDs.

After the observation, the students were asked to fill the researcher-made questionnaire containing 18 questions regarding awareness about ergonomic principles.
3. Results

Mean RULA score and mean awareness score were 5.02 and 42.2, respectively. Table 2 shows statistical details of RULA and awareness scores.

Frequency distribution of dental students’ levels of risk of developing musculoskeletal disorders, according to RULA scores, were as follows: Level 1: 0 (0%); Level 2: 35 (34%); Level 3: 53 (51.5%); Level 4: 15 (14.5%).

Regression correlation test did not show a significant correlation between RULA score and awareness score ($r = 0.18, P = 0.07$). Statistical analysis revealed that none of the factors including gender, academic year, and wards of dental clinic, have significant effects on RULA score (Table 3).

Also difference from mean of RULA scores for right side (5.1) and left side of the body (5) was not statistically significant ($P = 0.12$).

There was no significant correlation between awareness score and academic year ($P = 0.92$). The mean for fourth-year students was 42.3 and for fifth-year students was 42.

4. Discussion

In this study risk assessment of MSDs among dental students in Mashhad, Iran was performed. According to RULA scores, 66% of dental students were within risk levels 3 and 4, meaning if the observed postures were continued, they would be at an intermediate to high risk of developing MSD symptoms.

This finding is in agreement with previous studies. A similar study on dentists in Shiraz based on RULA scores revealed that intermediate to high risk levels were the most prevalent [18]. Varmarzyar et al. assessed working posture of dentists using REBA (Rapid Entire Body Assessment) and reported that about 80% of dentists had high to very high risk levels [34]. Also in Nasl Saraji et al. assessment of dentists’ risk for MSDs using REBA, risk levels in most dental postures were intermediate to high [35]. Rafeemanesh et al. reported that 80–90% of dentists in Mashhad were at intermediate or high risk [1]. Furthermore it has been shown that REBA and RULA results are in high correlations [35]. Given above, dentists and dental students risk to MSDs is intermediate to high which indicates that ergonomic interventions for appropriate posture and body mechanics should be considered soon.

Statistical analysis showed that RULA scores of right side and left side of the body were not significantly different. This finding is in accordance with Yaghoubiee and Esmaili [33]. Although in right-handers right hand is the more active hand, left hand is also involved in dental practice and is admitted to long periods of static and/or repetitive positions such as holding the intraoral mirror or tissue retraction.

In this study no significant difference between RULA scores of participants working in different wards of dental clinic was determined. This result indicates that ergonomic interventions should be taken into consideration for all different studied clinic wards. It is inconsistent with Yaghoubiee and Esmaili reporting indicating dental postures are more disappointing in

<table>
<thead>
<tr>
<th>Level of risk</th>
<th>RULA score</th>
<th>Needed actions</th>
</tr>
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<tbody>
<tr>
<td>1 or 2</td>
<td></td>
<td>Acceptable posture.</td>
</tr>
<tr>
<td>3 or 4</td>
<td></td>
<td>Further investigation and ergonomic intervention may be needed.</td>
</tr>
<tr>
<td>5 or 6</td>
<td></td>
<td>Further investigation and ergonomic intervention soon.</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>Investigation and ergonomic intervention immediately.</td>
</tr>
</tbody>
</table>
Although in this study the average awareness levels and MSDs risk levels among students were shown to be unsatisfactory, there were no significant correlations between the two. In other words, students with higher awareness about ergonomics had not necessarily adopted a healthier posture. This indicates that awareness alone does not sufficiently affect their behavior. Therefore it can be said that theoretical instructions are not enough. Adopting a correct posture and maintaining it during operating time is a skill rather than a cognitive matter. Therefore, it is best that theoretical principles be accompanied by repeated and constant clinical training and practice. As a suggestion, authorities should provide students with proper ergonomic equipment etc. Therefore, in addition to discussed measures, authorities should provide students with proper ergonomic equipment and facilities.

5. Conclusion

According to the present study, students of Mashhad School of Dentistry do not use a favorable working posture; they are at intermediate to high risk for MSDs and their awareness about ergonomic principles is unsatisfactory. In addition, it is necessary that ergonomic training courses including both theoretical and practical contents be included in dental students’ academic curriculum.

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Conflict of interest

The authors have no conflict of interest to report.

References


