

Short Communication**Ergonomic Evaluation of Dental Professionals as Determined by Rapid Entire Body Assessment Method in 2014**Fatemeh Jahanimoghadam¹, Azadeh Horri¹, Naimeh Hasheminejad², Naser Hashemi Nejad³, Mohammad Reza Baneshi⁴¹ Dept. of Pediatric Dentistry, School of Dentistry, Kerman Oral and Dental Disease Research Center, Kerman University of Medical Sciences, Kerman, Iran.² PhD Student, Kerman Oral and Dental Diseases Research Center, Kerman University of Medical Sciences, Kerman, Iran.³ Dept. of Occupational Health, School of Health, Kerman University of Medical Sciences, Kerman, Iran.⁴ Research Center for Modeling in Health, Institute for Futures Studies in Health, Dept. of Biostatistics and Epidemiology, Kerman University of Medical Science, Kerman, Iran.**KEY WORDS**Musculoskeletal disorders;
Body posture;
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Received in Revised form December 2016;
Accepted February 2017;**ABSTRACT****Statement of the Problem:** In dentistry, incorrect working posture is the most important cause of musculoskeletal disorders.**Purpose:** The aim of this research was to evaluate the work postures of general dentists and specialists using rapid entire body assessment (REBA) method.**Materials and Method:** In this cross-sectional study, work postures were assessed in 90 dentists by employing REBA method. Stratified sampling method was used. Data were analyzed by analysis of variance (ANOVA), Independent t-test and Pearson's correlation test in SPSS 19.**Results:** The results showed that work postures of 90% of dentists were at moderate- to high-risk levels. Among the specialists, periodontists, pedodontists and oral and maxillofacial surgeons had the worst body postures.**Conclusion:** In general, dentists' working postures need improvement and consequently, a more comprehensive ergonomic training and promotion is required in dentistry curriculum at Universities.**Corresponding Author:** Hasheminejad N. Shafa Street, Dental School, Department of Dental, Public Health, Kerman, Iran. Email: hnaimeh@yahoo.com Tel: +98-3432119021 Fax: +98-343211807**Cite this article as:** Jahanimoghadam F., Horri A., Hasheminejad N., Hashemi Nejad N., Baneshi MR. Ergonomic Evaluation of Dental Professionals as Determined by Rapid Entire Body Assessment Method in 2014. *J Dent Shiraz Univ Med Sci.*, 2018 June; 19(2): 155-158.**Introduction**

In dentistry, improper body posture along with factors such as prolonged work in a static position with no rest period, use of excessive force and vibrating tools, repetitive work and the need for special precision in a small working field puts dentists at a very high risk of developing musculoskeletal disorders. [1-4] The prevalence of MSDs in dentists has been reported to be 63% to 92%. [5-9]

Rapid entire body assessment (REBA) is an ergonomic assessment tool which uses a systematic process to evaluate whole-body postural MSDs and risks associated with job tasks. [10] This observational method has reliability rate of 62-85% and is designed for easy use specially in rapidly changing jobs such as dentistry.

[11] Literature review shows that little work has been carried regarding the body posture of different dental professionals. Also with most studies analyzing the posture as a whole, the most badly postured body parts were not defined clearly. Therefore, it seems necessary to identify body parts that are badly postured during different dental tasks.

Materials and Method

This cross-sectional descriptive/analytical study was carried out in the Kerman/Iran in 2014 by observation. The checklists were completed by a trained examiner. Based on the list of dentists given by the medical council of Kerman, according to the proportion of general dentists and different specialists to the total number of

dentists in Kerman, systematic random sampling method was used to recruit the participants in each professional group. The group of study included general dentists, pedodontists, periodontists, oral and maxillofacial surgeons, orthodontists, prosthodontists, endodontists, and operative dentists. According to a similar published paper in Iran, [11] the proportion of dentists at high risk of musculoskeletal disorders was approximately 40% (p). With a type one error (α) of 5% and a precision (d) of 10%, sample size was calculated as 90.

$$n = \frac{p \times q \times z_{1-\frac{\alpha}{2}}^2}{d^2}$$

The ethical code (K/92/440) for current study was assigned by Ethical Committee of Kerman University of medical sciences. A dentist familiar with dental work and positions, along with a specialist in ergonomics, visited the recruited dentists' private offices or dental clinics in Kerman and carried out the study. Informed consents were obtained from participants. Demographic data such as age, gender, educational status, and data revealing dentists' years of clinical experience, weekly hours of work, and number of patients visited and/or treated each day, height and weight were recorded in the first part of the checklist. Postures were analyzed by REBA method. Each dentist's body posture at the time was carefully observed (at least for 30 minutes). The worst and most frequent body postures were selected and according to the angulation of each body part, a score was given to the head, neck, body, upper limbs and lower limbs.

These scores were recorded in the second part of the checklist, and the interpretation of the final REBA scores was carried out according to Table 1.

Final REBA score	Risk level	Action level	Action (including further assessment)
1	Negligible	1	Not necessary
2-3	Low risk	2	May be needed
4-7	Medium	3	Necessary
8-10	High	4	Very necessary (soon)
11-15	Very high	5	Very necessary (now)

Because REBA has different coding systems for different body parts and the possible minimum and maximum scores for each body part are different, it was not possible to determine the most badly postured body part. Data was analyzed by analysis of variance (ANOVA), Independent t-test and Pearson's correlation test in

SPSS (version 19, SPSS Inc., Chicago, IL, USA). *p* Values < 0.05 were considered statistically significant.

Results

This study was carried out on 90 general dentists and specialists in Kerman, Iran, 69 of which were general dentists and 21 were specialists in different fields. Considering the gender, 52% of participants were male and 48% were female. The mean age of the dentists was 35±7 years. Forty-five percent of participants had a regular (at least weekly) exercise program and 55% did not exercise on a regular basis. Other demographic variables are listed in Table1. The risk level of developing MSDs and the priority of needed corrective actions (according to REBA), are shown in Table 2.

	Minimum	Maximum	Mean	Std. Deviation
Age	25	53	35.5	7.2
Years of clinical experience	1	34	9.3	6.6
Weekly hours of work	12	66	33.5	12.3
Number of patients visited or treated in one day	2	20	6.5	3.7
Body mass index	19	36.4	24.2	3.8

Considering body posture (REBA score), there was no difference between general dentists and specialists as a whole group. The results showed that 77.8% of dentists had a final REBA score of 4-7, which indicated a moderate risk level of developing MSDs. Furthermore, 12.2% of dentists had a high to very high-risk level for developing MSDs and further assessment was so necessary in order to correct their posture. The mean REBA score of general dentists was 5.5±1.7, which showed an overall moderate risk of developing MSDs. Pediatric dentists and periodontists had the highest mean REBA score, which means that they had the worst body postures. To determine the most badly postured body part, all the scores were converted to a 100-degree scale range as in Figure 1. Overall, the left forearm with a score of 80/100 had the most improper posture during dental work. After that, the right forearm and the neck were the parts with the worst posture. General dentists gained a score of 5.5±1.7 and specialists had a score of

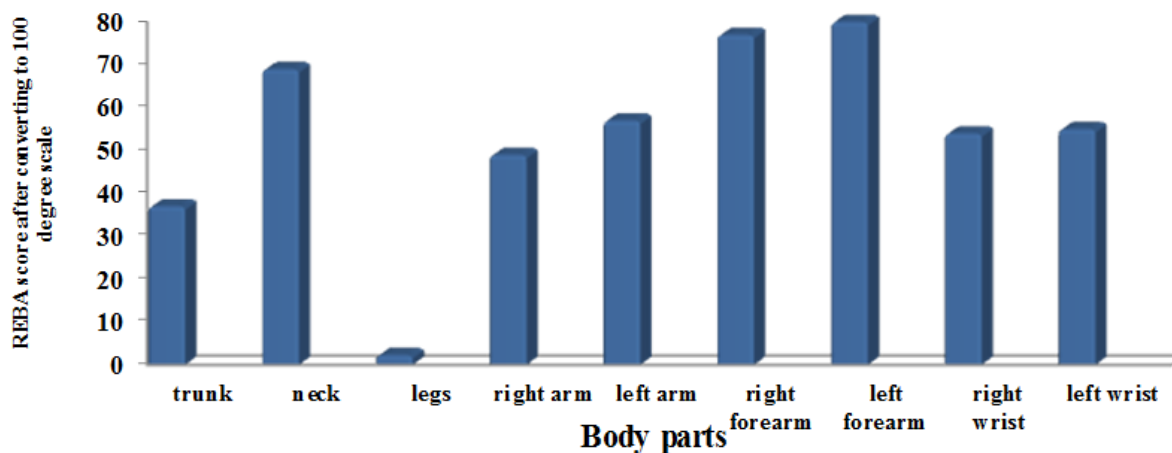


Figure 1: Mean REBA score of each body part after converting to 100-degree scale

5.3±2.2. Data analysis revealed a statistically significant relationship between age and REBA score ($p= 0.03$, Pearson’s correlation -0.2). The relationship between years of clinical experience and REBA score was also significant ($p =0.01$, Pearson’s correlation -0.02). The risk level and the need for correction actions in general and specialist dentists are shown in Table 3.

Discussion

Ergonomic REBA analysis revealed that, 90% of dentists adopted unfavorable working postures making them susceptible to moderate to high risk of future musculoskeletal disorders. This fact is in line with the findings of many other studies in Iran. [3, 11-13] Descriptively, the mean REBA scores of periodontists, pediatric dentists, and oral and maxillofacial surgeons indicated the worst body postures during dental work, whereas operative dentists adopted the best postures. These scores are in agreement with Yaghobee’s results to some extent, noting that students maintained the most awkward body postures in surgery, pediatric and endodontic departments and that the most appropriate postures were adopted during operative dentistry. [11] The high risk in pediatric dentists might be the result of in-

appropriate positioning of the child and the excessive effort for controlling the child. In this study, dentists adopted better work postures with an increase in age and clinical experience. It seems that they will gradually learn to work in a more effective and comfortable position. Parallel with reports of Askaripoor *et al.* [13] and Poorabbas’s *et al.* [12], REBA score was not related to gender, number of patients visited, BMI, and so on. [12-13] In this study, the right and left forearms and the neck exhibited the highest REBA scores, demonstrating that they had the worst postures during dental work which is in line with the finding of Finsen *et al.* [14]

Therefore, it is of great significance to pay special attention to these body parts and avoid any action that would compromise their posture. Furthermore, it is strongly recommended that ergonomics be taught in pre-clinical education as well as continuing educational programs. According to REBA, the high score of right and left forearms show bending of less than 60° or more than 100° of this body part, which is generally caused by working at an inappropriate height. To prevent this problem, the working level should be 5-10cm lower than the dentist’s elbow. [15] The key objective for dentists is to find a position that helps them achieve optimu-

Table 3: The risk level and the need for correction actions in general dentists and specialists in different fields

	Frequency	Mean REBA Score	Risk level	Action level	Action (including further Assessment)
General dentists	69	5.5	Moderate	2	Necessary
Endodontists	3	4	Moderate	2	Necessary
Orthodontists	4	6.2	Moderate	2	Necessary
Pediatric Dentists	3	7	Moderate	2	Necessary
Operative dentists	4	3.5	Low	1	May be necessary
Prosthodontists	3	5	Moderate	2	Necessary
Periodontists	2	7	Moderate	2	Necessary
OMF Surgeons	2	6.5	Moderate	2	Necessary

m access, visibility, comfort, and control at all times. [16] Murtomaa [17] also stated that dental teams require functionally designed dental equipment and proper training in ergonomic methods.

Regarding the limitations of this study such as the small number of specialists, a specific analysis of dental specialists' body postures using a larger sample size might be useful to identify the specialists most at risk.

Conclusion

With regard to the results of this study and population's constant need for dental services, we suggest that actions be taken towards raising the dentist's knowledge of proper working postures. Furthermore, to prevent chronic pain, it is required that dentists change their improper positions, select proper ergonomic equipment, and have a break after each operation with stretching exercise.

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Conflict of Interest

The authors declare no conflict of interests.

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