RESEARCH ARTICLE

EVALUATION OF WORKING POSTURE AMONG THE DENTIST USING RULA AND REBA

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ABSTRACT

Aim & Objective The aim of the present study was to assess the unpredictable working postures of dentists using the postural analysis tool, Rapid entire body assessment (REBA) and Rapid Upper Limb Assessment (RULA). Materials and Methods: The study was conducted on one hundred and seventy five dentists working in different clinics having an experience of 3 to 20 years with age ranging from 25 – 50 years. Posture was assessed using the posture analysis tools like Rapid entire body assessment (REBA) and Rapid Upper Limb Assessment (RULA). Data are collected about the body posture, forces used, type of movement or action, repetition, and coupling. After the data for each region is collected and scored, tables on the form are then used to compile the risk factor variables, generating a single score that represents the level of MSD risk. Results: The REBA score for 85% of the subjects were 7 and above which indicates the risk level is medium to high. The RULA Score for most of the subjects (54%) were left 3 and right 5. This score indicates investigation and changes may be required in their posture. 47% of subjects were having a left score 4 and right score 5&6

INTRODUCTION

People adopt postures mostly without any conscious decision to deal with the work place and the surrounding environments they find. The goal is to perform an action or a task and the posture is chosen to achieve that goal. This adaptability is made possible by the complex anatomy of the musculoskeletal system which has the freedom to adopt numerous postures and postural adjustments. The redundancy provided by the multiple degrees of freedom ensures that for performing a particular task several alternative postures can be adopted.

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All the alternative postures may not be healthy postures, particularly when extended for a period of time, when they cause localized loading on joints, muscles, ligaments or other tissues or when force must be exerted. General principles for work place and work space are outlined, but it is that effects of any of the influencing factor may vary with an individual worker. This is most obvious when considering the anthropometric effects of body size. The posture that an individual can adopt to perform a task is solely depending upon the interaction between the layout of the work place and his or her own anthropometry. Postural deviation alters the body mechanics, causing uneven pressure on joint surfaces, ligamentous strain and skeletal muscle disadvantage. Associated soft tissue shortening may cause back pain. Chronic pain is yet another added burden to this patient group,

and may exacerbate low mood and decrease motivation. Stiffness and pain in the spine and ribs may inhibit ventilation, and poor posture along with low body weight may reinforce poor body image and reduce self confidence. Global Burden of Diseases' statistics developed by the World Health Organization (WHO) reveal that musculo skeletal disorders (MSD) contribute 37% of the disease burden attributable to occupational risk factors (WHO, 2004). The posture adopted for a particular task is most directly determined by the work place and the equipments particularly in relation to work height, reach distance, field of view, and space to move freely. The dimensions and arrangements constrain the range of postures that are possible while performing the task.

A person working in an esteem or awkward posture will have to use more force to accomplish the same amount of work compared to using a neutral posture, which in turn affects muscle loading and compressive forces on the intervertebral disc (Anderson, 1986). The dental professionals are more prone for work related musculoskeletal disorders (MSD). Hunching over patients, reaching and stretching in awkward positions, the physical strains and repetitive movements required by the occupation can lead to muscle imbalances, postural dysfunction and compensatory movement patterns leaving the dentist with pain or chronic discomfort (Leggat *et al*., 2007; Pandis *et al*., 2007; Shenkar *et al*., 1998). Back pain was the most common complaint among dentists followed by neck pain (McRea, 1990). Dentists are subjected to a wide variety of physical and psychological ailments that aggravate disorders of the musculoskeletal system and greatly affect the health of dentists (Rowe, 1969; Ishmael, 1976; Osborn *et al*., 1990; Marshall *et al*., 1997). In order to prevent this, correct posture must be established by the dentist early in the dental career. Therefore, the correct posture must be stressed in dental schools. Although most schools teach the correct and ideal dentist posture and positions, it is not always applied by the dental students. The most common sites of pain among the dentist are the lumbar and the cervical vertebrae (Ishmael, 1976; Osborn *et al*., 1990; Marshall *et al*., 1997).

The musculoskeletal health of dental professionals has been the subject of numerous studies worldwide, and their focus has been on the pain experienced by the practitioner. Because their work area is narrow, dental treatment is performed, in a very inflexible work posture. Studies indicate that back, neck or shoulder pain is present in 81% of dental operators (Bramson *et al*., 1998). Studies highlighted that stress, postural practice (bending and twisting trying to gain better access and visibility within the oral cavity), as well as prolonged working times leads to fatigue (Valachi, 2013; Kerosuo *et al*., 2000). Various investigators have pointed out the common postural faults among dentists and dental auxiliaries are craning and/or excessive bending and twisting of the neck, bending forward from the waist, elevation of the shoulders, and general bending or twisting of the back and neck (Fox, 1967; Paul, 1979; Bers, 1980; Willee, 1967; Green, 1963; Jinu Merlin, 2016). The present study was to assess the working postures of the dentist using the postural analysis tool like Rapid entire body assessment (REBA) and Rapid Upper Limb Assessment (RULA) (Hignett, 2000; Mcatamney, 1993)

Aim and Objective

The aim of the present study was to assess the unpredictable working postures of dentists using the postural analysis tool,

Rapid entire body assessment (REBA) and Rapid Upper Limb Assessment (RULA).

MATERIALS AND METHODS

The study was to assess the unpredictable working postures of dentists in Chennai. One hundred and seventy five dentists working in different clinics were randomly selected and included in this study, over a period of three months. The study proposal was submitted to the Institutional Ethics Committee and due clearance was obtained from them.

Inclusion criteria

- Dentists with 3 - 20 years work experience
- Age ranging from 25 – 50 years,
- Both sexes.

Exclusion Criteria

- Individuals with any acute ailments or systemic diseases
- Pregnant women
- Those who were not willing

Informed written consent was obtained from each of the participants

Rapid Entire Body Assessment {REBA}

Rapid entire body assessment (REBA) was developed to assess the type of unpredictable working postures found in health-care and other service industries. Data were collected about the body posture, forces used, type of movement or action, repetition, and coupling. A final REBA score was generated to give an indication of the level of risk & urgency with which action should be taken. Wrists, forearms, elbows, shoulders, neck, trunk, back, legs and knees were assessed using REBA employee assessment worksheet (Figure 1).

Rapid Upper Limb Assessment (RULA)

The RULA ergonomic assessment tool considers biomechanical and postural load requirements of job tasks/demands on the neck, trunk and upper extremities. RULA assessment worksheet was used to evaluate required body posture, force, and repetition(Figure 2). Based on the evaluations, scores were entered for each body region in section A for the arm and wrist, and section B for the neck and trunk. After the data for each region was collected and scored, tables on the form were then used to compile the risk factor variables, generating a single score that represents the level of MSD risk.

RESULTS

The study group consists of 175 dentists having work experience of minimum 3 yearsand maximum of 20 years. The sample population included 96 females & 76 males with an average age of 33 years and average work experience of 9 years. The general characteristics of the study population like age, work experience, working hours, height, weight, body mass index (BMI) were shown in Table 1. Table 2 and Table 3 represent the REBA and RULA score of the subject group respectively.
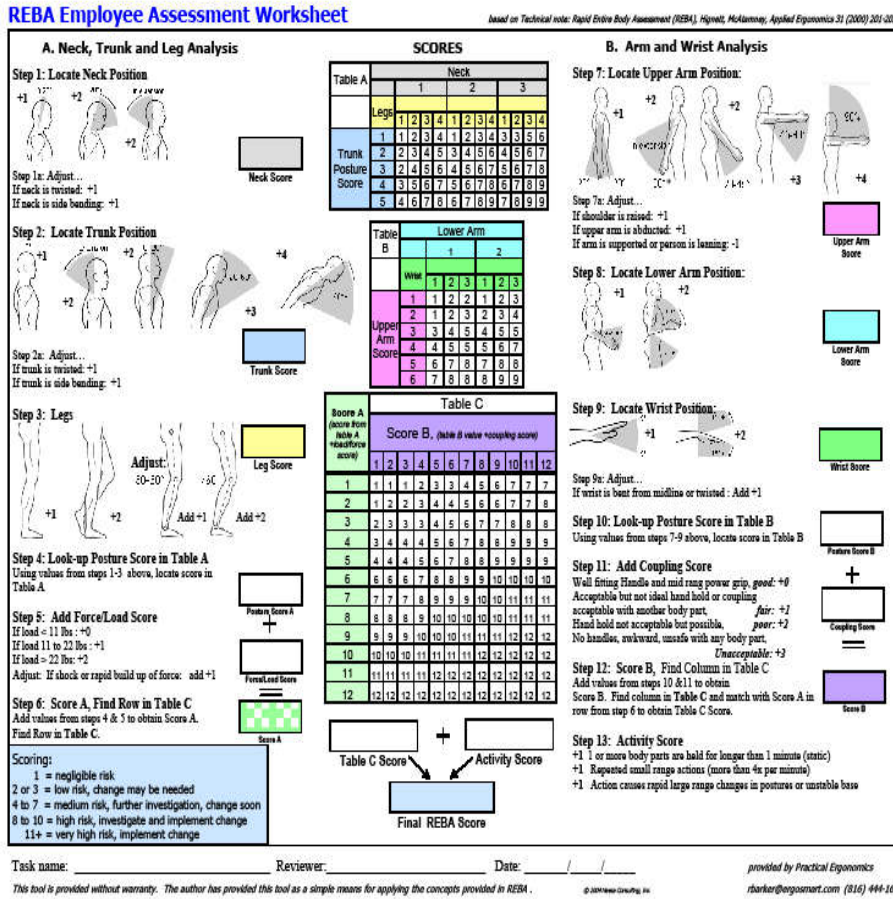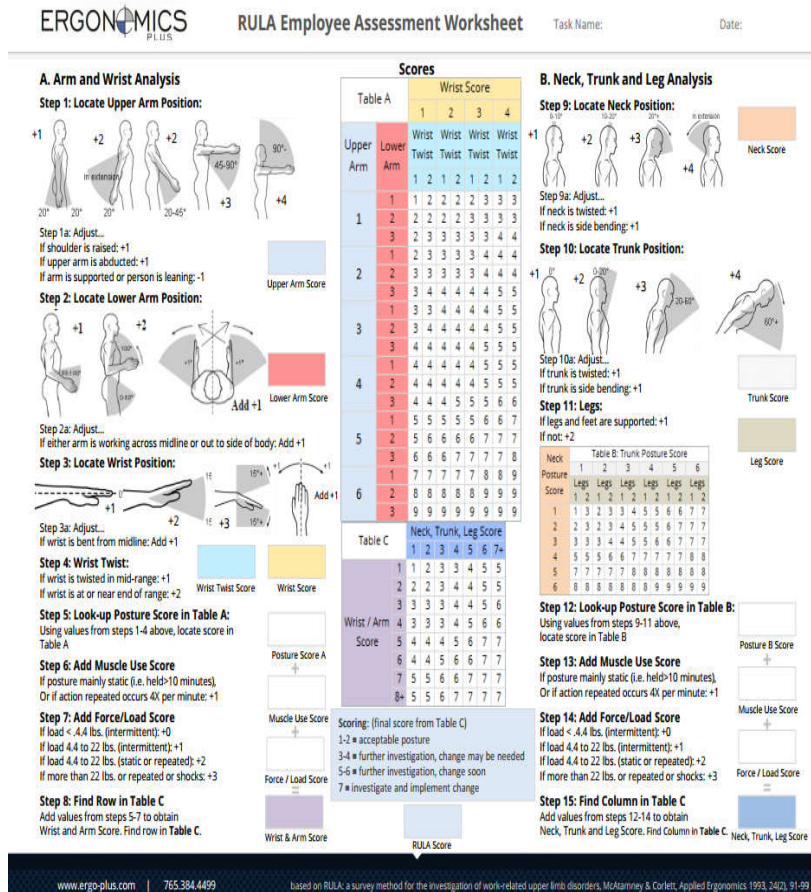
Figure 1. REBA employee assessment worksheet

Figure 2. RULA assessment worksheet

Table 1. General Characteristics of the Study Subjects

Socio demographic variables	MALE	FEMALE
Age	33 ± 5.0606	32 ±4.23
Work experience	9 ± 5.109	8 ± 4.09
Married	57	78
Unmarried	22	18
Working hrs per day	9 ± 1.448	6 ± 1.35
Working hrs per week	54 ± 8.693	36 ± 8.08
Patients handling per day	20 ± 7.612	12 ± 4.52
Patients per week	120 ± 45.67	72 ± 27.16
Height	172 ± 7.87	158 ± 7.40
Weight	72 ± 8.48	62 ± 5.45
BMI	24.65 ± 1.72	24.80 ± 2.146
Mean ± Standard deviation n=175 M:F 79:96		

Table 2. Reba Score of Dentists

REBA SCORE OF DENTISTS N=175

Number of persons	SCORE	PERCENTAGE
3	11	1.71
18	10	10.29
38	9	21.71
55	8	31.43
37	7	21.14
11	6	6.29
13	5	7.43

Graph 1. REBA score

Table 3. Rula Score of Dentists

RULA			
Number of persons	LEFTSCORE	RIGHT SCORE	Percentage
128	3	5	73.14
1	3	6	0.57
7	4	5	4.00
93	4	6	53.14
9	5	7	5.14

Graph 2. RULA score

Table 4. Inference of Reba Score

REBA SCORE	RISK LEVEL	ACTION NEEDED
1	Negligible	None necessary
2-3	Low	May be necessary
4-7	Medium	Necessary
8-10	High	Necessary soon
11-15	Very High	Necessary now

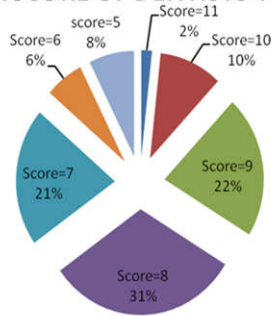### Table 5. Inference of Rula Score

RULA SCORE	ACTION NEEDED
Score = 1-2	Posture acceptable if not maintained or repeated for long periods
Score = 3-4	Further investigation is needed, and changes may be required
Score = 5-6	Investigation and changes are required soon
Score = 7	Investigation and changes are required immediately

DISCUSSION

The present study group was conducted in 175 dentists having work experience of minimum 3 years and maximum of 20 years. The sample population included 96 females & 76 males with an average age of 33 years and average work experience of 9 years. The general characteristics of the study population like age, work experience, working hours, height, weight, body mass index (BMI) were assessed. The data collected were tabulated and REBA & RULA scoring were done. The REBA score for 85% of the subjects were 7 and above which indicates the risk level is medium to high. The RULA Score for most of the subjects (54%) were left 3 and right 5. This score indicates investigation and changes may be required in their posture. 47% of subjects were having a left score 4 and right score 5&6. Vilagra (2003) has evaluated working postures with odontology students using the RULA method. The found score average was 5.9, indicating further investigations and changes required soon.

Agreeing with the studies of Vilagra (2003), our sample has presented an average score of postures analyzed by the RULA method of 5.1, with indications of fast changes. While the REBA method has presented an average score of 8 for the postures that have been analyzed, but the indications says only that the changes are necessary soon (Vilagra, 2003). Studying the postural stress in dentists through the RULA method, Silva (2001) found that none of the postures that had been analyzed is acceptable, that means, all postures had a final score above 2 (Silva, 2001). Saquy *et al*. (1996), affirm that during the work activities of the dentists, rotation and inflections of the vertebral column should, preferentially, eliminated (Saquy, 1996). The onset of modern dentistry, as evidenced by four–handed dentistry, has made the major part of the dentist tasks purely sedentary in nature. This has resulted in dramatic rise in musculoskeletal symptoms (Karwouski, 1999). Studies showed that persons with sedentary jobs and a positive family history had a probability of having diabetes (Jinu Merlin Koshy, 2015). Hence for dentists, along with MSDs the risk of obesity and diabetes also is alarming. In this study it was observed that most of the dentists were having bad posture while performing their professional work. To sum up dentist report a high prevalence of various types of work related musculoskeletal symptoms due to prolonged awkward postures at work. For adopting a stable, active sitting posture, from which movements can easily be carried out, the dentists should sit symmetrically upright, with the breastbone pushed slightly
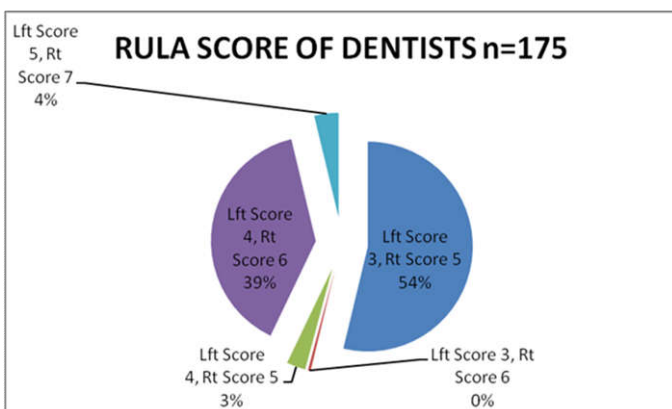
forwards and upwards and the abdominal muscles strained slightly. The shoulders are above the hip joints and the line of gravity runs through the lumbar vertebrae and pelvis in the direction of the seat. This posture facilitates good breathing.

Conclusion

Dental procedures should be carried out in the mouth of the patient whilst maintaining a healthy sitting posture. Adopting symmetrical upright posture without overloading the musculo-skeletal structures should be taught in dental schools itself. Adopting correct posture prevents the high percentage of musculo-skeletal complaints which are known to affect about 65 % of dentists and are also the cause of a high percentage of disability. In order to reduce spine problems, correct postural practices, relaxation interval sessions during work, and weight monitoring could be utilized.

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