COMPARISON OF METHODS RULA AND REBA FOR EVALUATION OF POSTURAL STRESS IN ODONTOLOGICAL SERVICES

Fernanda Diniz de Sá
Master. Production Engineering Master Program, Federal University of Paraiba (UFPB) - fedinizsa@yahoo.com.br

Maria Adelaide A. do Nascimento
Masters. Production Engineering Master Program, Federal University of Paraiba (UFPB) - adelaidefisio@yahoo.com.br

Ana Caroline Carvalho de Melo
Program in process. Production Engineering Master Program, Federal University of Paraiba (UFPB) - aninha_fisio@hotmail.com

Juliana da Costa Santos
Master. Production Engineering Master Program, Federal University of Paraiba (UFPB) - jullycs@hotmail.com

Paulo José Adissi
Teacher. Production Engineering Master Program, Federal University of Paraiba (UFPB) - adissi@producao.ct.ufpb.br

Abstract:
The objective of this article was to evaluate posture stress in Odontology students of the Federal University of Paraiba by means of RULA and REBA methods. The study was characterized as being descriptive, transversal. The research instruments had been two softwares of evaluation of work positions. The research was developed in the clinic of Odontology of the Federal University of Paraiba - UFPB. The individuals had been photographed in their activities. 39 positions had been analyzed. The analysis had been
treated by means of descriptive statistics using the program Excel 7.0. The results inform an average of points of positions of 5.5 for method RULA, having as indications inquiries and changes required soon. The REBA methods presented, as average of evaluation of the positions studied, 7.07 as point, that corresponds the necessity changes. The RULA method revealed more indicated, since it analyzes the superior extremity of the body, or either, that more required during the related activity.

**Keywords**: Postural Stress - Rula - Reba - Odontology

1 **Introduction**

The workers complaints about discomfort and pain, come, most of the time, from inadequate postures during work activities. Being a bio-mechanic nature factor, the skeletal-muscular lesions can be better understand after an analysis of the work postures. For that, the registers of postures' evaluation have been largely used.

The OWAS (Ovaco Working Analysing System) method, proposed by the Finishes Karu, Kansi e Kuorinka (1997), is based on the sample of activities done in constant or variable intervals, verifying the frequency and the time taken in each posture. Legs, arms, beck and postures demanding strength, and also the phase of the activity were considered. The methods OCRA, OREGE, Strain Index, ACGIH evaluate the superior members factors of risk. The ERGO-IBV method, developed by the Bio-mechanic Institute of Valencia, in Spain, evaluates the hand manipulation of loads, repetitive tasks and imposed postures. Some other registers are used, for example then ones from Colombini e Occhimpinti (1995); Malchaire (1998); Moore and Garg (1995); Rodgers (1989).

In ergonomics, when an analysis of postures has to be done, it is important to well define the criterions of the analysis demand. The election of the method that will better assist the analysis needs is defined by the demand's characteristics. A bad selection of a register can obtain results that don't reflect the physical work. (Guimarães *et al.* 2001).
In the present study two methods of postural evaluation were compared. The method REBA (*Rapid Entire Body Assessment*), proposed by Hignett e McAtanamey (2000) and the method RULA (*Rapid Upper Limb Assessment*), developed by McAtamney ad Corlett (1993). They promote a fast evaluation of body's constraint due to work activity.

The work situation used for this comparison was an odontological assistance service, developed by students of the Odontology course, at Federal University of Paraiba.

2 The activity of dental assistance

The work setting of a dental surgeon is composed of the dental chair and its commands, some other equipment and extra furniture. In this study's case, the community assistance Clinic is set with a flexible chair, hand and pedal commands, a bench and a small auxiliary shelf.

When the dental chairs imposed a seated fixed position from the client, the dental-surgeons' work was done exclusively in a standing position by the dental chair, being uncomfortable and harmful for the professional.

With the arrival of the chair that permits the client lay down, the work postures were able to change. Today, the dental-surgeon works, most of the time, in a sitting posture, that, when it is done in a correct way, reduces the fatigue, increases the balance and improve the stability (Saquy et al., 1996). In this posture, the column, when leaned on the chair, is straight and the feet are free to a better control of the pedals on the floor. However, besides these improvements, there are some postures adopted by the dental professionals that, in a period of time, can cause serious problem in vertebral column, in circulatory system and in articulations.

The high predominance of pain and discomfort in the back, neck and shoulders (Green and Brown, 1963 apud Langosky, 2001) have contributed to dental surgeon to adopt, at the end of the 60's, the sitting posture as its working posture. However, it was presumed that if the professional stopped working standing up, it would be smaller the overload on locomotive system. However, the painful symptoms are still being complaint (Rundcrantz, 1991 apud Langosky, 2001).
The working movements are classified after the demanding human-body effort. For a better work return, the dental-surgeon's movements should be limited to the finger, wrist and forearm movements, preferentially eliminating the rotations and inflections of the vertebral column (Saquy et al., 1996).

Studying the postural stress in dentists through the RULA method, Silva (2001) has found that none of the postures that had been analyzed is acceptable, that means, all postures have had final scores above 2. He has analyzed 4 assistance phases, having as a result the following scores: anesthesia, 6; isolation, 7; access, 4; canal preparation, 4.

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.

Zamata (2004), evaluating the system of worker's security and health administration in the dental assistance sector at UFPB, has found as ergonomics risks the maintenance of health harmful postures, the use of working tools for a long period of time, an ergonomic inadequate use of working tools and the absence of a brake during the work day. After Zamata, these factors leads to fatigue with probable muscular-skeletal lesions.

3 Materials and Methods

This study has been characterizes as descriptive, transversal and exploratory study. The research instruments were two softwares of working postures evaluation.

This research has been developed in the dental clinic of Federal University of Paraiba - UFPB, on March 25th, 2005. The selection of the population determined that everyone should be in dental assistance during practical classes. Before the beginning of the investigation, the students were informed about the research's objective and about the confidentiality of the data. Everybody has signed a free term accepting those prerogatives.
Pictures had been taken of the population during one period of assistance, while they developed their activities. The sample method was based on images taken every 30 seconds, being 118 pictures of activities. The posture that most happened during the activity were chosen to the analysis, making a total of 39 work postures. The data from the REBA and RULA analysis was treated by a descriptive statistics using Excel 7.0 program.

The REBA (Rapid Entire Body Assessment) method does a fast evaluation of the whole body. While, the RULA (Rapid Upper Limb Assessment) method makes a fast evaluation of upper body members constraints. Both methods, through a software, present postures categorizations, having as an analysis result scores that represents the work’s risks and indicate possible actions to avoid or minimize the risks (Tables 1 and 2).

<table>
<thead>
<tr>
<th>SCORE</th>
<th>RISK LEVEL</th>
<th>ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>none</td>
<td>Not necessary</td>
</tr>
<tr>
<td>2 to 3</td>
<td>low</td>
<td>Can be necessary</td>
</tr>
<tr>
<td>4 to 7</td>
<td>medium</td>
<td>It is necessary</td>
</tr>
<tr>
<td>8 to 10</td>
<td>high</td>
<td>It is necessary to be done fast</td>
</tr>
<tr>
<td>11 to 15</td>
<td>very high</td>
<td>It is urgent</td>
</tr>
</tbody>
</table>

4 Results

Gotten results reveal an average posture score of 5.5 for the RULA method, having as indications investigations and changes required in short term. The REBA method has presented as an average score of the analyzed postures 7.1, what corresponds to a medium risk needed changes.

Table 1 – REBA: Scores and indications.

<table>
<thead>
<tr>
<th>SCORE</th>
<th>RISK LEVEL</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<td>2 to 3</td>
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<tr>
<td>11 to 15</td>
<td>very high</td>
<td>It is urgent</td>
</tr>
</tbody>
</table>

Table 2: RULA: Scores and indications.

<table>
<thead>
<tr>
<th>SCORE</th>
<th>INDICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 and 2</td>
<td>Acceptable posture, since not done for long periods.</td>
</tr>
<tr>
<td>3 and 4</td>
<td>Deeper investigations are needed and changes can be required</td>
</tr>
<tr>
<td>5 and 6</td>
<td>Investigation and changes are soon required</td>
</tr>
<tr>
<td>7 or more</td>
<td>Investigations and changes are immediately required</td>
</tr>
</tbody>
</table>
Figures 1 and 2 represent the distribution of the scores frequency of the method RULA and REBA, respectively. The bigger frequency of postures (51.3%) was classified by the REBA method as being a medium risk (score 5-7) with an indication of a needed change. In this group, a predominance of postures involving the frontal/lateral inflection of the vertebral column, rotation of the trunk and cervical, and upper body members elevation was found. These postures were the same found in the categorization (fast change) of the highest frequency (53.9%) among the postures analyzed by the method RULA.
The methods present categorization levels with different scores scales. Besides that, the REBA method has 5 categorization levels of postures while the RULA method has only four. However it was possible to observe similarities in the indications maiden in both registers about the postures that have been analyzed. In table 4, to facilitates the results comparison, a standard categorization was maiden for both methods, after eliminating category 3 from the REBA method, dividing it equally between two neighbors categories.

<table>
<thead>
<tr>
<th>Category</th>
<th>RULA</th>
<th>REBA</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1 or 2</td>
<td>1</td>
<td>OK situation</td>
</tr>
<tr>
<td>B</td>
<td>3 or 4</td>
<td>2 to 5</td>
<td>Studies for a change</td>
</tr>
<tr>
<td>C</td>
<td>5 or 6</td>
<td>6 to 10</td>
<td>Actions for a change</td>
</tr>
<tr>
<td>D</td>
<td>7 or more</td>
<td>10 to 15</td>
<td>Urgent changes</td>
</tr>
</tbody>
</table>

Applying this standard categorization, the found results presented a high coincidence between the methods, in 77% of the postures. Inside the discordances (33%), the RULA method has predominate with a bigger rigor. As shown in picture 3, two postures, classified in B category (studies for a change) by the REBA method, were indicated as C (Action for a change), by the RULA method, and, six postures indicated as C by the REBA method, were indicated as D by the RULA method. Only in the case of A category (OK situation) the RULA method (one posture) had lesser rigor than the REBA (none posture).
5 Discussion

Agreeing with the studies of Vilagra (2003), our sample has presented an average score of postures analyzed by the RULA method of 5.5, with indications of fast changes. While the REBA method has presented an average score of 7.07 for the postures that have been analyzed, but the indications says only that the changes are necessary, without saying when.

Silva (2001) has found that none of the postures of the dental-surgeons analyzed by him was accepted. For this sample population, only one of the assumed postures during work activity was considered acceptable by the RULA method. Both registers used in this study present similar categorizations of indication (or action), but they have proposals of evaluations different in their focus. Like that, some divergences could be observed.

The RULA method has presented a better sensibility to detect fast and urgent action levels, knowing that during the analysis, using both methods, the RULA one has detected a bigger proportion of postures in these categories than the proportion detected by the REBA method (picture 4). It can be explained by the fact that the dentists work, during a bigger part of the time, using the top superior part of the body, exactly the evaluation focus of the method RULA.
Saquy et al. (1996), affirm that during the work activities of the dentists, rotation and inflections of the vertebral column should, preferentially, be eliminated. Between the sample's postures, these kind of movements, taken as harmful by both methods that have been used and classified by them as demanding urgent changes, had prevailed.

6 Conclusion

For an evaluation of the postures assumed by the dentists in their labor activity, the method RULA presented to be the most indicate method, taking that it analyses the top superior part of the body, that means, the most used part in this activity. Being an activity done most of the part sitting down, neither the RULA method nor the REBA one provide a possibility of analysis about this posture, acting as a limitation for this kind of evaluation, being characterized specially as a specific deficiency of the REBA method, once that it is used for analyzing the whole body.

References


