

RULA and REBA Assessments in Computer Laboratories

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Abstract- Sitting static while doing office tasks or typing tasks on personal computers is frequently found to be awkward. People, especially students do not aware of the importance of sitting with correct postures while doing their works on computers. For that reason, this study is done to identify the level of criticality of sitting with awkward postures for students in computer laboratories in School of Manufacturing, Universiti Malaysia Perlis (UniMAP). It is done using RULA and REBA methods and the scores reveal that there are some necessary actions may be needed to be implemented for further improvement.

Keywords: Ergonomics, RULA, REBA, Working posture, assessment, upper limb disorders.

I. INTRODUCTION

The incidence of musculoskeletal injuries associated with computer use is rising from time to time and in reality these injuries associated with computer use account for at least half of all reported work-related injuries [1]. Poor posture may be caused by habits from daily bodily process such as sitting in office chairs, looking at the computer or even sitting for long periods of time. Awkward posture can easily become second nature, causing or worsening episodes of back pain and damaging spinal structures. Fortunately, the most common factors involving posture and ergonomics are completely within one's ability to control and are not delicate to alter [2]

RULA (Rapid Upper Lim Assessment) and REBA (Rapid Entire Body Assessment) provide a quick analysis of demands on a person's musculoskeletal system when performing a specific task.

RULA is used if the person is sitting, standing still or in an otherwise sedentary position and mainly using the upper body and arms to work where REBA while for other task, REBA is generally used [3]. The development of REBA is aimed to[4]:

- i. Develop a postural analysis system sensitive to musculoskeletal risks in a variety of tasks.
- ii. Divide the body into segments to be coded individually, with reference to movement planes.
- iii. Provide a scoring system for muscle activity caused

by static, dynamic, rapid changing or unstable postures.

- iv. Reflect that coupling is important in the handling of loads but may not always be via the hands.
- v. Give an action level with an indication of urgency.
- vi. Require minimal equipment - pen and paper method.

II. PROBLEM STATEMENT

It has been widely understood that sitting with an awkward posture for quite a long period of time without short breaks may cause ergonomics issues. School of Manufacturing, Universiti Malaysia Perlis consists of three (3) computer laboratories that frequently be used by students to do academic tasks. It is required for students to sit and make use of personal computers (PC) more than 100 minutes per usage. Besides, the involvement of final year projects that needs the use of PC to run some experiments and simulations.

People usually fall absorbed on using PCs without realizing that there are so many ergonomics issues. Mostly they do not sit with proper postures, static and fail to remember to apply microbreaks. This issue led to the developing of this study.

III. STUDY METHODOLOGY

A camera is strongly suggested to be used in recording and analyzing human postures through RULA and REBA [5]. The assistance of photograph can help in giving a comfortable analysis for RULA and REBA scoring purposes. Therefore, in this study, pictures with 15 samples (refer Fig.1) out of each laboratory are taken randomly and analyzed using RULA and REBA technique.

Photograph is ideally taken directly from the side and back in order to avoid parallax error.



Fig. 1. Samples of postures taken from three difference computer laboratories at (a) Drawing Studio, (b) CAD/CAM laboratory and (c) CATIA studio.

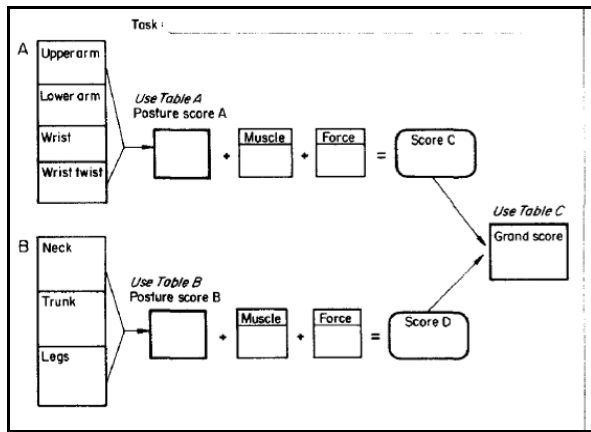


Fig. 2. RULA scoring sheet[6].

Fig. 2 shows the way of calculating the score for RULA. The grand score for RULA is classified as follows [6]:

- i. **Action level 1**
A score of 1 or 2 indicates that posture is acceptable if it is not maintained or repeated for long periods.
- ii. **Action level 2**
A score of 3 or 4 indicates that further investigation is needed and changes may be required.
- iii. **Action level 3**
A score of 5 or 6 indicates that investigation and changes are required soon.
- iv. **Action level 4**
A score of 7 indicates that investigation and changes are required immediately.

The higher action levels will not lead to clear actions to reduce or eliminate any risks to the operator. Since the human body is a complex and system, simple methods cannot deal in simple ways with postural and loading effects on their bodies. What the RULA system provides is a guide, and it was developed to identify boundaries around the more severe situations.

However, the combination of factors which influence the load but vary between operators, and factors which alter the individual's reaction to a particular load may contribute to rising the load from being within acceptable boundaries to being a serious problem for some people.

A standard REBA check sheet and its calculation follows the guidelines which the example is shown in Fig. 3 [6]. The more awkward posture taken from the subject, the higher value of scoring will be obtained.

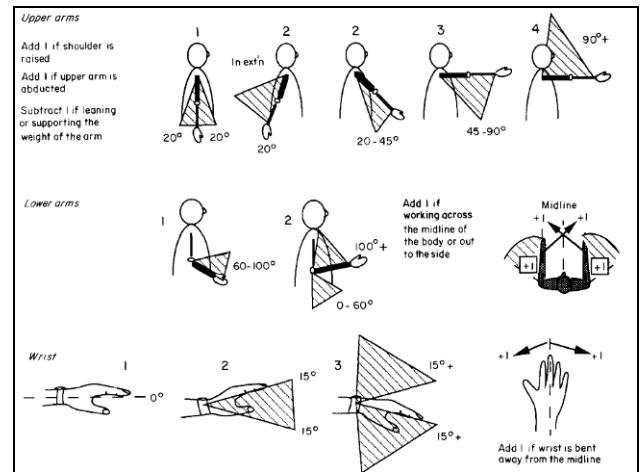


Fig. 3. Samples of posture scoring in RULA method [6].

Similar to RULA scoring methods, for postural analysis using REBA method, it is done using a standard REBA check sheet and its calculation follows the guidelines which the example is shown in Fig. 4 [4] and the scoring is shown in Fig. 5.

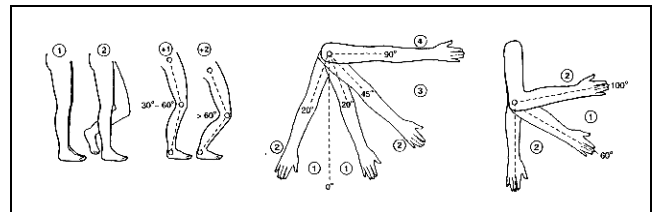


Fig. 4. Samples of posture scoring in REBA method [4].

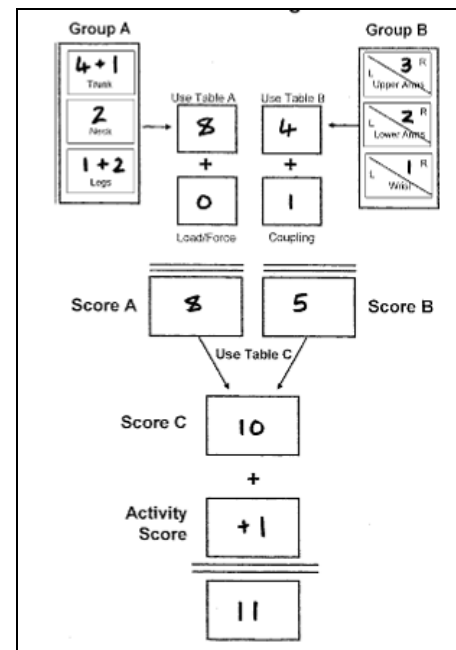


Fig. 5. Example of REBA scoring sheet[4].

TABLE 1
REBA ACTION LEVELS

Action Level	REBA score	Risk level	Action (Including further assessment)
0	1	Negligible	None necessary
1	2-3	Low	May be necessary
2	4-7	Medium	Necessary
3	8-10	High	Necessary soon
4	11-15	Very High	Necessary NOW

Table 1 shows the guidelines of necessary actions to be taken after the REBA scoring has been accomplished. This table indicates that if the value of score is very high, an urgent action must be taken as soon as possible in order to eliminate or at least minimize the risk measured.

IV. RULA AND REBA RESULTS

Table 2, 3 and 4 show the results of the assessments made by three (3) laboratories respectively.

TABLE 2
RULA AND REBA SCORES IN CATIA LABORATORY

	POSTURE NO.	RULA ASSESMENT SCORES	REBA ASSESMENT SCORES
	CATIA Laboratory	1	3
	2	3	4
	3	3	3
	4	3	3
	5	3	3
	6	3	3
	7	3	5
	8	3	4
	9	3	3
	10	3	3
	11	3	3
	12	3	3
	13	3	3
	14	3	4
	15	3	3

TABLE 3
RULA AND REBA SCORES IN DRAWING STUDIO

	POSTURE NO.	RULA ASSESMENT SCORES	REBA ASSESMENT SCORES
	DRAWING STUDIO	1	3
	2	3	4
	3	3	3
	4	3	4
	5	3	4
	6	3	3
	7	3	4
	8	3	3
	9	3	4
	10	3	3
	11	3	4
	12	4	4
	13	3	3
	14	3	3
	15	3	3

TABLE 4
RULA AND REBA SCORES IN CADCAM LABORATORY

	POSTURE NO.	RULA ASSESMENT SCORES	REBA ASSESMENT SCORES
	CADCAM Laboratory	1	3
	2	3	4
	3	3	2
	4	3	4
	5	4	6
	6	3	3
	7	3	3
	8	3	4
	9	3	4
	10	3	4
	11	3	3

	12	3	3
	13	3	3
	14	3	3
	15	3	3

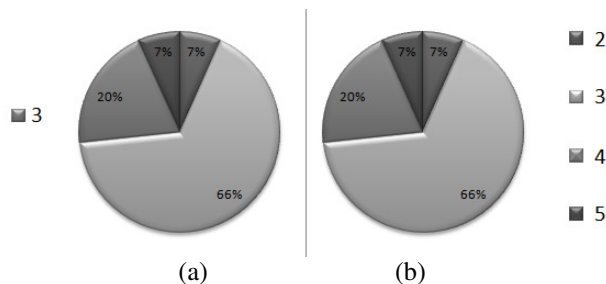


Fig. 2. Percentage for RULA (a) and REBA (b) score level in CATIA laboratory

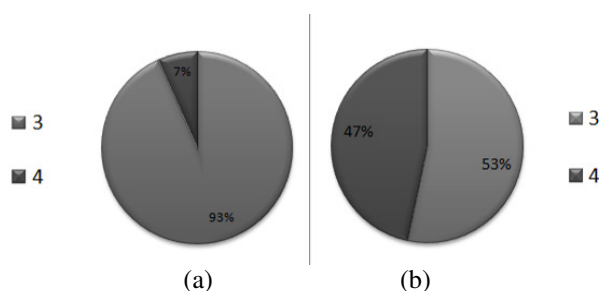


Fig. 3. Percentage for RULA (a) and REBA (b) score level in Drawing Studio

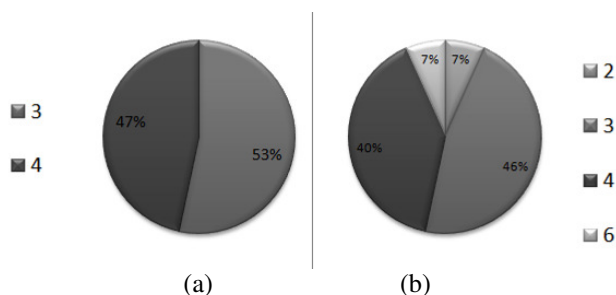


Fig. 4. Percentage for RULA (a) and REBA (b) score level in CADCAM laboratory

V. DISCUSSION

From the results obtained, the average score of using RULA assessment technique is 3.04 which is under action level 2. This average value still indicates that it needs to be reduced further in future and changes may be required to achieve it.

The average score for REBA is 3.42 which is a bit higher than RULA's score but still needs to be improved as according to the REBA guidelines. It can be seen that for all 6 pie charts constructed in Fig. 2, Fig. 3, and Fig. 4, all postures are mostly classified at level 3. Therefore, it is understood that most of students do not face a critical postural issue with regards to ergonomics.

Only a number of students in the lab were identified having problems with their posture while sitting and this is mainly due to some special reasons such as to find space to look at the notes at the white board, to discuss with the colleague next to them and some of them were identified to have this poor sitting posture due to their normal habits.

VI. CONCLUSION

Even though most of students do not face a critical postural issue with regards to ergonomics using RULA and REBA technique, it should be prominent that this result can be used as guidance to the risks related with postural or work-related musculoskeletal injuries and there is no alternative ways for some understanding of occupational ergonomics if decisions are to be made on the basis of the information, when redesigning operations.

The applications of RULA will give a priority order for jobs (in this case, postural issues in computer laboratories) which should be investigated, while the magnitude of the individual posture scores indicate which aspects of the postures are likely to be those where trouble will be expected.

Further substantiation still needs to be carried out in order to validate the accuracy of the scores in RULA and REBA. It is possible to carry out this validation, in cross reference with other tools such as OWAS and NIOSH or through empirical measurement in a laboratory setting in order to support the results obtain in this study.

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