
POSTURE ANALYSIS WITH REBA AND RULA METHODS AT PT. PAGILARAN BATANG CENTRAL JAVA

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Abstract

One of the levels of worker productivity is influenced by work posture. Work posture is an important aspect that needs to be considered in the industrial world, especially in the production process activities. Movement errors that are carried out repeatedly over a long period of time will cause fatigue of musculoskeletal disorders (loading errors on muscles and skeleton) and this can reduce the performance of workers in doing their work. So it is necessary to analyze the work posture of workers or employees using the REBA (Rapid Entire Body Assessment) and RULA (Rapid Upper Limb Assessment) methods which are work posture research methods to investigate disorders of the limbs. Based on the results of data processing using the REBA method, it can be concluded that the work posture in the wet sorting sector has a score of 9. This work posture really needs to be improved and will cause a high impact / risk if it continues. In the results of data processing using the RULA method, the work posture of the milling station workers has a final score of 7. This means that the work posture needs to be improved. The work posture at the two stations to be improved immediately in order to minimize the fatality that occurs in the worker's body posture.

Keyword: REBA; RULA; Work posture

Introduction

This research was conducted at PT. Pagilaran to operators in the Production section. In general, this department carries out the production process manually from the withering process of raw materials to the packaging / packing process. Operators observed are operators who work at each work station in the black tea production process. Unnatural working attitude conditions for workers, namely doing standing activities at cutting and milling stations, wet sorting (oxidation), drying, dry sorting, packing for a long period of time and carrying out activities repeatedly with the facilities used not ergonomic. In addition, the average production worker has a relatively old age, making these workers have a high potential for injury.

In this case, an analysis of the work posture of the workforce or employees will be carried out using the REBA (*Rapid Entire Body Assessment*) and RULA (*Rapid Upper Limb Assessment*) methods, so that how the work posture of the workers in the wet sorting and drying workstation section of the black tea production of PT. Pagilaran using the REBA and RULA methods.

Literature review

Rapid Entire Body Assessment (REBA) is a method developed in the field of ergonomics and can be used to quickly assess an operator's work position or posture of the neck, back, arms, wrists and feet. In addition, this method is also influenced by the coupling factor, external loads that are supported by the body and the activities of the workers. Assessment using REBA does not take long to complete and do a general scoring on a list of activities that indicates the need to reduce the risk caused by the operator's work posture. Whereas RULA (Rapid Upper Limb Assessment) is a method developed in the ergonomics field that investigates and assesses the work position performed by the upper body. This equipment does not require special tools to provide a measurement of the posture of the neck, back and upper body, in line with muscle function and external loads supported by the body.

Besides the above, in this section, several similar previous studies are presented for comparison with this research. Research comparison is seen based on the objectives, methods, and results of the research. There are the results of several previous studies:

Table 1. Literature Review

No	Researcher	Method	Case Study	Result
1	Dzikrillah, N (2015)	<i>RULA (Rapi Upper Limb Assessment)</i>		The method of body work posture analysis used is the <i>Rapi Upper Limb Assessment</i> , in this study using a valid matrix, the measurement results show the number 2 which means a low level of risk, it may need to be corrected.
2	Kun Istighfaniar and Mulyono (2016)	REBA and RULA	Regional Hospital of Madiun City	In the pharmacy installation workers at the Madiun City Hospital, it was found that the majority of workers had problems with their work posture. Musculoskeletal complaints that most often occur in the pharmacy installation workers at the Madiun City Hospital are at the waist.
3	Fahmi Sulaiman & Yossi Purnama Sari	REBA Methods	Agate Validation Process Workers	From the results of the analysis of REBA calculations, it is necessary to propose to improve the work attitude of agate grinding workers. This needs to be done in order to provide ergonomic improvements for the work posture of the agate grinding process workers
4	Titin Isna Oesman , Era Irawan , Petrus Wisnubroto (2019)	RULA	PT Mandiri Jogja Internasional	By using the RULA measurement method, a score of 7 is obtained which is in the very high category so that it needs to be repaired as soon as possible
5	Mochamad Imron. (2019)	Rapid Upper Limb Assessment (RULA), Rapid Entire Body Assessment (REBA) Dan Ovako Working Posture Analisis (OWAS)	KCP PT. Steelindo Wahana Perkasa laboratory	Based on the analysis of the 3 methods used, namely the RULA method, REBA, and OWAS, it can be concluded that based on the results of the analysis using the method RULA for work posture for KCP PT. Steelindo Wahana Perkasa laboratory employees got a score of 6 namely the moderate risk category, while based on using the REBA method the results were obtained score 7 is the action category 2, which is moderate risk, while the analysis of the

				OWAS method results score 1 with the category not too risky / moderate risk.
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Methods

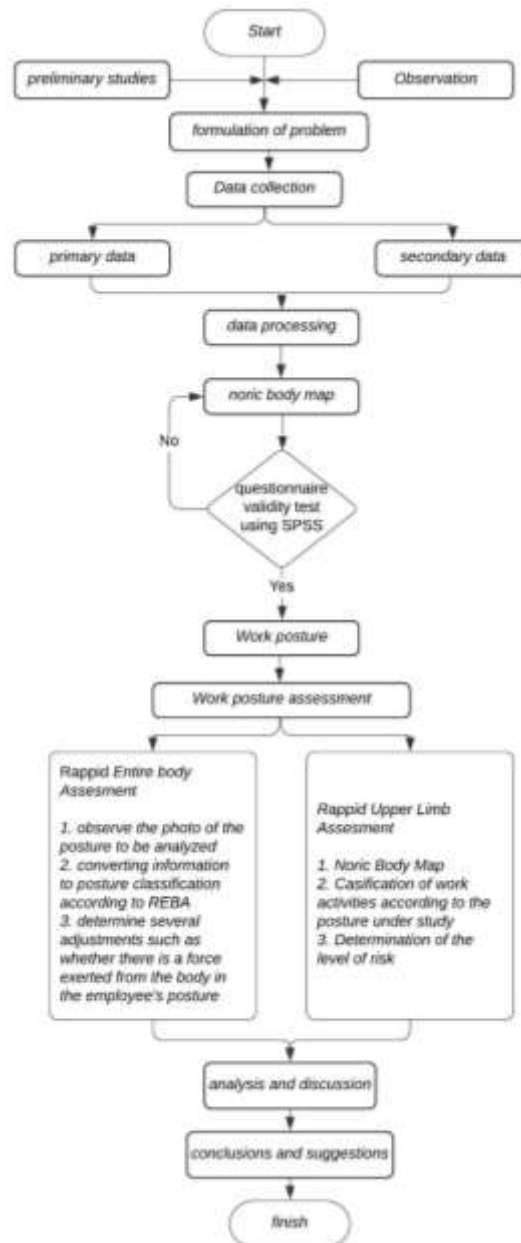


Figure 1. Research flowchart

Result and discussion

Based on the data that has been obtained, data processing is carried out using REBA or RULA. The calculation using the REBA method is used to analyze the posture data of the workers at the wet sorting and drying

stations. Meanwhile, the milling and packing stations are processed using the RULA method. The following is the processing of work posture at each bag production workstation using the REBA or RULA method:

1. Wet Sorting Workstation

Table 2. REBA Dimension Angle Worker Posture Wet sorting station

Group	Dimensions	Angle (°)
A	Neck	0
	Back	42
	Knee Leg	66
	Load	-
B	Upper arm	60
	Forearm	0
	Wrist	0

Based on table 2. It can be seen that the body posture of the wet sorting workers obtained the angle for group A, namely the neck of 0°, back of 42°, knee of 66°, and the load used was 5 kg or 1. Whereas in group B the angle of the upper arm was 60°, the arm down by 0° and wrist by 0°.



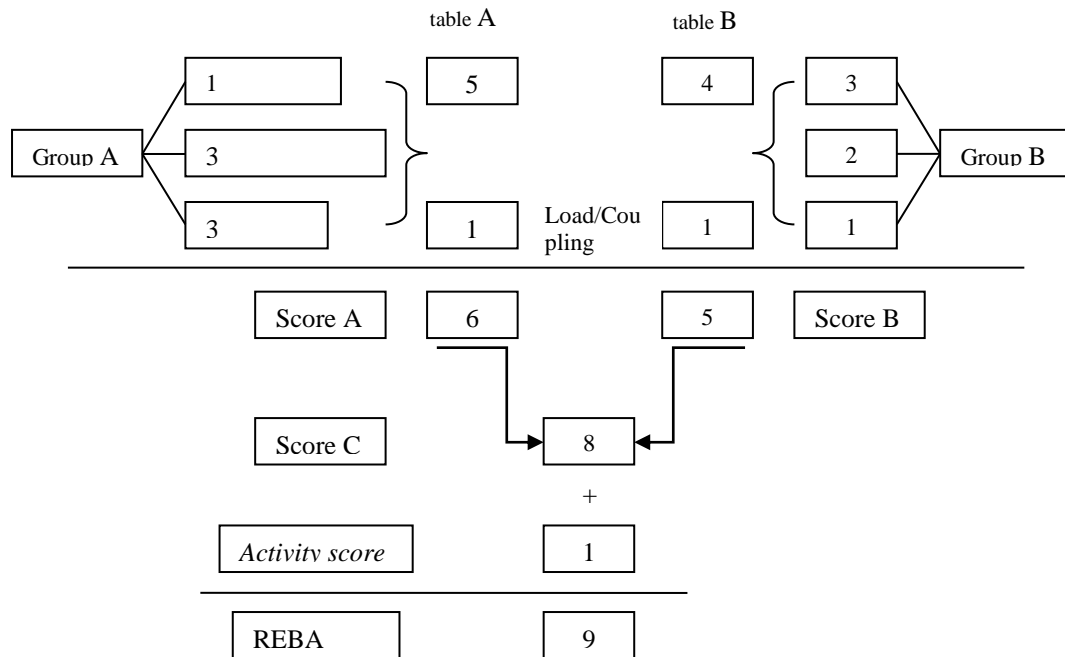
Figure 2. Analysis of the REBA Method with Autocad

Table 3. REBA Score Wet Sort Station Worker Posture

Group	Dimension	Angel	Score	Table A	Score A	Score C	REBA Score
A	neck	0°	1	5	6	8	9
	Back	42°	3				
	Position of the legs load	66°	3				
				1			
Group	Dimension	Angel	Score	Table B	Score B		
B	Upper Arm	60°	3	4	5		

Forearm	0°	2				
Wrist	0°	1				
Coupling			1			
Activity score					1	

Calculations on the Wet Sorting Station Using the REBA Method as bellow:



Based on the A score and the B score, it can be seen that the value of the C score is 8. To get the REBA score, by adding up the C score which is 3 with an activity score of 1, the result is a score of 9.

2. Milling Work Station

Table 4. RULA Dimensional Angle of Milling Station Worker Posture

Group	Dimension	Angle (°)
A	Upper Arm	49
	Forearm	19
	Wrist	0
B	Round	-
	Neck	46
	Back	66
	Feet	-

Based on table 4.3. It can be seen that the body posture of the milling workers obtained angles for group A, namely the upper arm of 49°, the forearm of 19° and the wrist of 0°. While in group B the angle of the neck was 46° and the back was 66°.



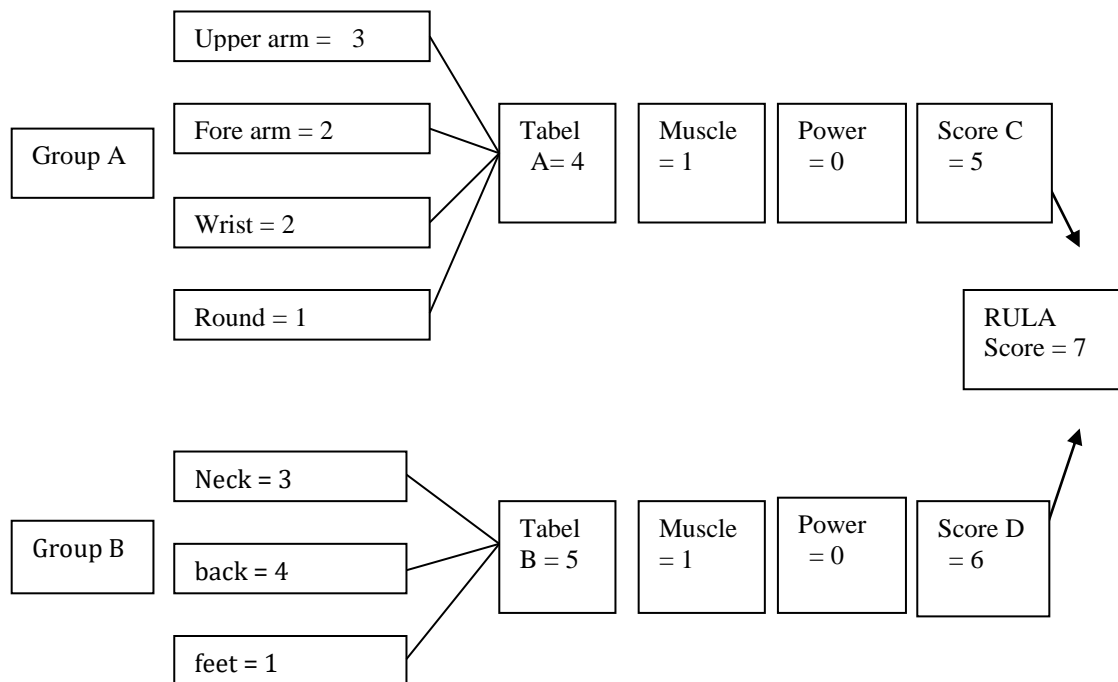
Figure 3. Analysis of the RULA Method with Autocad

Table 5. RULA Score Milling Station Worker Posture

Group	Dimension	Angle	Score	Table A	Score C	RULA score	
A	Upper arm	49°	3	4	5	7	
	Forearm	19°	2				
	Wrist	0°	2				
	Round		1				
	Muscle						1
	Power						0
Group	Dimension	Angle	Score	Table B	Score D		
B	Corner of neck	46°	3	5	6	7	
	Back corner	66°	4				
	Feet (supported)	-	1				
	Muscle						1
	Power						0

Based on the C and D scores that have been obtained, the RULA value is obtained. For the C score in group A, it is 5 and the D score in group B is 6. By looking at the grand score table based on the C and D scores, it can be obtained that the RULA is 7.

Calculations at the Milling Station Using the RULA Method



Based on the results of data processing, it can be seen the final score of each tea production process. The following is a table of risk levels for each work station

Table 6. Ergonomic Risk Level with the REBA Method

No	Worker Work Posture	REBA score	Action Level	Risk Level	Corrective action
1	Wet Sorting Station Workers	9	4	High	Need Immediately
2	Drying Station Workers	6	3	Medium	Need

As for the analysis of the final RULA score in terms of the level of ergonomic risk from the adjustment stage to the end of the bag production process, it can be seen in table 7.

Table 7. Ergonomic Risk Level with the RULA Method

No	Worker Work Posture	RULA score	Action Level	Risk Level	Corrective action
1	Milling Station Workers	7	4	Medium	Need
2	Packing Station Workers	5	2	Low	Maybe Need

Conclusion

Based on the results of the analysis and discussion, the following conclusions is:

1. Based on the results of data processing using the REBA method, it can be concluded that the work posture in the wet sorting sector has a score of 9. This work posture really needs to be improved and will cause a high impact / risk if it continues. In addition, the working posture of drying station workers has a REBA score of 6. It can be concluded that the work posture at the station may require corrective action to prevent fatigue and injury to the worker's body.
2. In the results of data processing using the RULA method, namely the work posture of the milling station workers has a final score of 7. This means that the work posture needs to be improved. Meanwhile, work posture at the packaging / packing station has a RULA score of 5. The work posture at the two stations needs immediate improvement in order to minimize the fatality that occurs in the worker's body posture.

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