THE WORK POSTURE ANALYSIS OF PACKAGING WORKERS AT PT. X USING THE REBA METHOD

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ABSTRACT
PT. X reduced the drug packaging operators due to the Covid-19 pandemic. As a result, the workload they got was heavier than usual, the work posture which not following to the standards, and caused excessive fatigue for these operators. The results of systematic scientific research of Global Burden of Disease (GBD) states that one of the mains causes of lost life due to a disability (Years Lived with Disability) in Indonesia had caused by MSDs (Musculoskeletal Disorders). The purpose of this research was to analyze the work posture of PT. X’s drug packaging operators so that they can anticipate muscle injury problems if the operator continues to apply for an ineffective work posture. The REBA (Rapid Entire Body Assessment) method being used to find out postural disturbances that occurred. The research was conducted by interviewing, recording, and taking photos at the drug packaging operator Line 1 at PT. X must be analyzed so that a suitable fixing or solution can be applied. And the results obtained through REBA analysis get a final value of 4, which means they got the medium level of risk activities category in Line 1 PT. X requires further research and recommending a right manual handling way to improve the operator's work posture.

Keywords: Work Posture, Ergonomics, REBA Method

I. INTRODUCTION

Industry performers surely expected that the production runs according to their targets, so both machines and human labor must work constantly. The machines are may be able to work continuously, but it is different from humans who can be exhausted if they work for a long time. So the use of human labor must be accompanied by methods and work situations that support their health, for example, an ideal body posture at work to anticipate work injuries or accidents.

Research data conducted by the ILO (International Labor Organization) 2003 found that every day about 6,000 people died, most likely one person in every 15 seconds, or 2.2 million people per year due to work-related accidents or work-related sicknesses. Meanwhile, the highest budget for work-related accidents and sickness was MSDs (Musculoskeletal Disorders) is about 40%, heart disease is about 16% accidents, and respiratory diseases are about 19%. From 27 countries monitored by the ILO, Indonesia ranks 26th in work-related cases accidents and work-related sicknesses. (Ayunda, 2020)

The Covid 19 pandemic currently happening has an extreme effect, especially in the industrial sector. At present, we encounter many industries that have gone bankrupt, or their sales cannot reach the target due to reduced interest and purchasing power of the community, so the industries had forced to reduce their workers. And this also happened to PT. X, which is reducing drug packaging operators due to this pandemic. Naturally, this reduction in operators will affect the productivity of the packaging output in the company in contradiction of their expected management target shown in Figure 1.
The data had shown in Figure 1. that Line 1 PT. X drug packaging target is 220 boxes/day, and PT. X was trying to re-observed the productivity of the packaging process for one month during the pandemic. They want to find out whether the packaging process is according to the standard and their target, and it turns from thirty working days that ten working days are not effective because they cannot reach the company's target. So they reduced the workers of the drug packaging up to 20 peoples.

The reduction in workers caused their workload to increase due to the decreasing number of their colleagues. Their workloads that heavier than usual, and the work posture is not following standard cause excessive fatigue in these operators. The systematic scientific research result of Global Burden of Disease (GBD) states that one of the leading causes of lost life is a disability (Years Lived with Disability) in Indonesia due to MSDs. The main risk factors for children under five years of age and adults around 15-49 years (productive age) are due to work-related risks. In 2010 Indonesia was ranked 6th in incidence's case of Low Back Pain and 7th in Neck Pain as a disorder of the movement system MSDs (GDB, 2010; Antoni et al., 2020; Kithatu et al., 2020; Ozdemir, 2020).

The purpose of this research was to analyze the work posture of Line 1 PT.X drug packaging operators so they can anticipate muscle injury problems or MSDs sickness if the operator continues their inappropriate work position. And this research is going to identify the effect of the work posture of drug packaging operators in Line 1 PT. X, through the data analysis method. This research will have the REBA (Rapid Entire Body Assessment) method. The REBA method is used in this research because this method can quickly analyze the functional and postural loads of all parts of the body while working. This method allows the determination of the risks associated with complaints and disorders of the musculoskeletal system, which caused by the body position adopted during work, range of motion, strength, external load, muscle dynamics, and grip type and variability in body position (Górska, 2007, 2010; Kong, Y. -K., Lee, S. -Y., Lee, K. -S., Kim, 2018). And this is going to be analyzed to get the right solution to minimize injuries to workers by improvising proper lifting methods that will be applying through the training.

II. LITERATURE REVIEW

Ergonomics

Ergonomics aims to improve workspaces and environments to minimize the risk of injury or harm. As technology changes, so do the need to ensure that the tools we access to work, rest, and play are design for our bodies’ needs. Ergonomics aims to create safe, comfortable, and productive workspaces by bringing human capabilities and limitations into the workspace design, including the individual’s body size, strength, skills, speed, sensory abilities (sight, hearing), and attitudes. (Dohrmann, 2014)

Work Posture

Work posture is physical activity at work by relying on several positions to carry out work activities. The working posture is involved with muscle force, and if it is not correct and inappropriate, it will result in physical fatigue and the emergence of problems in muscle health called MSDs. It will affect the worker's productivity and make their production's output decreasing, which bring harm to the workers' health. The existence of ergonomics research will help to formulate a working concept or a repair system to overcome the problems that arise from the ineffective work posture that has been running. The work Posture had influenced by the following things can be seen in Figure 2:
Figure 2. The Postural Triangle, Factors That Affect Work Posture (Bridger, 2003)

The following is an explanation of the aspects that affect work posture as shown in Figure 2:

a) Personal Factors: As age, anthropometry, body weight, fitness, joint movement, musculoskeletal disorders, vision, hand reach, obesity, and injury/surgery experience before.

b) Task requirements, Such as visual needs, the need for manual work (position, force/force), shift changes, rest periods, static/dynamic work.

c) Workspace design: seating dimensions, work surface dimensions, seating design, workspace dimensions, privacy, lighting levels, and quality. (Bridger, 2003)

The risk factor of work posture is a problem where the discomfort in muscle health or MSDs experience by the workers. And if this continuously being ignored for a long time, it can increase damage to the worker's body. A person who works in an inappropriate position or posture must use more force than someone who uses a standard working posture, which will affect the loading of the compressive muscles on the intervertebral discs.

REBA method

REBA (Rapid Entire Body Assessment) is a method for analyzing work posture. The REBA method is a rapid method for assessing the functional and postural load of the whole body during work. In this method, it possible to determine the risks associated with complaints and musculoskeletal system disorders that occurred, which had caused by the body position adopted during work, range of motion, strength, external load, muscle dynamics, grip types, and variability in body position. This method is related to ergonomics studies can be analyzed quickly to assess ineffective work postures such as overcoming posture for the neck, back, arms, wrists, and feet for a worker.

In addition, this method can also be used as a company standard if there are working conditions related to work posture where the activities of the job position are not following the standards. These are the steps for determining REBA scoring (Hignett, S., McAtamney, 2000b):

a) Group A diagram is the scoring result for the neck position and feet.

b) Table C of Group A is the result of group A + with F or load score.

c) Group B diagram is a scoring location on the upper arm, forearms, and wrists.

d) Table C of Group B is the result of Group B + Couple score position.

e) The total Reba score's based on the result of the Total C Score + Activity Score.

III. RESEARCH METHODS

In this research, the method used is descriptive research with a cross-sectional, which selected ten operators of drug packaging Line 1, at PT. X to become respondents. This research has proposed an improvement or solution in implementing the REBA method to minimize the risk of MSDs in the final process drug packaging operators of Line 1 at PT.X. The variables analyzed are their target of drug packaging per day and complaints related to posture during work. These variables will observe visually, then will be assessed according to the REBA method. The comparison graph refers to the actual output results in the drug packaging process carried out during the one-month observation period. The data collection process was carried out by interviewing, recording, and taking photos at the drug packaging operator Line 1 at PT. X.
Diagram 1 shows interviews result with ten correspondents for drug packaging operators on Line 1 at PT. X with their physical complaints. Most of the physical complaints they experience are back pain, with an average working hour of 8 hours/day and 30 minutes of rest, where the target packaging per Line is 220 boxes/day. And the interview's result data is in diagram 1 below:

![Diagram 1. The results of the interview data of Line 1 drug packaging operators PT. X](image)

Diagram 1. The results of the interview data of Line 1 drug packaging operators PT. X

Figure 3 shows the stepwise methodology used to determine the REBA score. The non-standard posture will decide by the posture's scores of neck, trunk, and legs. And it will produce a correspondent score of A. A similar process is to identify the ineffective posture based on the observation of the upper arm, lower arm, and twist postures will produce B's score. Score A and B will affect the final score (Score C) on the REBA method. So the identification of the result will determine the problem-solving in this method.

![Figure 3. A systematic methodology using the REBA method](image)
IV. RESULT AND DISCUSSION

The work attitudes documentation of operators on Line 1 at PT. X in packaging activities by taking pictures when the operator carries out the final packaging process. It is shown in Table 1 that the operator carrying out the lifting of the master box from the bottom to the top of the pallet will be done continuously in the neck, trunk, and legs posture, which is going to be analyzed. When they are move from the bottom to the top in the range of 10-20°, with a back movement around 90°, caused their neck position will flex. The legs' position from lifting to lowering the master box is stable and straight.

Table 1. REBA Group A Analysis

<table>
<thead>
<tr>
<th>No.</th>
<th>Position Image</th>
<th>Activities</th>
<th>Observation result</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>Lifting the Master Box from the bottom to the top of the plastic pallet</td>
<td>The position of the neck is flex around 10-20°</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Lifting the Master Box from the bottom to the top of the plastic pallet</td>
<td>The position of the back is flex around 90°</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Lifting the Master Box from the bottom to the top of the plastic pallet</td>
<td>The position of the worker's feet is stable when lifting the master box straight and parallel</td>
<td>1</td>
</tr>
</tbody>
</table>
In Table 2, an analysis of the operators who carry out the lifting of the master box from the bottom to the top of the pallet repeatedly, when lifting the master box, the conditions of the right and left arm movements are symmetrical, the position of the shoulders and upper arms are around 90° with the back posture that raised. When the operator lifts and stores the master box, the elbow position is around 60°. And when doing the movement from lifting to keeping the operator's wrist straight and parallel to the master box.

Table 2. REBA Group B Analysis

<table>
<thead>
<tr>
<th>No.</th>
<th>Position Image</th>
<th>Activities</th>
<th>Observation result</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td><img src="image1.png" alt="Image" /></td>
<td>Lifting the Master Box from the bottom to the top of the plastic pallet</td>
<td>The position of the shoulders and upper arms is around 90°, and the back raised</td>
<td>4</td>
</tr>
<tr>
<td>2.</td>
<td><img src="image2.png" alt="Image" /></td>
<td>Lifting the Master Box from the bottom to the top of the plastic pallet</td>
<td>The position of the elbow is around 60°</td>
<td>1</td>
</tr>
<tr>
<td>3.</td>
<td><img src="image3.png" alt="Image" /></td>
<td>Lifting the Master Box from the bottom to the top of the plastic pallet</td>
<td>The position of the workers' wrists when lifting the master box straight and parallel</td>
<td>1</td>
</tr>
</tbody>
</table>

REBA scoring on operators who are doing the drug packaging into the master box and stacked on pallets, their posture have been analyzed while working during the process of moving goods at PT.X. Based on the results of the research will be explained in Figure 4:
The final result for all positions is 4, so the risk is at a medium level, so the solution is doing further research and recommending how to lift the correct weight in manual handling. (Hignett, S., McAtamney, 2000b). Based on the hazard control hierarchy (OHSAS 18001). Several control groups must form to eliminate or reduce hazards, including:

1. Elimination
2. Substitution
3. Engineering / Design Control
4. Administrative Control
5. Personal protective equipment.

From the process that occurred in Packaging Line 1 PT. X, the control can be done by administrative control by recommending how to lift the load by making a safe procedure system as a solution to this research, shown in Figure 5:

The REBA scoring recalculation after doing the administrative control by recommending how to do the ideal definition of manual handling, shown in Figure 6.
After reassessing the suitable body posture for the right way of manual handling, a new, better score obtained is 1. Then the results that work which carried is safe, so there is no need for further action. And based on the observation, the ideal conditions in manual handling are defined as:

1. Stand symmetrical, straight, and upright.
2. An upright with a body does not rotate.
3. The horizontal distance between the load and the floor when lifting is less than 25 cm.
4. Hold the hand on the object relaxed and straight (neutral wrist posture).
5. Comfortable environmental conditions.

V. CONCLUSION

From the results obtained through the REBA analysis in this research, a final score is 4, which means the score is in the medium level category, so the risk of activities in Line 1 PT.X must be carried out on further research and recommending how to do the correct way of manual handling. So it is necessary to hold regular reassessment and training by responsible stakeholders in the area to ensure the safety and hygienic conditions in every workplace. One of the methods designed and used by the OSH department is the risk value of the REBA method that comprehensively covers the musculoskeletal system of all workers for this purpose. And also, the company stakeholders must conduct further research related to physical and ergonomic conditions, like training on manual handling methods according to standards in the workplace to minimize the risk of injury or health problems of the operators. In addition, provide regular refreshment of the dangers MSDs glitches are needed.

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