

Farmer's Work Posture Analysis of Affected Musculoskeletal Disorders

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Abstract. Indonesia has an area of 8.1 million hectares of agricultural land. The extent of rice fields in Indonesia, will give an impact on the manpower increase in this field. However, this is not fully supported by the central and regional governments in a logistic way. The tools used by farmers are still classified as traditional, by utilizing their old equipment. The use of Traditional tools accompanied by natural posture, can cause minor injuries to severe injury. Aims of this research is to find the REBA and RULA score based on the farmers work posture while it could reduce musculoskeletal disorders. REBA and RULA method were used to obtain the work posture score. Nordic body map questionnaire also used to obtain pain disorders of the user. In this research, by using REBA and RULA method, obtain result that most farmer are in highly risk based on their work posture. It can be seen by the REBA score which are higher than 4, and RULA score which are 7.

Introduction

Indonesia is an agrarian country, where most of Indonesian people work as farmers. Both farmers in paddy fields or on plantation land. Based on data from the minister of agriculture, the area of rice fields in Indonesia reached 8.1 million hectares [1]. This is supported by increasing land area in remote areas such as Kalimantan and Papua which have potential as new rice fields that can be developed. The extent of land under the existing land in Indonesia will have an impact on the increase of manpower in the field. BPS (Central Bureau of Statistics) states that the absorption of labor in the agricultural sector is greater than other sectors. As many as 34.4 percent of the 38.07 million Indonesians absorption of labor occurred in the rice field [1].

The total area of rice fields in Java which reached 42.49 percent of the total area of rice fields in Indonesia. Central Java, particularly Delanggu has a high potential for the risk of musculoskeletal injury to farmers. It is increasingly supported by the way that the work is still relatively traditional. With both of these reasons, farmers in Central Java area have the potential to experience fatigue or work accident due to work. Attention to injuries to farmers' bodies is not yet an extra concern for local authorities. The main problem that often happens is a muscle complaint due to work position bent too long.

Farmers are an important asset for Indonesia. In addition to providing jobs for the people in general, but also to suppress the import of rice in particular. Unfortunately, this is not fully supported by adequate tools from central government and the local government. Often encountered farmers working conditions that are not in accordance with existing ergonomic rules. Uncomfortable working conditions can lead to losses and even accidents for farmers. In general, humans who work with manual equipment or manually, are required to work safely so as not to cause injury to the body. Based on NRC [2] Accumulation of minor injuries resulting from long-term overwork and repeated exposure may be considered a major cause of Musculoskeletal Disorder (MSDs). MSDs disorders are

one of the most serious consequences associated with musculoskeletal workload [3][4][5][6][7]. This is not separated from the general health condition of farmers. Poor work postures, such as standing for long periods of time, squatting, bending, lifting and hauling can cause discomfort when repeated over a long period of time. Matters affecting general health other than age and gender are the burden and personal nature of the worker [8][9][10].

Posture analysis is needed to minimize potential muscle injury to MSDs. The research was conducted by REBA method, Rapid Entire Body Assessment [11] and RULA, Rapid Upper Limb Assessment [12]. This method is a method developed in ergonomics and can be used to assess posture. The results obtained in this assessment can be found out the level of risk and the need for corrective action for farmers.

Method

Subject and Object. This research is conducted in Sidowayah village. Where this is one of the paddy field area in Central Java. Subject in this research are farmers in this area, who met the following criteria: (1) male or female; (2) healthy; (3) BMI standard; (4) age 25 – 35 years. This research is held for 50 farmers. This research is conducted in cropping season and farmer picture were taken in cropping posture using traditional tool called *sabit*.

Research Instrument. Instrument used were the following: (1) Nordic Body Map questionnaire to measure musculoskeletal disorders; (2) REBA worksheet; (3) RULA worksheet; (4) NIKON D5000 for documentation. At this stage, Nordic Body Map questionnaires were prepared, as well as REBA and RULA worksheet to measure of farmer working posture.

Nordic Body Map (NBM) questionnaire is a subjective measurement tools like questionnaire used to determine the parts of muscle experiencing symptoms ranging from discomfort (mildly ill) to very sick [13]. This questionnaire using the image of the human body which is divided into 9 main body part that is the neck, shoulders, upper back, elbows, wrist, lowerback, hips, knees and ankles. From 9 body parts then breakdown into 28 parts of the body.

Rapid Entire Body Assessment (REBA) method can be used to quickly assess the posture of a worker and this method is also influenced by coupling, external load supported by the body and the activity of workers [11].

Table 1. Action Level of REBA Method

Action Level	REBA Score	Risk Level	Corrective Action
0	1	Can be ignored	Do not need
1	2-3	Low	Probably need
2	4-7	Medium	Need
3	8-10	High	Soon
4	11-15	Very High	Highly soon

The risk level can be known by the REBA value obtained from the previous calculation results. Based on the classification of the table above, it can be seen the level of risk that occurs and whether or not the actions needed to be carried out for repairs. Possible work improvement include redesigning work equipment based on ergonomic principles.

Rapid Upper Limb Assessment (RULA) is a method developed in the field of ergonomic investigating and assessing the work done by the position of the upper body. This method uses diagrams of body postures and three assessment tables (tables A, B, and C) are provided for evaluating the hazardous working posture in the work cycle. Through this method will get the maximum limit value and the various postures of workers, the limit values ranging between grades 1-7. Grand score then interpreted to the classification risk level table and action list as follows :

Table 2. RULA risk levels

Score	Risk Level and Action List
1-2	Risk is ignored, no need for handling
3-4	Low risk, change is needed
5-6	Medium risk, further handling, needs immediate change
6+	Very risky, make changes now

Result and Discussion



Fig. 1. Sample on REBA sheet



Fig. 2. Sample on RULA sheet

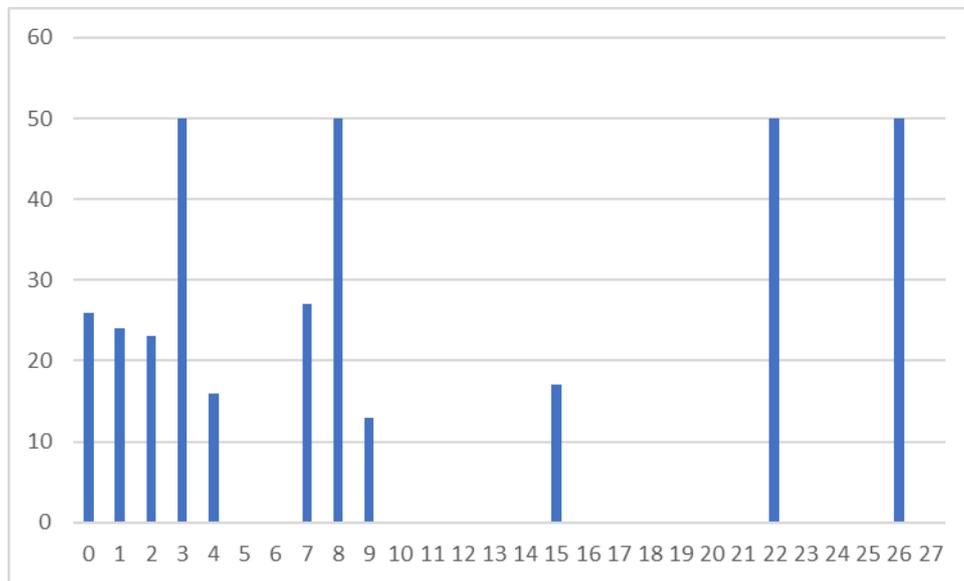


Fig. 3. Nordic Body Map Questionnaire result

Figure 1 show that worker has quite bad posture, it can be seen by the REBA score. REBA worksheet prove that worker or farmer obtain 7 score for REBA. Which means that worker need corrective active soon. This posture could affect her hip and trunk. Based on Hanklang [14] musculoskeletal disorder symptoms are affected woman workers it supported by prolonged working hours and awkward posture during work. It can be concluded that the worker has high risk level and needs to take immediate action. Figure 2 showed the other work posture measurement using RULA of field worker. It showed that those worker is bending too much. Thus, posture obtain 7 score for RULA. Abd Rahman, et al [15] explained that harvesting works are done manually by human power, without any conventional tools. This could be the main factor of musculoskeletal disorders among harvest

workers. Highest possibility of disorders which could attack farmer is neck and low back pain. As seen in the figure above, bad worker posture which do in high frequency could affect low back pain and also give more pressure to the worker leg. At the graphic figure, highest disorder are held for 3 as right shoulder, 8 as hip, 22 as left calfs, and 26 as left leg. Most farmer are complained at this body parts. This is because of the bending posture during work.

Pain and discomfortness in the neck often occur at work. Especially in jobs with heavy loads, manual work in a sitting position. In addition to neck pain, shoulder pain also often interferes with farmer activity. Shoulder pain occurs due to exorotation, the role of rotator cuff muscle that occurs and adheres to it depends on which muscles are dominant [16]. Musculoskeletal disorders are problems that affect muscles, tendons, ligaments, soft tissues and joints. Backpain often occurs because of a stretch in the lower waist that is spread out. The waist is the part that most often feels pain, because it is a hinge.

Conclusions

By this research, it can be concluded that based on REBA and RULA score farmer need to improve their posture immediately. It could affect musculoskeletal disorder in the next time. By REBA final score is 7. RULA final score is 7.

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