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Ergonomic Stairs Reduces Fatigue of Coconut Transporter Women in Bali

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Abstract: The condition of the hilly land is an obstacle in the application of modern tools for processing rice fields in remote villages, so that traditional rice processing tools are still used. "Lampit" is one of the traditional means of processing rice fields, which functions to level the land for planting rice. The operation of "lampit" can increase the work pulse up to 50% above the resting pulse and is included in the category of moderate to heavy workloads. At the end of the operation of "lampit", causing various complaints in the musculoskeletal system, especially on the buttocks and back, which is caused by the small and hardness of the "lampit" rod. To overcome this situation, improvements were made to the “lampit” seating design by adding foam pads and adjusting the pressure lever found on the “lampit” stem. This research is an experimental study using the same subject design, selected 30 research subjects from farmers in Dusun Semaja Antosari Tabanan Bali. The workload is evaluated on the basis of the work pulse measured using the ten pulses method. The pulse was measured before and after the improvement of the "lampit" design. The data compared were the mean values before and after improvement, which were analyzed using paired t test ($\alpha = 0.05$). The result is that there is a significant decrease in the work rate of 19.35% ($p < 0.05$). Thus, it can be concluded that the improved design of the "lampit" can reduce the workload, therefore it is advisable for farmers to continue using and perfecting the improved "lampit".

Keywords: Ergonomics Stairs, Fatigue, Coconut Transporter

1. Introduction

One of the agricultural and plantation sectors in Bali which the processing of mechanism is still handled traditionally is coconut. Coconut trees are very often found in Bali, especially in coastal areas and some are in the highlands. People in Bali have traditionally been accustomed to maximizing the use of coconut to fulfill their daily needs. Not only the coconut flesh that can be used, but also the stems, coir, shell to the pulp. There are many benefits of coconut in everyday life, from its water to virgin coconut oil, but only few people concern and pay attention to the role of humans from the time of the coconut is picked until it is ready to be processed into various food ingredients. Banjar Semaja Desa Bengkelsari Tabanan is one area that still maintains the traditional way of picking coconuts. The coconuts are plucked from the trees in the fields, using a bamboo pole tied with a sickle at the end. After the coconuts are collected in the field, the coconuts are transported by placing them in baskets, then the baskets are upheld to the main road and finally by vehicle they are transported to the market. Coconut picking is conducted almost every day. The groups who work in a fairly large fields are gathered in a "banjar" environment and are divided into six coconut picking groups, and an average of one group consists of 15 to 20 members. The group of coconut pickers consists of 3 sections of workers, namely (a) coconut pickers are tasked with picking coconuts with bamboo poles, which is usually carried out by two to three men; (b) coconut collectors, consisting of three to six people, with the task of collecting coconuts that fall to the ground after they have been plucked from the coconut trees and collected in a certain place; (c) coconut transporters, totaling six to 20 people, who are in charge of transporting coconuts that have been collected in a place by coconut collectors, which is usually conducted by women. Transporters carry out their work starting from picking up the collected coconuts, putting them in baskets, lifting baskets over their heads assisted by collectors. After

the basket is full, it is held above the head and then transported to the final shelter with a distance of ± 500 meters, usually on the edge of a large road that can be passed by four-wheeled vehicles. When lifting the basket with the coconut load above the head, the hand holds the basket part of woven bamboo which can cause pain in the fingers, and is carried out without paying attention to the ergonomic lifting system, so that it can cause a forced position which in turn can cause complaints. musculoskeletal system. The basket above the head contains ± 25 coconuts, ± 25 kg in weight and ± 500 m of distance traveled, and through a track with a varying angle of inclination of the ground from 10° to 25°. On a track with a sharp angle of inclination, there are no stairs that can be traversed by workers. This work starts from 8.30 to 16.00, with one meal break during the day for ± one hour carried out in each house. While carrying out work there are no short breaks and snacks are given after two hours of work. The average pulse rate of coconut transporters when transporting coconuts is 114 ± 17.21 pulse/minute, including in the heavy work category [4, 19, 8]. However, from a physiological point of view, lifting weights by upholding the workload is lighter than in other ways, for example carrying it on the shoulder [1]. This is because the weight of the object being transported is divided evenly down through the head bone and then to the cervical spine. It will be different if you carry an object, then the weight of the object will be outside the body's center of gravity, as well as if the object is next to the body. This requires more power for transportation [3, 8]; Mikhew in [6] revealed that the characteristics of the informal sector industries are: (1) the emergence of a high risk of occupational hazards; (2) limited resources in changing the work environment and determining adequate occupational health services; (3) low awareness of occupational health risk factors; (4) non-ergonomic working conditions, hard physical work and long working hours; (5) diverse division of labor and low management supervision and prevention of occupational hazards; (6) family members are often exposed to occupational hazards; (7) environmental protection problems are not well resolved; (8) lack of health care, security, social security (health insurance) and welfare facilities. Manuaba [15] in [16] reveals the main problems faced in the transportation of products in primary industries are: lift-and-transport systems such as unnatural work positions, inappropriate equipment design, inappropriate time organization, only using economic and technical considerations when solve the problem. The International Labor Office (ILO) in [19], recommends that the weight should be carried by women in the range of 15-20 kg, and should be reduced by 25% if the work is carried out frequently. Pheasant [19] recommends for workers aged 20-35 years the allowable load is 15 kg. Similarly, Ray [20], in more detail, suggests that the weight of the load carried on top of the head for women in India is in the range of 15 to 18 kg. Suyasning in [17] research which was carried out on women workers carrying solid rock with ergonomic steps and temporary shelters with an angle of land between 30-40º and a distance of 50 m, ergonomic intervention showed a decrease in workload, which was calculated by means of work pulse rate and decrease. subjective complaints. Singarsa [21] reported that improving work positions can reduce workload and increase productivity of padas stone miners in Werdhi Bhuwana Village. In Selemadeg sub-district which was monitored by the medical records department of the Tabanan Hospital, where the Semaja banjar is located in its area, 152 cases of lower back disease were found in the last three years and 41% of these cases occurred in women aged 14-71 years. This indicated that there are certain jobs in the community or in the informal sector, which put considerable pressure on the lower lumbar area, which is probably one of the causes of this work of transporting coconuts. Therefore, with the number of loads and ways of lifting and carrying, body position, rest and snacks, basket design, mileage and fields conditions with a varying angle of incliation between 10°-25°, the coconut transporter women looked tired, gasping, sweating, and often took breaks in the middle of the road. During each transportation period, there was a spontaneous break for a long time at the final coconut collection point, slowing down the road to the pick-up location and when transporting the coconuts. After working they felt pain in the waist, stiffness all over the body, especially in the legs and neck. Based on the description, a research was conducted by ergonomic stairs, so that fatigue decreases and the productivity of coconuts transporter women were increased, in line with the improvement in the quality of life.

2. Materials and Methods

This type of research was an experiment with the same subject design. In this study, it was necessary to have a "washing out" which was useful to eliminate the effects of previous treatments so as not to leave an effect or response (residual effect) [5]. The research design can be shown as follows:

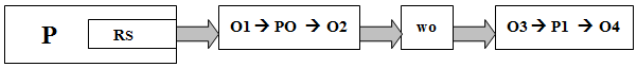

Figure 1. *Experiment With The Same Subject Design.*

P = population; Rs = sample randomly selected from the population; O1 = preliminary data collection before repair (transporting coconuts in the traditional way); O2 = final data collection before repair (transporting coconuts in the traditional way); O3 = initial data collection after repair (transporting coconuts using the Total Ergonomic approach); O4 = final data collection after repair; Wo = washing out for three days; PO = before repair, which was considered as control; P1 = after repair, which is considered as treatment.

Fatigue was the subjective perception of workers that are felt after they carry out their activities which are recorded with 30 items of rating scale issued by the Japan Association of Industrial and Health. This questionnaire consisted of three categories, namely: weakened activity (items 1-10).; decreased motivation (items 11-20); physical exhaustion

(items 21-30). Work fatigue was recorded before and after work; (Table 6).

On a track with a sharp angle of inclination, an ergonomic stairs is made, 2 R + T = 6 3 c m provided that R = Riser (height of steps); T = Tread (depth of steps) [8]. (Figure 2).

Figure 2. *Ergonomic Stair Making.*

The population in this study were 80 subjects and 20 research subjects selected by simple random sampling of coconut transporter women in Banjar Semaja, Bengkel Sari Village, Tabanan Regency who worked during 2020 period, with an age range of 20 - 45 years.

In this study, data on the subject's condition, environmental conditions, ECPT / ECPM, WBGT Index before and after repair will be tested for data normality which will be carried out with the Kolmogorov-Smirnov (KS) test (goodness of fit test), [25, 14]. To find out that the subject's initial conditions and environmental conditions were the same between before and after the repair, a comparability test was carried out with a paired t-test against wet temperatures, dry temperatures and radiation temperatures. For category-scale fatigue data, a non-parametric test was used, namely the Wilcoxon Signed Rank Test. Furthermore, the data obtained and analyzed in this study are as follows: a) the data on the subject's condition were analyzed descriptively by means of: age, height and weight were searched for the average and standard deviation. Environmental conditions in the form of the average of wet temperature, dry temperature, radiation temperature, together with% CVL will be converted into the WBGT Index, mean relative humidity, ECPT / ECPM, the effects of which are described before and after repair with t-paired tests, if the data is normally distributed and vice versa using the Wilcoxon Signed Rank Test, the one-tail test, with a significance level of $\alpha = 0.05$. From this description, it will be known whether the environmental conditions before and after the repair are the same or the environmental conditions have no effect on the dependent variable ($p > 0.05$), or vice versa ($p < 0.05$), b) to determine the effect of improving ergonomic measures on the fatigue of coconut transporter women is carried out by the Wilcoxon Signed Rank Test, with the following conditions. Ho: $\mu 1 = \mu 2$ (mean fatigue score before repair is the same as after repair). Ha: $\mu 1 > \mu 2$ (mean fatigue score before repair is greater than after repair). Ho is accepted (there is no significant difference between the mean score of fatigue before repair compared to after repair), if $p > 0.05$. Ho is rejected (there is a significant difference between the mean score of fatigue before repair compared to after repair), if $p < 0.05$.

3. Results

Table 1. *Average, Standard Deviation, Data Range of Characteristics of Coconut Transporters Women in Banjar Semaja, BengkelSari Tabanan.*

Characteristic Subject	Average	SD	Range
Age	32,05	2,95	25,00- 35,00
Weight (kg)	54,00	6,26	46,00 – 65,00
Height (cm)	151,60	3,86	146,00 – 160,00
Sistolic blood pressure (mm Hg)	103,50	9,75	90,00 – 120,00
Diastolic blood pressure (mm Hg)	66,00	5,98	60,00 – 80,00
R. P /minutes	77,40	11,24	58,00 – 88,00
R. P	= Resting pulse		
S. D	= Standard Deviation	P	= level of significance

In this study, the environmental conditions measured were wet temperature, dry temperature and radiation temperature and relative humidity. The average, standard deviation, range and normality of the working environment conditions between before and after repair are presented in Table 2.

Table 2. *Average, Standard Deviation and Normality of Environmental Condition Data in Banjar Semaja, Bengkelsari Tabanan Bali.*

Variable	Average	SD	Range	*Z*	*p*
Before treatment					
Wet temperature (°C)	26,19	0,87	24,88 – 27,88	0,45	0,99
Dry temperature (°C)	29,11	1,99	26,13 – 32,00	0,44	0,99
Radiation temperature (°C)	27,78	1,82	24,00 – 29,88	0,63	0,82
Relative humidity (°C)	72,22	8,33	60,00 – 90,00	1,15	0,14
After treatment					
Wet temperature (°C)	26,07	0,58	25,00 – 26,63	0,69	0,73
Dry temperature (°C)	28,93	1,68	25,63 – 30,88	0,57	0,91
Radiation temperature (°C)	27,50	2,10	23,75 – 29,63	0,62	0,84
Relative humidity (°C)	74,22	7,26	70,00 – 90,00	1,19	0,12
S. D	= Standar deviation			Z	= normality value
P	= level of significance				

In Table 2, it can be seen that the working conditions of the coconut transporter women in Banjar Semaja, Bengkelsari Tabanan, between before and after repair by the Kolmogorov-Smirnov test (KS. All data were normally distributed ($p > 0.05$), and can be continued with parametric analysis with using the paired t-test.

Table 3. *The t and p values of Environmental Condition Data Before and After Repair in Banjar Semaja, Bengkelsari, Tabanan.*

Variable	Before treatment		After treatment		T	P
	Average	SD	Average	SD		
Wet temperature (°C)	26,19	0,87	26,07	0,58	0,53	0,61
Dry temperature (°C)	29,11	1,99	28,93	1,68	0,62	0,55
Radiation temperature (°C)	27,78	1,82	27,50	2,10	1,14	0,29
Relative humidity (°C)	72,22	8,33	74,22	7,26	1,00	0,35
S. D	= Standard deviation				t	= paired t-test
P	= level of sifnificance					

In Table 3, it can be seen that the t and p values of the data on the working conditions of coconut transporter women in Banjar Semaja, Bengkelsari, Tabanan, Bali. With the paired t-test, it turns out that there is no significant difference in the conditions of the work environment between before and after the repair ($p > 0.05$). It means that the research subjects were exposed to the same environmental conditions before and after the repair.

Fatigue in Transporting Coconuts

To determine the effect of the application of total ergonomics on the fatigue of coconut transporter women, a different test was conducted on the fatigue score which was recorded using a 30 item of rating scale questionnaire which was carried out twice, before and after working time, before and after the repair. Fatigue data is on an ordinal scale, so a different test is carried out with the Wilcoxon Signed Rank Test.

Tabel 4. *Average, Standar deviation of coconut transporter women fatigue.*

Time	Before working		After working	
	Average	SD	Average	SD
Before treatment	30,10	0,45	64,10	15,29
After treatment	30,00	0,00	45,65	9,57
S. D	= Standard deviation			

Tabel 5. *Result of Wilcoxon and the significance data of coconut transporter women in Banjar Semaja, Bengkelsari tabanan, Bali.*

Time	Different average	SD	W	P
Before treatment	34,00	15,31	3,92	0,00
After treatment	15,65	9,57		
S. D	= Standard deviation		W	= Wilcoxon value
P	= level of significance			

4. Discussion

Transporting coconuts is part of picking coconuts in a field. The group of coconut pickers usually consists of 3 parts of the worker, namely (a) the coconut picker is in charge of picking coconuts with bamboo poles, which is usually carried out by two to three men; (b) coconut collectors, consisting of three to six people, with the task of collecting coconuts that have just been picked from coconut trees and which have already been dropped to the ground; (c) coconut transporters, who are in charge of transporting coconuts that have been collected by coconut collectors which are usually carried out by women, therefore the subjects of this study are women workers. The number of subjects were 20 people with an age range of 25.00 to. 35.00 years, the average is 32.05 years. In a previous study by Nada in [17], on improving the work

position of local rice thresher workers in Penebel Tabanan Village, using almost the same age range, namely 26.00 to 35.00 years. Likewise, the age range used by Sucipta [22], which examines the modification of the feeder table and the addition of a rice thresher noise damper increases work productivity, in which the age range of research subjects is between 20.00 and 30.00 years. Age range 25.00 to 35.00 years, is included in the category of productive age where the capacity of a person's muscle and physical strength is optimum for activity. As stated by Grandjean [8], the peak muscle strength for both men and women are reached at the age between 25.00 to 35.00 years. Has decreased at the age of 39.00 years, and in the age range of 50.00 to 60.00 years of muscle strength only reaches 75.00 - 85.00% compared to people aged between 25.00 to 35.00 years [19]. From this description, it can be concluded that all ages of the subjects involved in this study were included in the optimal range of muscle physical strength, so that they can transporting coconuts optimally. The average body weight of the research subjects was 54.00 ± 6.26 kg with a range ranging from 46.00 to 65.00 kg. The average height was 151.60 ± 3.86 cm with a range from 146.00 cm to. 160.00 cm. Not much different from the research conducted by Nada [26], on the improvement of work positions of local rice thresher workers in the village of Penebel Tabanan, revealed that the weight range of research subjects ranged from 52.00 to 68.30 kg, with a height range of 155.70 to 175.50 cm. The same thing was reported by Intaranont and Vanwonterghem in [10], that the average body weight of women in Thailand was 46.59 ± 8.80 kg. Likewise, female bricklayers at Batu Bulan Gianyar have an average body weight of 53.35 ± 6.10 kg. Thus it can be said that the body weight and height of coconut transporters women in Banjar Semaja Bengkelsari Tabanan Bali were almost the same as the weight and height of women in other places. By using the formula for ideal body weight, namely height minus 100.00 ± (the result of the reduction is multiplied by 10%) [2], the ideal body weight of research subjects was 46.44 to 56.76 kg. The average body weight of the research subjects was in between, so that the subject was included in the ideal category. Comparison of body weight and height that is not ideal, with the assumption that body weight exceeds the ability to support the body will cause pain in the knees and ankles [2]. Thus it can be said that the workload and the occurrence of fatigue that arise are not caused by weight and height that are not ideal, but are more influenced by the main factors, namely the load carried, and the additional workload caused by tools and work methods and the environment. The working environment conditions recorded in this study were wet temperature, dry temperature, radiation temperature, and relative humidity. Measurements were carried out every hour starting at 8.00 to at 16.00 WITA. Relative humidity was calculated based on a psychometric diagram. Wet temperature before repair was 26.19±0.87°C, after repair was 26.07±0.58°C, there was no statistically significant difference ($p > 0.05$), with a value of $t = 0.53$ and $p = 0.61$. Relative humidity before improvement was 72.22 8.33% and after improvement 74.22 7.26%, there was no significant difference between before and after repair, this means that the research subjects were exposed to the same relative humidity. The mean value of dry temperature before repair was 29.11±1.99°C and after repair was 28.93±1.68°C, there was no significant difference ($p > 0.05$), with a value of $t = 0.62$ and a value of $p = 0.61$. This dry temperature is in the comfortable range, that the comfort for Indonesians is that the dry temperature is between 22-28°C with a relative humidity of 70-80%. Likewise, the research conducted by [24], which was located in Subak Yeh Gde, Kediri District, Tabanan Regency with a dry temperature of 28.29°C. Meanwhile, the research which was conducted by Kerana, et al., [13] revealed results that were not much different from the dry temperature of 29.94°C. The radiant heat of the sun was evaluated by recording the radiation temperature, which was measured by an ordinary thermometer which the reservoir was placed in a copper ball with a diameter of 15.00 cm which was colored black (not shiny), because black absorbs radiation, so the temperature inside the ball would rise which was recorded by the thermometer. Before repair, the radiation temperature was 27.78±1.82°C and after the repair was 27.50±2.10°C. Radiation temperature before repair and after repair was not significantly different ($p > 0.05$) with a value of $t = 1.14$ and $p = 0.29$, so it can be said that the subjects in this study were exposed to the same radiation temperature. Somewhat different from the statement [23], the various measurements of the temperature of the ball showed that the outdoor temperature exceeds 30°C. This difference is due to the fact that the work of transporting coconuts is carried out under the shade of a coconut tree. Relative humidity before repair was 72.22 ± 8.33% and after improvement 74.22 ± 7.26%. This relative humidity did not differ significantly between before and after repair ($p > 0.05$). That means the research subjects were exposed to the same relative humidity between before and after treatment. The results of this measurement are not much different from the measurement of relative humidity carried out by Suyasning in [17], which ranges from 79.10 ± 0.60 to 81.10 ± 0.58. Dunia et al [27], noted that the relative humidity in the open air of Klungkung was 69.60 ± 2.70. WBGT before repairing 26.80°C and after repairing 2 6.79°C, the value of WBGT (Wet Bulb Globe Temperature) was the sum of = 0.7 Tnwb + 0.2 Tg + 0.1 Tdb (Tnwb = natural wet bulb temperature, Tg = black globe temperature, Tdb = dry bulb temperature of ambient) between before and after repair. So, it can be said that the WBGT value between before and after the repair was not significantly different ($p > 0.05$). This WBGT value was in accordance with the maximum requirements recommended by NIOSH (National Institute for Occupational Safety and Health) for moderate work, namely 28°C and hard work, namely 26°C or 79°F and 82°F [18]. With the description above, it can be said that the research subjects were exposed to the same environmental conditions before and after the treatment and were also still in an environment of temperature and relative humidity which was included in the comfortable category. That means that environmental conditions can be controlled during the study and are not biased. Fatigue will quickly arise due to monotony of work, heavy and long-lasting physical work, poor microclimate, mental and psychological problems, illness, pain at work and lack of energy. The assessment of

fatigue was 30 items of rating scale questionnaire. From the statistical test results, it was found that the fatigue scores before and after the improvement were significantly different ($p < 0.05$). After the repair, there was a decrease in fatigue by 53.97% from before the repair. This means that there is a decrease in the average fatigue between before and after the repair. It is not much different from similar research conducted by [22], namely that the repair of work tools can reduce fatigue by 48.91%. The reduction in fatigue is possible because there have been some repairs in how to lift and carry and adjust the weight of the loads being lifted and transported with the ability of the body, the arrangement of working and rest time, giving sweet tea after two hours of work, making ergonomic steps in fields that have a sharp angle of inclination. As expressed by ILO [11], that fatigue will quickly appear due to monotony of work, heavy and long-lasting physical work, poor microclimate, mental and psychological problems, illness, pain at work and less energy. Physiologically, fatigue is divided into two types, namely: muscle fatigue (peripheral) and general (central) fatigue. Muscle fatigue is a condition in which the muscles suffer from fatigue due to excessive tension, seen from several symptoms of muscle tremors, decreased strength, slower muscle movements and decreased muscle coordination. The cause of muscle fatigue is possible due to a static work attitude without the opportunity for adequate recovery, so that blood flow to the muscles is obstructed, the supply of oxygen and glucose decreases, there is an accumulation of metabolic waste and eventually stiffness (pain or ache) in the body's muscles [9]. While general fatigue is a condition seen from the symptoms of psychophiological changes in the form of slackness in motor activity, respiration, feelings of pain and heaviness in the eyeballs, so that it will affect physical and mental work [8]. Fatigue is related to the increasing ongoing anaerobic capacity and low aerobic capacity or one's health. Health is an indispensable basis for the success of carrying out work [7]. Anaerobic energy supply metabolism is processed from the breakdown of glycogen stores in muscle as energy, which causes the glycogen concentration in muscles to decrease and lactic acid to increase. The increase in lactic acid will cause fatigue, as stated by Guyton et al [9], who stated that muscle fatigue increases almost directly proportional to the rate of glycogen reduction. The fatigue score in this study decreased to 53.97%. This shows that the physical condition and health of coconut transporters after the improvement using the total ergonomics approach is better than before the repair with the total ergonomics approach. This condition from an ergonomic point of view is in accordance with the concept of national health and the concept of the Ministry of Manpower, namely an increase in the quality of life of workers or the quality of working life [12].

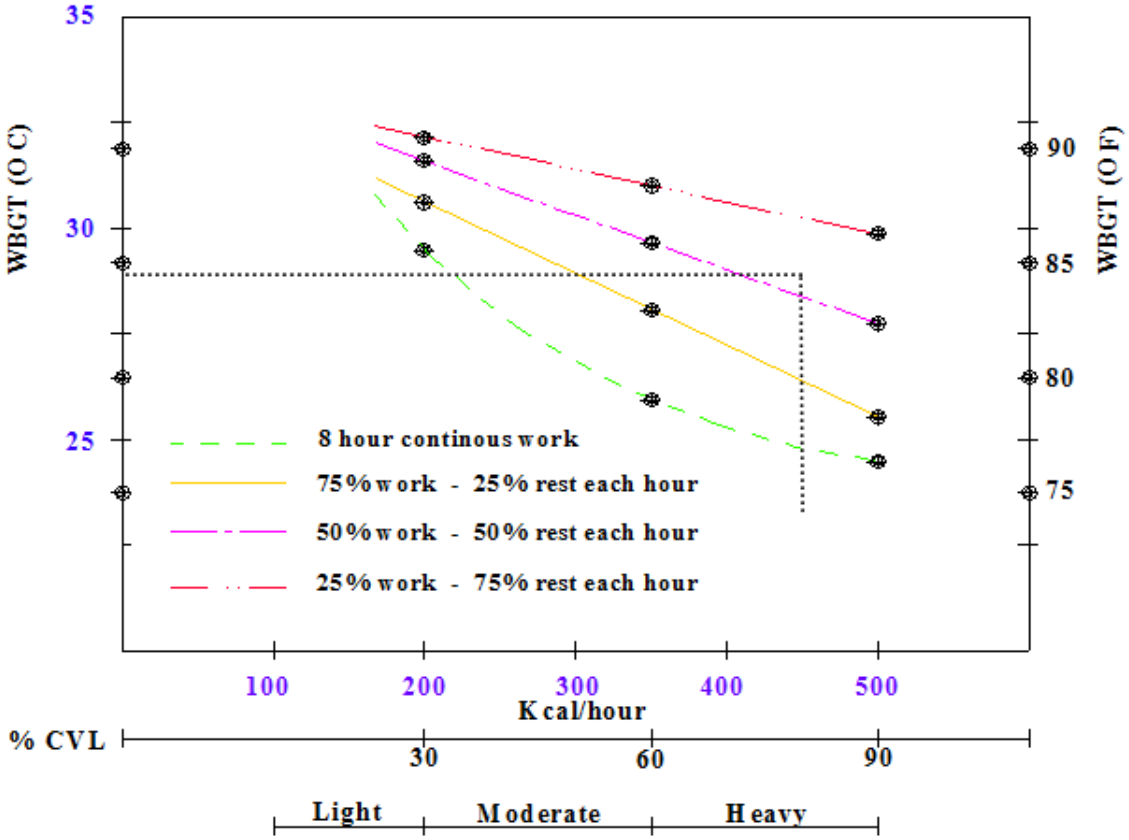

Figure 3. *Graph of WBGT Index and Rest Period Before Recovery for coconut transporter women.*

After using the ergonomic design, where% CVL = 62.10 with WBGT = 26.79, indicates that the work of transporting coconuts is combined with existing environmental conditions, including at the lowest level from the category of heavy work to moderate work, and can be implemented. continuously for eight hours of work (Figure 3).

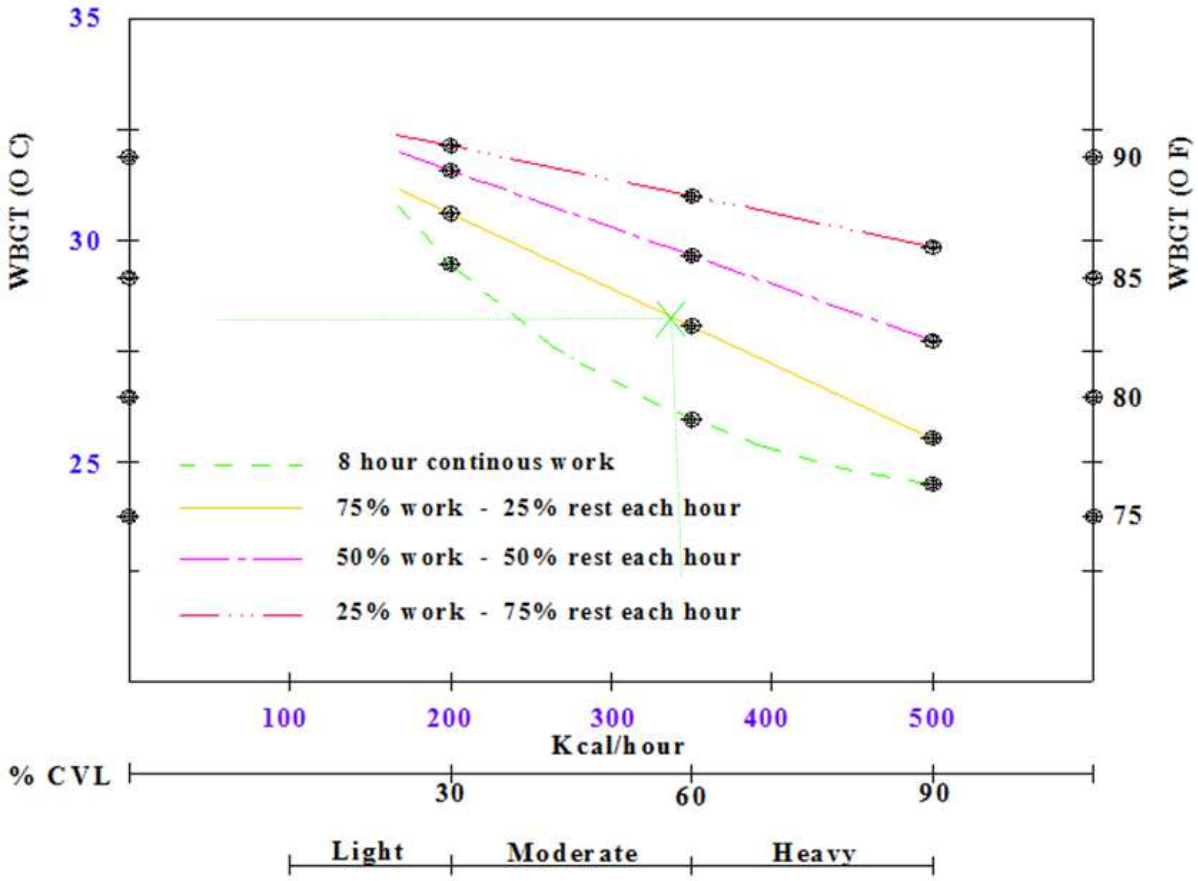

Figure 4. *Graphic of WBGT Index and Rest Period After Repair of Coconut Transporter Women in Banjar Semaja Bengkelsari Tabanan Bali.*

5. Conclusions

Based on the literature review, research results, statistical analysis and discussion, the following conclusions can be stated; ECPT before improvement was 39.77% greater than ECPT after improvement ($p<0.05$), also ECPM after treatment was 10.35% better than ECPM after improvement ($p<0.05$). The decrease occurred between %CVL before and after improvement for 25.43% ($p<0.05$). Fatigue declined significantly 53.97% ($p<0.05$) between after and before treatment. Moreover the difference average of musculoskeletal complaints decreased significantly 48.01% ($p<0.05$). In this study, it was found out that coconut transport which not applied total ergonomic approach done before improvement indicated 48.84% lower productivity than that of which after improvement using total ergonomic approach. It can be summarized that total ergonomic approach decreases the workload seen from the ECPM 10.35%, cardiovascular load 25.43%, fatigue 53.97%, and musculoskeletal complaints 48.01%. In other words, the total ergonomic approach can improve the life quality of coconut female carriers in Banjar Semaja Antosari Tabanan-Bali.

Conflicts of Interest Statement

The outhor declare that they have no competing interests and they have NO affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.

Consent for Publication

No applicable.

Ethics Approval and Consent to Participate

No applicable.

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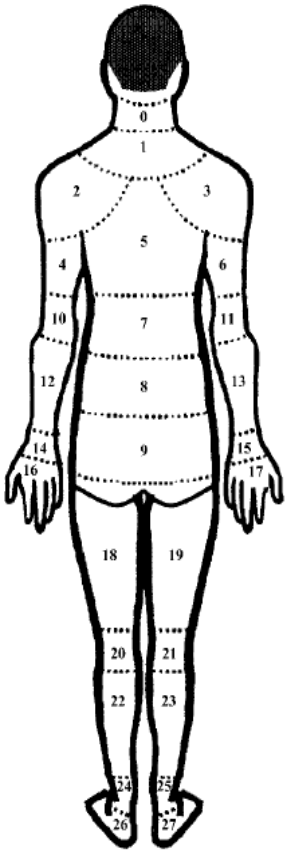
Appendix

Table 6. *Quesioner Nordic Body Map.*

NAME	:	……
AGE	:	……
SEX	:	……
STATUS	:	BEFORE/AFTER REPAIR PRE/POST TEST
INSTRUCTIONS	:	CROSS (X) IN THE COLUMN AVAILABLE ACCORDING TO THE COMPLAINT OF PAIN/STIFFNESS IN THE MUSCLES YOU FEEL
DESCRIPTION	:	A = NO PAIN, B = SLIGHTLY PAIN, C = PAIN AND D = VERY PAIN



No	Location	Grade of complaints			
0	Pain/stiff in the upper neck	A	B	C	D
1	Pain in the lower neck				
2	Pain in the left shoulder				
3	Pain in the right shoulder				
4	Pain in the left upper arm				
5	Pain in the back				
6	Pain in the right upper arm				
7	Pain in the waist				
8	Pain in the buttock				
9	Pain in the bottom				
10	Pain in the left elbow				
11	Pain in the right elbow				
12	Pain in the left lower arm				
13	Pain in the right lower arm				
14	Pain in the left wrist				
15	Pain in the right wrist				
16	Pain in the left hand				
17	Pain in the right hand				
18	Pain in the left thigh				
19	Pain in the right thigh				
20	Pain in the left knee				
21	Pain in the right knee				
22	Pain in the left calf				
23	Pain in the right calf				
24	Pain in the left ankle				
25	Pain in the right ankle				
26	Pain in the left foot				
27	Pain in the right foot				

Figure 5. *Nordic Body Map.*

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