

COMMUNITY EMPOWERMENT THROUGH ERGONOMICS TRAINING WITH LOCAL WISDOM ORIENTED TO IMPROVE QUALITY OF SCULPTOR HEALTH IN THE PELIATAN VILLAGE, UBUD, GIANYAR, BALI-INDONESIA

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Background: Until recently, data applied for reference of Balinese workers in their work stations and processes, including anthropometric data still applying secondary data source from literature review. This was probably inappropriate due to different size, since the literature data generally on the basis of western size of anthropometry. The objective of this research, therefore, was to establish community empowerment through ergonomics training with local wisdom oriented to improve the sculptor health care quality and productivity. Ergonomics training through workshops conducted with a systemic, holistic, interdisciplinary, and participatory (SHIP) approach. The training is done to make people aware of the work as a sculptor that is very important to apply ergonomics in the workplace. The results showed that (a) participants judge that ergonomics workshop can open their insights about the importance of the application of ergonomics in the workplace, (b) work equipment is not in accordance with sculptor anthropometric, (c) inadequate working conditions, because the workers were exposed to noise working tool more than 80 decibel and the room temperature exceeds 34°C and work a lot of cockroaches and rats roam, and (d) the data of sculptor health quality is very poor, increase the workload at about 13.5 %, musculoskeletal complaints at about 41.3 %, and fatigue at about 46.8 % ($p < 0.05$) between before and after working. That means the work is very necessary sculptor redesigned in order to achieve comfort, safe, healthy, effective, and efficient of working conditions. It can be concluded that the ergonomics training with local wisdom oriented is required in an effort to implement the principles of ergonomics to achieve adequate health care quality sculptors and maximum productivity.

Keywords: community; empowerment; ergonomics; indigenous; health care quality.

INTRODUCTION

In the design of work stations and processes, until now there has been reference to the anthropometric data of existing workers in areas where they are active. Commonly used as a reference is that of the secondary data source readings literature or relevant are generally still using the size of the west people. To overcome these problems is necessary to explore the basic data that will be used as a reference in making ergonomic work station design. In addition, through a systemic, holistic, interdisciplinary and participatory (SHIP) approach will materialize station design and work processes that are technically in accordance with the workers and

physiologically not cause musculoskeletal complaints, did not result in the workload is too heavy and can slow down the appearance of fatigue.¹⁻³ Anthropometry is the size and proportions of the human body that have practical benefits to determine the size of the seating area, a work desk, reach, grip, space, and limits joint movement.⁴ If examined the relationship between the tools, the human family and their work, the anthropometric data will be required to obtain a match between the size of themselves with the tools used. Is still not widely used anthropometric measured in the design of the instruments of labor and the workplace, these anthropometric when in fact been used by the Balinese during build houses and work equipment by using *asta kosala-kosali* and *asta bumi* similar to the concept of anthropometry. In addition, the concept embodied in the *Tri Hita Karana*, *pamali* concepts and Hindu Ayurveda Medical Sciences is also used as a reference in the repair station and work processes

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in small industries associated with healthcare quality and productivity parameters. It is wisdom that can be applied in society with reference to the principles of ergonomics.

The application of ergonomics that workers always strive for healthy, safe, and comfortable in the process is an urgent work to be carried out and should be implemented as soon as possible.¹⁻³ If this is ignored, then the quality of the health of workers believed to be disrupted and can lead to deformities in the body organs and ultimately will reduce the productivity of labor. One way that can be taken so that the workers engaged in the activities in a small industry remains in a healthy condition, safe, convenient, effective, and efficient as well as high productivity is needed ergonomics rules based on local wisdom in the conduct or activity in the workplace.

Based on the background of the problem can be made formulation of the problem: (1) Is community empowerment through training of local wisdom oriented ergonomics can be used as a reference in improving the quality of health sculptor?; (2) What was the condition of equipment and work environment that accompanies sculptor during work?; (3) How is the quality of health sculptor seen from fatigue, musculoskeletal complaints, and the workload between before and after working?

MATERIAL AND METHOD

The study population was a sculptor in Peliatan village numbering 107 people. Of these 30 were randomly selected as a sample with multistage random sampling technique. This experimental study using pre and post-test group design.

Independent variable is the empowerment of communities through training of ergonomics with local wisdom oriented and dependent variable is the quality of the assessed health of the workload, musculoskeletal complaints, and fatigue sculptor. Data were analyzed descriptively by finding the mean and raw intersection, then tested different paired t test at a significance level of 5%, because the data are normally distributed.

RESULTS AND DISCUSSION

The quality of health sculptor assessed workload, musculoskeletal complaints, and perceived fatigue before and after work. The results of the data analysis are presented in Table 1.

Table 1
Results of Data Analysis Health Quality Sculptor

Variable	Working		Changes (%)	p
	Before	After		
Workload	80.93±5.93	91.82±3.93	13.50	0.0001
MC	29.80±0.97	42.10±1.89	41.30	0.0001
Fatigue	31.30±0.65	45.94±1.56	46.80	0.0001

MC= Musculoskeletal complaints

Quality health sculptor assessed from changes in heart rate, fatigue, and musculoskeletal complaints can be used as a reference in improving the working conditions of a process that begins with local knowledge oriented ergonomics training. It needs to be done so that the sculptor can be empowered in particular in terms of scrutiny of the health and environmental conditions that accompany them while working. In this case, it was found that the quality of health sculptor very alarming and accompanied by inadequate environmental conditions.

Workload

The study's findings indicate that community empowerment through training ergonomic oriented with local knowledge is indispensable in order to reduce the workload of the sculptor. It could be said, because it turned out after working sculptor workload increased by 13.5% ($p < 0.05$). Percentage increase in workload is relatively large, indicating that the application of active rest, adjustment of anthropometry with working equipment, the improvement of the working environment and the attitude is very necessary to be implemented in order to reduce the workload significantly. It needs to be done so that the sculptor can work effectively and efficiently, along with environmental conditions that are comfortable, healthy, and safe.

These findings are similar to the findings of other researchers, namely: (a) Arimbawa (2009) reported that work equipment is ergonomically redesigned to reduce the workload of coconut oil makers in Dawan sub district, Klungkung was 14.69%, (b) Artayasa (2007) reported that total ergonomics approach to be lifting process of coconut can reduce the workload of 10.61 %; (c) Purnomo (2007) reported that a working system with a total ergonomics approach to reduce the workload of workers in the pottery industry in Bantul Kasongan of 21.69% ; (d) Sajiyo (2008) reported that the workload roll artisan hand-rolled cigarettes in Kediri, East Java, decreased by 20.81% ($p < 0.05$) after redesigning the place and system of work with ergonomics intervention; (e) Josephus (2011) reported that the workload of fishermen in South Minahasa, North Sulawesi decreased by 53.56% after ergonomics intervention in the process of fishing with purse seine; (f) Widana, et al (2012) reported that the workload of vegetable farmers decreased by 18.67% after the implementation of ergonomics in the processing of agricultural loose soil in Tabanan Bali.⁵⁻¹¹

Musculoskeletal Complaints

The study findings suggest that community empowerment through training ergonomic with oriented by local knowledge is indispensable in order to reduce musculoskeletal complaints sculptor. Said, because it turned out after working

sculptor musculoskeletal complaints increased 41.3% ($p < 0.05$). Percentage increase in musculoskeletal complaints are relatively large, indicating that the application of active rest, anthropometric adjustments with working equipment, the improvement of the working environment and the attitude is very necessary to be implemented in order to reduce musculoskeletal complaints significantly. These findings are similar to the findings of other researchers such as : (a) Purnomo (2007) reported that workers in small industrial potters in Bantul Kasongan musculoskeletal complaints decreased by 87.80% ($p < 0.05$) after application of a working system with total ergonomics approach, (b) Artayasa (2007) reported that female workers in lifting process of coconut can reduce musculoskeletal complaints by 10.61% after total ergonomics approach applied; (c) Sajiyo (2008) reported that musculoskeletal complaints roll artisan hand-rolled cigarettes in Kediri, East Java, a decrease of 66.94% was observed from the motion of the head, 61.52% seen from shoulder motion, and the 81.75% seen from upper limb motion ($p < 0.05$), after redesigning the place and system of work with ergonomics intervention; (d) Arimbawa (2009) also reported that musculoskeletal complaints of coconut oil makers in Dawan Klungkung decreased by 26.17% ($p < 0.05$) after work equipment is ergonomically redesigned; (e) Surata (2011) reported that the cultivation of seaweed farmers in the village of Nusa Penida has decreased musculoskeletal complaints by 56.15% ($p < 0.05$) after redesigning seaweed dryer and the system works; (f) Josephus (2011) reported that musculoskeletal complaints of fishermen in South Minahasa, North Sulawesi decreased by 53.55% after ergonomics intervention in the process of fishing with purse seine ; (g) Suardana (2012) reported that the ergo - architecture can reduce musculoskeletal complaints of 2.22% of workers in the use of building ergonomics ; (h) Widana, et al (2012) reported that musculoskeletal complaints vegetable growers decreased by 14.27 % after the implementation of ergonomics in the processing of agricultural land in Tabanan, Bali, and (i) Sudarma (2012) reported that musculoskeletal complaints aligning Balinese gamelan decreased by 21.87% after application of software design and redesign GAENet ergonomic work station.⁸⁻¹³

Fatigue

The study findings suggest that community empowerment through training ergonomic oriented with local knowledge is indispensable in order to reduce fatigue sculptor. It could be said, because it turned out after working sculptor fatigue increased by 46.8% ($p < 0.05$). Percentage increase in fatigue relatively large, indicating that the application of active rest, anthropometric adjustments with

working equipment, repair work environment and attitude is very necessary to be implemented in order to reduce the workload significantly. It was done to address the inadequate working conditions and an attempt to introduce the concepts of ergonomics relevant to local wisdom embraced by the local community, for example: should not work when the sun is directly above the head (*tengai tepet*), may not work when sunset (*sandyakala*), and when the work required to pray first to invoke God 's blessing in the hope that his work useful for many people and *metaksu*. The findings are similar to reports of other researchers, such as: (a) Purnomo (2007) reported that workers in small industrial potters in Bantul Kasongan fatigue decreased by 77.50% ($p < 0.05$) after application of a working system with total ergonomic approach, (b) Artayasa (2007) reported that musculoskeletal complaints of female workers of coconut carrier in Semaja Antosari Tabanan decreased by 53.97% after total ergonomics approach applied; (c) Arimbawa (2009) also reported that musculoskeletal complaints in coconut oil makers Dawan Klungkung decreased by 25.83% ($p < 0.05$) after working equipment is ergonomically redesigned; (d) Surata (2011) reported that the fatigue of cultivation of seaweed farmers in the village of Ped Nusa Penida decreased by 50.84% ($p < 0.05$) after redesigning seaweed dryer and the system works, and (e) Josephus (2011) reported that fatigue of fishermen in South Minahasa, North Sulawesi decreased by 16.15% seen from general fatigue category, 19, 96% of category fatigue causes by activity, 11.70% seen from exhaustion motivation, and 14.53% was observed from physical exhaustion, after ergonomics intervention in the process of fishing with purse seine; (f) Widana, et al (2012) reported that fatigue vegetable growers decreased by 13.06% after the implementation of ergonomics in the processing of loose of agricultural land in Tabanan Bali, and (g) Sudarma (2012) reported that fatigue aligning Balinese gamelan decreased by 28.57% after application of software design and redesign GAENet ergonomic work station.⁸⁻¹⁶

CONCLUSIONS AND RECOMMENDATIONS

Based on the results and discussion, it can be concluded : (1) ergonomics training with local wisdom oriented is required in an effort to implement the principles of ergonomics to achieve adequate health care quality and productivity sculptor maximum employment, (2) work equipment and environmental conditions that accompany sculptor during work needs to be fixed so that a sculptor can work more effectively and efficiently, safe, comfortable, and healthy, and (3) the quality of health sculptor is very alarming, because an increase in the workload of 13.5%,

fatigue by 46.8% , and musculoskeletal complaints by 41.3%.

Suggestions that seem essential to be submitted are:

(1) that workers in small industries examine the working conditions in terms of ergonomic approach combined with relevant local knowledge, (2) the application of local knowledge that is relevant to the concept of ergonomics should be maximized in order to achieve satisfactory results associated with attempts to improve working conditions begins with training, and (3) the application of the concept of ergonomics based on local wisdom should have been done early, in order to achieve a healthy working conditions, safe, comfortable, effective, and efficient, and the highest of productivity would be achieved.

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