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ANALYSIS OF WORKERS WORK LOAD ON PLATING PROCESS ON AMERICAN SERVICE AT KITCHEN OF VILLA AIR BALI BOUTIQUE RESORT AND SPA CANGGU-BALI

N.K Dewi Irwanti¹⁾; M. Yusuf²⁾; Wahyu Susihono³⁾; Ni Nyoman Rusmiati⁴

^{1&4)} STIPAR Triatma Jaya Badung, Bali, Indonesia

²⁾ Politeknik Negeri Bali, Indonesia

³⁾ Department of Industrial Engineering, Faculty of Engineering, University of Sultan Ageng Tirtayasa Banten, Indonesia

Email : ¹⁾ nk_dewi_irwanti@yahoo.com

Abstract

Plating activity or process of decorating a dish requires precision and quite a long time. In this activity, it takes 15 minutes for a chef to prepare 15 plates. The activity is done continuously for 4-hour work in standing and bending work postures by using the available worktable. This condition creates fatigue, musculoskeletal complaint, and stress. Therefore, observation and evaluation were done toward 9 kitchen workers at Villa Air Bali Boutique Resort And Spa Canggu-Bali on their workload in order to make an improvement in form of ergonomics intervention for the next research phase. The workload was measured objectively and subjectively. Objectively, the workload was measured based on the working pulse which was measured using pulse meter. Subjectively, the workload was measured based on musculoskeletal disorders and general fatigue. The general fatigue was predicted using 30-item fatigue questionnaire using 4 Likert scale. The musculoskeletal disorders was predicted using Nordic Body Map questionnaire. Occupational risk factors are measured using RULA analysis. Data was analyzed using descriptive and inferential statistics. The research's results concluded that: (1) The kitchen workers workload was on the medium workload category, (2) There was a significant score difference on subjective complaint before and after the work (musculoskeletal complaint and fatigue in general), (3) On the risk level score using the RULA method, a grand score of 5 indicates a moderate level of risk and immediate or immediate corrective action is needed.

Keywords: Plating Process, Workload, Fatigue, Musculoskeletal Disorders, RULA, Kitchen Workers.



1. INTRODUCTION

Starred hotels usually have food and beverage services handled by the Food and Beverage department. This section is led by an executive chef or chef consisting of several cooks. In processing and preparing the food to be served, a chef needs some equipment (kitchen equipment).

One of the equipment used in the hotel kitchen is a working table. This tool is used from the process of preparing the ingredients to the plating process or the process of preparing food that is ready to be served to be given a menu decor (garnish). The intensity of utilization of this working table is quite high, especially in plating activities in American service. American Service is one of the services in a kitchen that has been prepared on a plate from the kitchen and is ready to be served to guests.

Preliminary observations were carried out in five-star hotels in the Nusa Dua area of Bali. It was found that the kitchen equipment used was a foreign product, so it was feared it was not in accordance with the anthropometry of workers. Work tools that are not in accordance with anthropometry can be an additional workload that has an impact on increasing musculoskeletal disorders and pain in workers. Sutajaya said that in designing work stations and work processes, until now it has not referred to the anthropometric data of workers in the area where they are active, generally the secondary data used is in the literature or relevant reading sources which generally still use measurements Western people (Sutajaya and Ristiati, 2011).

Plating activity or the process of decorating food requires precision and a long time. In this activity, a chef takes 15 minutes to prepare 15 plates so that it takes ± 1 minute to prepare 1 plate. This activity is carried out continuously for 4 hours of work with the work posture standing and bending by utilizing the existing working table. Based on direct observations kitchen workers of Villa Air Bali Boutique Resort And Spa Canggu-Bali, there appears to be a non-ergonomic work posture such as an overly advanced head position, too bent back movement, and a static standing position for a long time when plating. Head posture that is too advanced at work will be followed by neck pain (Nejati, Farzinmehr and Lakeh, 2014).

This condition has the potential to increase fatigue and muscle pain in certain body parts. The America Podiatric Association reports that 83% of industrial workers in the United States experience foot discomfort and pain associated with standing for too long. And standing for long periods of time can cause discomfort, muscle injury and fatigue. Standing work posture will be more risky for workers if followed by a bent work posture caused by work stations that are not in accordance with worker anthropometry (Kroemer and Grandjean, 2009).



Some studies have attempted to reduce fatigue in workers with standing positions, for example, as expressed by Grandjean who recommends that for this type of meticulous work, the table height is set 10 cm above the elbow. For the type of light work, the location of the table height is set parallel to the elbow height, and for heavy work, the table height is set 10 cm below the elbow height (Kroemer and Grandjean, 2009). As for coverage, the work table must also be considered wide. The reach of human hands, especially women, for the front is 85 cm. While to the side between 42cm - 62cm. Range of work will affect the effectiveness of work. In addition, coverage also affects body resistance and working time.

The purpose of this study was to determine how much muscle complaints in workers at in the plating process in american service, and to provide solutions for working table sizes that are in accordance with worker anthropometry so that effective, comfortable, safe and healthy in accordance with ergonomic rules.

2. RESEARCH METHOD

This research is an observational study of 10 kitchen workers of Villa Air Bali Boutique Resort And Spa Canggu-Bali. The workload was measured objectively and subjectively. Objectively, the workload was measured based on the working pulse which was measured using pulse meter. Subjectively, the workload was measured based on musculoskeletal disorders and general fatigue. The general fatigue was predicted using 30-item fatigue questionnaire using 4 Likert scale. The musculoskeletal disorders was predicted using Nordic Body Map questionnaire. Occupational risk factors are measured using RULA analysis. Data were analyzed descriptively, while data before and after work on workload, musculoskeletal disorders, and fatigue, tested the differences using the t test.

3. RESULT AND DISCUSSION

3.1 Subject Characteristics

The characteristics of kitchen workers Villa Air Bali Boutique Resort And Spa Canggu-Bali who are the subject of this research are as follows:

Table 1. Characteristics of Research Subjects

	Mean	SD	Range
Age (year)	30.50	2.25	25 – 38
weight (kg)	62.31	4.21	56.5 – 68.7
Height (cm)	165.17	3.35	158.2 – 171.3
Body mass index	20.45	22.67	18.10 – 22.64
Work experience (year)	5.5	1.25	1 - 9



The mean age of the subjects was 30.50 ± 2.25 years, with an average work experience of 5.5 years. This shows that the subject is in the productive age and has long experience working in his field. Body mass index is at an average of 20.45. This body mass index is in normal condition. The subject's condition is still in an optimal physical state to do work because it is in a productive age and in good physical condition. Age conditions affect the ability of physical work or muscle strength of a person. Maximum physical ability of a person is achieved at the age between 25 -35 years and will continue to decline with age (Kroemer and Grandjean, 2009).

The results of research conducted by Choobineh show that someone who has an abnormal body mass index is at risk of experiencing musculoskeletal complaints in the lower back region twice as high as in people with a normal body mass index (Choobineh *et al.*, 2007).

3.2 Environmental Conditions

The work environment in which the research subjects work, includes conditions of temperature, relative humidity, sound intensity, and light intensity. The results of the analysis of the measurement of working environment conditions are shown in Table 2 below.

Table 2. Conditions of the Work Environment

	Mean	Standard Deviation	Range
Temperature (° C)	31.24	3.14	27.19 – 33.42
Humidity (%)	77.89	2.56	71.37 – 86.73
Sound intensity (dB)	64.28	5.21	59.74 – 74.21
Light intensity (lux)	367.89	11.68	319.38 – 479.42

All components of the work environment as shown in Table 2 show that before and after work are still within the limits of adaptation to carry out a work activity. The upper threshold value of the air temperature for workers is 33°C and the relative humidity of Indonesian workers which is still relatively comfortable is between 70% - 80%. The lack of light intensity can cause visibility and eyestrain problems .

The intensity of excessive lighting can also cause glare, reflection, excessive shadows, visibility and eyestrain. Armstrong further recommends that general lighting intensity according to work with moderate level of accuracy and contrast, is between 240-400 luks, such as work at the front office of this hotel, while Gandjean recommends between 200-300 luks (Kroemer and Grandjean,



2009). The highest threshold value of sound intensity that is acceptable to labor without causing permanent hearing loss for work time of no more than 8 hours a day is 85 dBA (BSN, 2004).

3.3 Work Load

A person's workload can be measured based on the pulse rate (Adiputra, 2002). Based on the calculation of the working pulse as shown in Table 3, it was found that the resting pulse rate was 72.46 minutes per minute, while the working pulse rate was 122.45 minutes per minute. There was a significant increase ($p < 0.005$) between resting pulse and working pulse. The work pulse is classified as a heavy workload. Working pulse rate is classified as moderate in the range of 100 - 125 beats per minute (Kroemer and Grandjean, 2009).

Table 3. Results of Workload Analysis

Variable	Mean (dpm)	SD	t	p
Resting Pulse	72.46	3.41	-20.68	0.000
Working Pulse	122.45	4.91		

3.4 Musculoskeletal Disorders and General Fatigue

Subjective complaints of workers as shown in Table 4, there was a significant increase ($p < 0.05$) between measurements before work and after work both in musculoskeletal disorders and in general fatigue. After work, musculoskeletal disorders occur in workers are pain in the shoulders, neck and waist (66% of workers), pain in the left arm, right arm, and pain in the back (55% of workers). While general fatigue that occurs is fatigue in the whole body, pain in the back (83% of workers), then feel heavy on the head, feet feel heavy, stiff or awkward in moving, stiff in the shoulder part 50% of workers. This complaint occurs because the work posture is bent over which is done repeatedly.

Table 4. Analysis of Musculoskeletal Disorders and Fatigue

Variable		Mean score	SD	t	p
Musculoskeletal disorders	Before work	35.42	3.56	-14.18	0.000
	After work	63.33	5.91		
Fatigue	Before work	43.75	3.11	-13.72	0.000
	After work	64.51	6.04		

Work postures bent for a long time are work postures that are not physiological. Non-physiological work postures can be caused by characteristics of task demands, work tools, work stations, and work postures that are not in accordance with the abilities and limitations of workers (Manuaba, 2006). Non-physiological work postures carried out for years can cause bone abnormalities in workers (Kroemer and Grandjean, 2009). Some of the problems of workers with unnatural work postures are musculoskeletal disorders and fatigue (Yusuf and Irwanti, 2017). To overcome the problems of skeletal muscle complaints and fatigue, it is necessary to improve work postures or new work systems by following the ergonomics method (Irwanti *et al.*, 2018).

3.5 RULA (Rapid Upper Limb Assessment) Analysis

By using the RULA analysis as shown in Figure 1 and the score values in the RULA analysis shown in Table 5, a total score of 6 was obtained in both the body parts of group A and in the body parts of group B, and the grand score of 7 with a recommendation for action was immediately corrected. Therefore, the results of the analysis of the workload of front office workers are recommended to immediately make good improvements. Improving working conditions based on RULA analysis and ergonomic interventions will reduce the level of risk and workload of workers (Yusuf *et al.*, 2016).



Figure 1. Chef / cook's Work Posture for plating activities



Table 5. RULA Analysis Score Results

Body Group A Postur Rating	Body Group B Postur Rating
Upper arm : +3	Neck : +3
Lower arm : +2	Trunk : +3
Wrist : +2	Leg : +1
Twist : +2	Muscle use : +1
Muscle use : +1	Force/load : +0
Force/load : +0	
Posture Score A : +3	Posture score B : +4
Final wrist, Arm, score (total score 1) : +4	Final neck, truck & leg score (total score 2) : +5
Grand Score : 5	

In Table 5, a grand score of 5 is obtained, this shows that the level of work risk is moderate and requires immediate intervention / improvement.

4. CONCLUSIONS AND SUGGESTIONS

4.1 Conclusions

From the results of the analysis and discussion above, the following conclusions can be drawn.

1. Workload on the plating process of kitchen workers at Villa Air Bali Boutique Resort And Spa Canggu-Bali including moderate workload.
2. There is a significant difference in musculoskeletal disorders and general fatigue between before and after work. After work, musculoskeletal disorders occur in workers are pain in the shoulder, neck and waist (66% of workers), pain in the left arm, right arm, and pain in the back (55% of workers). While general fatigue that occurs is fatigue in the whole body, pain in the back (83% of workers), then also feels heavy on the head, legs feel heavy, stiff or awkward in moving, stiff shoulder section 50% of workers. Therefore there is a need for a solution to reduce musculoskeletal disorders and general fatigue in workers.
3. On the risk level score using the RULA method, a grand score of 5 indicates a moderate level of risk and immediate or immediate corrective action is needed.



4.2 Suggestion

From the results of the above research the following things are suggested,

1. There is a need to improve the work station to provide solutions to the problems of the workers of the plating process at kitchen of Villa Air Bali Boutique Resort and Spa Canggu-Bali so as to reduce workload, musculoskeletal disorders and general fatigue.
2. Work station improvement will be followed by work posture improvement so that employee work productivity will increase.

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