Ergonomic Analysis Of Calorie Physical Workload And Mental Workload Towards The Indonesian Paramedics Of Public And Private Hospital

Iwan Nauli Daulay, Henni Noviasari

Abstract—The measurement of physical work load on the based of calorie and mental work load on the based of Subjective Workload Assessment Technique (SWAT) held in Pekanbaru, Riau province. It aim to know degree of physical and mental workload towards Indonesian paramedics work and comparation work load of the both public hospital and private hospital especially in the Emergency Installation Unit. Requiring data especially for physical workload was obtained by using interview toward paramedics for information of the work activities, weight percentage of each activity during work hours, body weight of paramedics to determining physical work load base on table of kcal/hours/body weight standardization. Then requiring data for mental workload was obtained by using questionnaires based on SWAT. The results showing degree of physical work load towards paramedics in middle range (200 – 350 kcal/hour) it means the paramedics work in ergonomic condition for both hospital and have no significant different in both of the hospital. Then, the result of mental work load analysis for both hospitals roughly the same in middle range of scale and have no significant different, it means the paramedics work in ergonomic condition. Hence, its implication lead to designing ergonomic work load on prevent work overstress and under stress in productive environment.

Index Terms— Physical work load, Mental work load

1 INTRODUCTION

One of the most important production factors is labor, where its existence is the main factor in driving the operational wheels of the company. Human physical and mental abilities are largely determined by body condition, age and sex and overall physiological condition of the body. With limited human capabilities, companies must be aware that they can design a work system which considers safety, comfort, safety and ease factors that can optimize the ability of human labor. In doing works, body will receive a burden from the outside. The burden can be either physical or mental burden. According to Meshkati (1988) in Hariyati (2011), workload is defined as a difference between the capacity or ability of workers and the demands of work to be done. In ergonomics, all workloads received by a person must be appropriate or balanced to physical abilities, cognitive abilities and limitations of the person who receives the burden. According to Tarwaka (2013: 2) every activity or work which is not done ergonomically will cause inconvenience, high costs, accidents and illnesses caused by work increases, and work performance decreases which results in a decrease in efficiency and labor power. Thus, it is necessary for the implementation of ergonomics in each company for the accuracy and suitability of the work performed by each employee. Ergonomic work systems will have an impact on the work results, which are increased effectiveness and industrial efficiency. Other impacts are lack of employee absenteeism, increased product quality, reduced work accidents, reduced costs for health and insurance as well as turn-over rates.

Over time, the number of hospitals in Indonesia in general and Pekanbaruin particular has grown. The increasing number of hospitals followed by the increasing number of outpatients and hospitalizations, which encourage both government and private sector to continue building new hospitals, creating competitive advantages and trying to provide satisfaction for the patients. In each hospital, the presence of medical and paramedic workers is crucial, solid and has a risky job as well as be required to provide the best service for patients. As shown in Table 1 below is the primary data related to the variables obtained through questionnaires about paramedics in public hospital (RSUD), Pekanbaru as pre-research data. The questionnaire was given to 20 patients.

TABLE 1. Pre-research of Paramedic Service Satisfactory in the Emergency Room of Riau Public Hospital

NO.	QUESTIONS	Alternative	Weight	Frequency	Score
1.	Responsiveness	Strongly agree	5	2	10
		Agree	4	6	24
		Neutral	3	8	24
		Disagree	2	4	8
		Strongly Disagree	1	0	0
		Number			66
2.	Reliability	Strongly agree	5	1	5
		Agree	4	5	20
		Neutral	3	11	33

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		Disagree	2	3	6
		Strongly Disagree	1	0	0
		Number			64
Total Number					130
Average					3.25

According to Table 1, it can be seen that both parameters namely responsiveness and reliability, which were part of service quality dimension used in pre-research, showed the scale of 1-5 with the average of 3,25. It indicated that the service satisfactory was in the level of fairly good. The pre-research data of patient's satisfactory towards private hospital service quality in Pekanbaru is shown in Table 2 as follows.

TABLE 2. Pre-research of Paramedic Service Satisfactory in the Emergency Room of Riau Province Public Hospital

NO.	QUESTIONS	Alternative	Weight	Frequency	Score
1.	Responsiveness	Strongly agree	5	5	25
		Agree	4	7	28
		Neutral	3	6	18
		Disagree	2	2	4
		Strongly Disagree	1	0	0
		Number			75
2.	Reliability	Strongly agree	5	4	20
		Agree	4	8	32
		Neutral	3	6	18
		Disagree	2	2	4
		Strongly Disagree	1	0	0
		Number			74
Total Number					149
Average					3.73

Source: 20 patients of private hospital in Pekanbaru

According Table 2 above shows that the level of patients' satisfaction to paramedic service in private hospital in Pekanbaru had the average score of 3,73, which indicated a fairly good score and was better than the score of Riau public hospital. It can be used as a phenomenon in measuring the burden of physical and mental works of emergency room paramedics, in which when they were given appropriately to the paramedics, it would be resulted in the satisfaction of the patients. Generally, paramedics must be always ready in emergency room, and able to pick up trauma patients in the location, so that it is considered as heavy work that needs high consistency and have a high risk. The challenge and condition faced by paramedic was taken as a research related to physical and mental burden of work for paramedics, by giving sample limit from private and public hospitals in Pekanbaru.

2 Backround of Study

2.1 Workload Ergonomic

The term of ergonomic is originated from Greek consisting of two syllables which are ergon means work and nomos mean rule or law. According to Wigjosoebroto (2003) in Simanjuntak (2010:54), ergonomic is an effort in terms of knowledge, technology, and art to harmonize tool, machine, system, organization, and environment with human's capability, ability, and limitation to achieve condition and environment which are healthy, safe, comfortable, efficient, and productive, by using human's body optimally. Workload can be defined as the different between work capacity or ability with work demand (Meshkati, 1988, in Tarwaka, 2013:106). Too much workload will cause physical and mental fatigue and emotional reactions. While too little workload will cause boredom and monotonous which results in a lack of attention to work so that it is potentially harmful to workers (Manuaba, 2000, in Prihatini, 2007).

2.2 Physical Workload

Organizational Physical work is a work that requires physical energy from muscles that functions as a source of energy. Physical work is also called 'manual operation' where work performance will depend entirely on human efforts that act as a source of energy and work control which will result in a change in physiological functions in the human body with several indicators, including: Oxygen consumption; Heart rate; Air circulation or vertilation of the lungs; Body temperature, especially rectal temperature; The concentration of lactic acid in the blood; Chemical composition in blood and amount of urine; Rate of evaporation through sweat, and so on. Assessment of physical workload can be done based on body metabolism, based on the number of caloric needs, and based on the cardiovascular system. The Minister of Manpower through Decree Number 51 (1999) in Tarwaka (2013: 114) established the category of workload according to the caloric needs as follows:

- Light workload: 100-200 kilocalories/hour
- Moderate workload:>200-350 kilocalories/hour
- Heavy workload: >350-500 kilocalories/hour

The hourly caloric requirement is the fulfillment of caloric needs for energy released due to the main workload. Therefore, additional calories are still needed if there are additional workloads, such as for non-ergonomic work stations, forced working hours attitude, hot temperatures of the environment, and so on.

2.3 Mental Workload

The According to Henry R.Jex (1988) in Tarwaka (2013), mental workload is a workload which comes from the difference between the workload demands of a task with the maximum capacity of a person's mental load in a motivated condition. In general, Meshkati, Hancock, & Rahimi (1992) in Tarwaka (2013: 131) classified methods to measure mental workload into three (3) categories, namely subjective method: physiological and biomechanical method; performance-based

method. The method to measure subjective mental workload which has been widely used includes the method using subjective workload assessment techniques (SWAT). This method has been developed by Gary Reid in Wignjosoebroto and Purnawan Zaini (no year: 3) from the Human Engineering Division at Armstrong Laboratory, Ohio-USA. It is used to analyze workload faced by a person who must carry out various activities (both physical and mental workload). In its application, SWAT will provide a subjective scaling which is simple and easy to quantify the workload of various activities which must be done by a worker. SWAT will also describe the work system as a multi-dimensional model of workload consisting three dimensions or factors, namely (1) Time Load, (2) Mental Effort Load, and (3) Psychological Stress Load. Each of them consists of three levels, namely low, medium and high. In the application, each level for these three factors will be combined so that they form 27 combinations of levels of mental workload.

TABLE 3. Rate Scale Dimension /Score of SWAT Method

1.	Time Load 1. Often have free time, rarely or never have interruption or overlap between activities. 2. Sometimes have free time, rarely have interruption or overlap between activities. 3. Almost have no free time, often or always have overlap between activities in worktime.
2.	Mental Effort Load 1. Need little mental effort with full awareness or need little concentration. Almost all activities are automatic, require little attention or no attention at all. 2. Need enough mental effort with awareness or need sufficient concentration. The complexity of the work is quite high due to uncertainty, unfamiliarity, and unpredictability. Attention-giving needs to be considered. 3. Mental effort and high concentration are necessary. Activities are very complex so that full attention is needed.
3.	Psychological Stress Load 1. There is a little confusion, risk, frustration, anxiety, or those traits mentioned can be easily accommodated. 2. Middle-level stress caused by confusion, risk, frustration, anxiety as additional load. Significant compensation is needed to maintain good performance. 3. High-level stress caused by confusion, risk, frustration, and anxiety. High determination and self-control are needed.

Source: Tarwaka (2013:132). ErgonomiIndustri (Dasar-Dasar PengetahuanErgonomi dan Aplikasi di TempatKerja)

3 Research Methods

3.1 Location

The research was done in public and private hospitals which have equally good qualification. The public hospital chosen was RSUD Arifin Achmad in Pekanbaru, Indonesia, with the consideration as the biggest public hospital with most visitors in Pekanbaru.

3.2 Population dan Sample

According to Roscoe (1975) in Sasmita (2013:39), the general guideline which can be used to decide the scale of research sample is:

a. Sample which contains more than 30 and less than 500 is adequate for most research.
b. If the sample is divided into some sub samples, a minimum of 30 for each category of sub sample is adequate.
c. Sample with less than 30 cannot be accepted for analysis using parametric statistics.

Sample taken from a population can be divided into two categories of data collection techniques, namely probability sampling and nonprobability sampling (Siregar, 2013: 56). In this study, nonprobability sampling technique was used, which was purposive sampling. Purposive sampling is a method to classify the respondents to be made as sample based on certain criteria (Siregar, 2013: 60). Some of the criteria are:

- Between 25-45 years old (productive age)
- Gender
- Body weight

The sample taken in this research was limited or using the quota of 30 respondents (Sugiyono, 2013:67).

3.3 Data Collection Technique

Data collection technique used was by survey to obtain primary data needed. There are two methods of survey to collect data, namely interview and questionnaire (Indriantoro, 2009:152). By using questionnaire, the researcher obtained the primary data.

3.4 Operational Definition and Variable Indicator

Operational definition and variable indicator about physical load, mental load, and stress load can be seen in the following Table 4.

TABLE 4. Operational Definition and Variable Indicator

No.	Variable	Indicator	Measurement Scale
1.	Physical workload is a work that requires physical energy from muscles that functions as a source of energy (Tarwaka, 2013:109)	• Assessment of workload based on the total of calories needed: 1. Sitting in rest condition. 2. Standing in a calm condition. 3. Standing by concentration to an object. 4. Walking lightly. 5. Walking rather	Ratio

		fast. 6. Walking downstairs. 7. Walking fast. 8. Walking upstairs.	
2.	Mental workload is a workload which comes from the difference between the workload demands of a task with the maximum capacity of a person's mental load in a motivated condition. (Hendry R.Jex, 1988) in Tarwaka (2013:).	• Time load 1. Has free time 2. Doing interruption • Mental effort load 1. High concentration 2. High attention 3. High uncertainty. • Psychological stress load **1.** Confused **2.** Frustrated **3.** Determined and self-improved	Likert

Source: Tarwaka (2013:105)

3.5 Analysis Method

3.5.1 Analysis Method

Descriptive analysis is research which deals with the question of the existence of single variables, both for one variable or more variables (single variable is variable which stand alone and not independent variable, because if independent variable is always paired with the dependent variable).

3.5.2 Analysis of Physical Workload

Data analysis used for physical workload data is the assessment of physical workload by using the calculation of hourly calorie needs. The calculation formula is as follows. With the standard of kilo calorie can be seen in the table 5.

Physical Workload = Standard of kilo calorie x work hour x

Source: Tarwaka (2013:115). ErgonomiIndustri (Dasar-dasarErgonomi dan Aplikasi di TempatKerja)

TABLE 5. Standard of kilo calorie per hour

No.	Types of Activities	Kilo calorie/hour/ bodyweight's kg
1	Sitting in rest condition.	1,43
2	Standing in a calm condition.	1,50
3	Standing by concentration to an object.	1,63
4	Walking lightly with the speed of ±3,9 km/hour	2,86
5	Walking rather fast with the speed of ±5,6 km/hour	4,28
6	Walking very fast with the speed of ±8 km/hour	5,20
7	Walking downstairs	9,28
8	Walking upstairs	15,80

Source: Tarwaka (2013:115). ErgonomiIndustri (Dasar-dasarErgonomi dan Aplikasi di Tempat

Then, it can be described the category of the physical workload based on the category of calorie-need workload, in line with the Regulation of Minister of Labor No.51 (1999).

3.5.2 Analysis of Mental Workload

Data analysis used for mental workload data is mental workload assessment using subjective workload assessment technique (SWAT) with a measurement scale of the research instrument named Likert. To provide an overview of the research results of each variable being studied, the assessment category is determined based on the scores obtained from the results of the questionnaire. The methods to determine the intended assessment categories are as follows:

1) Determining the assessment weight for each choice, in this case is based on Likert scale.
2) Calculating the score for each statement by multiplying the weight of the value by the number of frequencies (the number of respondent's answers to each alternative answer for each item statement)
3) Based on the average number in the frequency table, the categories of the results can be seen in the class interval table.

4 THE RESULT

4.1 Physical Workload

The physical workload was measured by multiple formulations in calculating the number of calories spent per hour. According to the types of determined activities which were related to paramedic activities during work based on Table 5 of Calorie Requirements Per Hour According to Activity Type, there are 8 items of activities that have been identified at paramedic work or activities. Then weighting was carried out according to the paramedic's assessment based on the frequency level of all activities during working hours. The results of calculation by using the multiple formulation formula for calculating the average number of calories per hour during working hours (8 hours) at Arifin Ahmad Public Hospital in Pekanbaru are presented as Table 6. Following by The physical workload of paramedics in private hospitals is presented as Table 7.

TABLE 6. Calorie-based Physical Workload Towards Paramedics of Emergency Room of Public Hospital in Riau Province

ITEM	PHYSICAL WORKLOAD	WEIGHT (%)	WORK-ING HOUR	DURATION (HOUR)	WEIGHT AVRG (KG)	KCAL/ HOUR/BW	BKF VALUE (CCAL/HOUR)
1	Sitting in rest condition.	0.1	8	0.8	62.3	1.43	71.27
2	Standing in a calm condition.	0.05	8	0.4	62.3	1.5	37.38
3	Standing by concentration to an object.	0.175	8	1.4	62.3	1.63	142.17
4	Walking lightly with the speed of ±3,9 km/hour	0.3	8	2.4	62.3	2.86	427.63
5	Walking rather fast with the speed of ±5,6 km/hour	0.3	8	2.4	62.3	4.28	639.94
6	Walking downstairs	0.025	8	0.2	62.3	5.2	64.79
7	Walking very fast with the speed of ±8 km/hour	0.025	8	0.2	62.3	9.28	115.63
8	Walking upstairs	0.025	8	0.2	62.3	15.8	196.87
	SUM	1	8	8	62.3	41.98	1695.68
TOTAL PHYSICAL WORKLOAD/ HOUR							211.96

Source: Processed Data

TABLE 7. Calorie-based Physical Workload Towards Paramedics of Emergency Room of Public Hospital in Riau Province

ITEM	PHYSICAL WORKLOAD	WEIGHT (%)	WORK-ING HOUR	DURATION (HOUR)	WEIGHT AVRG (KG)	KCAL/ HOUR/BW	BKF VALUE (CCAL/HOUR)
1	Sitting in rest condition.	0.1	8	0.8	61.24	1.43	70.06
2	Standing in a calm condition.	0.05	8	0.4	61.24	1.5	36.74
3	Standing by concentration to an object.	0.175	8	1.4	61.24	1.63	139.75
4	Walking lightly with the speed of ±3,9 km/hour	0.3	8	2.4	61.24	2.86	420.35
5	Walking rather fast with the speed of ±5,6 km/hour	0.3	8	2.4	61.24	4.28	629.06
6	Walking downstairs	0.025	8	0.2	61.24	5.2	63.69
7	Walking very fast with the speed of ±8 km/hour	0.025	8	0.2	61.24	9.28	113.66
8	Walking upstairs	0.025	8	0.2	61.24	15.8	193.52
	SUM	1	8	8	61.24	41.98	1666.83
	TOTAL PYSICAL WORKLOAD /HOUR						208.35

Based on table 6 and table 7 above, it showed that the physical workload of emergency room paramedics in public hospital in Riau was higher than the paramedics in private hospital, then the classification of physical workload be seen in the recapitulation table as follows:

TABLE 8. Calorie-based Physical Workload Towards Paramedics of Emergency Room of Public Hospital in Riau Province

NO.	EMERGENCY ROOM PARAMEDICS	AVRG OF PHYSICAL WORKLOAD (CCAL/HOUR)	CATEGORIES OF WORKLOAD
1.	Public Hospital of Riau Province	211,96	Medium
2.	Private Hospital in Pekanbaru	208,35	Medium

Source: Processed Data

From Table 8 above, it can be seen that the ergonomically physical workload of emergency room paramedic in both hospitals were in medium category. It was considered safe and well, but it still needed improvement to make it good or light workload.

4.2 Mental Workload

The response from the respondents regarding the research variables was based on questionnaires which had been designed in such a way, so that class intervals were needed to make classifications or categories could be identified from the average number of respondents' responses. For the rating scale, the scale range formula used is as follows (Sugiyono, 2013: 14):

$$Rs = \frac{n(m-1)}{5} = \frac{30\,(5-1)}{5} = \frac{120}{5} = 24$$

This scale range will be used to determine the level which shows the perception value of the variable studied. Table 9 is a range of table for measuring the responses of respondent. Following by Table 10~12are the data explained based on questions in questionnaire to 30 respondents of emergency room paramedics in Public Hospital of Riau Province.

TABLE 9. Range of Measurement Scale

Scale	Note
127 – 150	Strongly Agree (SA)
103 – 126	Agree (A)
79 – 102	Neutral (N)
55 – 78	Disagree (D)
30 – 54	Strongly Disagree (SD)

Source: Data Processed

TABLE 10. Response of Mental Workload (SWAT) of Emergency Room Paramedics in Public Hospital of Riau Province (Mental Time Load)

NO.	Statement	Alternative Answers	Weigh	Frequency	Score
1.	MTL1	SA	5	2	10
		A	4	5	20
		N	3	22	66
		D	2	1	2
		SD	1	0	0
		TOTAL			98
2.	MTL2	SA	5	2	10
		A	4	4	16
		N	3	21	63
		D	2	3	6
		SD	1	0	0
		TOTAL			95
3.	MTL3	SA	5	2	10
		A	4	4	16
		N	3	23	69
		D	2	1	2
		SD	1	0	0
		TOTAL			97
TOTAL					290
AVERAGE SCORE					96.67

Source: Data Processed

Table 10 contained the respondents' response of mental workload based on Mental Time Load dimension which had the average score of 96,67. Based on the table of score scale range, it indicated that the respondents had the impression of fairly good or neutral to the mental time load.

TABLE 11. Response of Mental Workload (SWAT) of Emergency Room Paramedics in Public Hospital of Riau Province (Mental Effort Load)

NO.	Statement	Alternative Answers	Weigh	Frequency	Score
1.	MEL1	SA	5	2	10
		A	4	5	20
		N	3	21	63
		D	2	2	4
		SD	1	0	0
		TOTAL			97
2.	MEL2	SA	5	2	10
		A	4	4	16
		N	3	21	63
		D	2	3	6
		SD	1	0	0
		TOTAL			95
3.	MEL3	SA	5	3	15
		A	4	5	20
		N	3	21	63
		D	2	1	2
		SD	1	0	0
		JUMLAH			100
4.	MEL4	SA	5	2	10
		A	4	6	24
		N	3	20	60
		D	2	2	4
		SD	1	0	0
		TOTAL			98
TOTAL					390
AVERAGE SCORE					97.5

Source: Data Processed

Table 11 contained the respondents' response of mental workload based on Mental Effort Load dimension which had the average score of 97,5. Based on the table of score scale range, it indicated that the respondents had the impression of fairly good or neutral to the mental effort load.

TABLE 12. Response of Mental Workload (SWAT) of Emergency Room Paramedics in Public Hospital of Riau Province (Mental Psychology Load)

NO.	Statement	Alternative Answers	Weigh	Frequency	Score
1.	MPL1	SA	5	2	10
		A	4	4	16
		N	3	22	66
		D	2	2	4
		SD	1	0	0
		TOTAL			96
2.	MPL2	SA	5	2	10
		A	4	6	24
		N	3	20	60
		D	2	2	4
		SD	1	0	0
		TOTAL			98
3.	MPL3	SA	5	3	15
		A	4	5	20
		N	3	19	57
		D	2	3	6
		SD	1	0	0
		TOTAL			98
4.	MPL4	SA	5	2	10
		A	4	4	16
		N	3	21	63
		D	2	3	6
		SD	1	0	0
		TOTAL			95
5.	MPL5	SA	5	3	15
		A	4	4	16
		N	3	22	66
		D	2	1	2
		SD	1	0	0
		TOTAL			99
TOTAL					486
AVERAGE SCORE					97.2

Source: Data Processed

Table 12 contained the respondents' response of mental workload based on Mental Psychology Load dimension which had the average score of 97,2. Based on the table of score scale range, it indicated that the respondents had the impression of fairly good or neutral to the mental psychology load

TABLE 13. Response of Mental Workload (SWAT) of Emergency Room Paramedics in PekanbaruPrivate Hospital (Mental TimeLoad)

NO.	Statement	Alternative Answers	Weigh	Frequency	Score
1.	MTL1	SA	5	3	15
		A	4	5	20
		N	3	21	63
		D	2	1	2
		SD	1	0	0
		TOTAL			100
2.	MTL2	SA	5	2	10
		A	4	4	16
		N	3	21	63
		D	2	3	6
		SD	1	0	0
		TOTAL			95
3.	MTL3	SA	5	2	10
		A	4	5	20
		N	3	22	66
		D	2	2	4
		SD	1	0	0
		TOTAL			100
TOTAL					295
AVERAGE SCORE					98.33

Source: Data Processed

Table 13 contained the respondents' response of mental workload based on Mental Time Load dimension which had the average score of 98,33. Based on the table of score scale range, it indicated that the respondents had the impression of fairly good or neutral to the mental time load.

TABLE 14. Response of Mental Workload (SWAT) of Emergency Room Paramedics in PekanbaruPrivate Hospital (Mental Effort Load)

NO.	Statement	Alternative Answers	Weigh	Frequency	Score
1.	MEL1	SA	5	4	20
		A	4	4	16
		N	3	20	60
		D	2	2	4
		SD	1	0	0
		TOTAL			100
2.	MEL2	SA	5	2	10
		A	4	5	20
		N	3	21	63
		D	2	2	4
		SD	1	0	0

		TOTAL			97
3.	MEL3	SA	5	3	15
		A	4	5	20
		N	3	19	57
		D	2	3	6
		SD	1	0	0
		TOTAL			98
4.	MEL4	SA	5	2	10
		A	4	6	24
		N	3	20	60
		D	2	2	4
		SD	1	0	0
		TOTAL			98
TOTAL					393
AVERAGE SCORE					98.25

Source: Data Processed

Table 14 contained the respondents' response of mental workload based on Mental Effort Load dimension which had the average score of 98,25. Based on the table of score scale range, it indicated that the respondents had the impression of fairly good or neutral to the mental effort load.

TABLE 15. Response of Mental Workload (SWAT) of Emergency Room Paramedics in PekanbaruPrivate Hospital (Mental Psychology Load)

NO.	Statement	Alternative Answers	Weigh	Frequency	Score
1.	MPL1	SA	5	2	10
		A	4	5	20
		N	3	21	63
		D	2	2	4
		SD	1	0	0
		TOTAL			97
2.	MPL2	SA	5	3	15
		A	4	7	28
		N	3	18	54
		D	2	2	4
		SD	1	0	0
		TOTAL			101
3.	MPL3	SA	5	3	15
		A	4	6	24
		N	3	19	57
		D	2	2	4
		SD	1	0	0
		TOTAL			100
4.	MPL4	SA	5	2	10
		A	4	4	16
		N	3	21	63
		D	2	3	6
		SD	1	0	0
		TOTAL			95
5.	MPL5	SA	5	3	15
		A	4	4	16
		N	3	22	66
		D	2	1	2
		SD	1	0	0
		TOTAL			99
TOTAL					492
AVERAGE SCORE					98.4

Source: Data Processed

Table 15 contained the respondents' response of mental workload based on Mental Psychology Load dimension which had the average score of 98,4. Based on the table of score scale range, it indicated that the respondents had the impression of fairly good or neutral to the mental psychology load. The following is the recapitulation table from the respondents' responses toward the mental workload.

TABLE 16. Recapitulation of Average Score of Mental Workload of Emergency Room Paramedics in Hospital

MENTAL WORKLOAD	Average Value		Remark
	Public Hospital	Private Hospital	
Mental Time Load	96.67	98.33	Neutral
Mental Effort Load	97.5	98.25	Neutral
Mental Psychology Load	97.2	98.4	Neutral
Average Score	**97.12**	**98.33**	**Neutral**

Source: Data Processed

Table 19 above showed that category of mental workload of paramedics in both hospitals could be categorized as fairly good or neutral.

4.3 Instrument Test

4.3.1 Validity Test

Instrument test was done by giving it to the respondents in Public Hospital of Riau Province. The coefficient correlation value of each statement item compared to r table was 0,361, which was valid if r count > r table. The following is the result of validity test which was done by using SPSS 2.1.

TABLE 17. Result of Validity Test

Item	Variable	Indicator	r count	r table	Notes
1.	*Mental Time Load*	MTL1	0,431	0,361	Valid
		MTL2	0,450	0,361	Valid
		MTL3	0,447	0,361	Valid
2.	*Mental Effort Load* (X2)	MEL1	0,854	0,361	Valid
		MEL2	0,907	0,361	Valid
		MEL3	0,876	0,361	Valid
		MEL4	0,758	0,361	Valid
3.	*Mental Psychology Load*	MPL1	0,784	0,361	Valid
		MPL2	0,794	0,361	Valid
		MPL3	0,849	0,361	Valid
		MPL4	0,672	0,361	Valid
		MPL5	0,671	0,361	Valid

Source: Data Processed

Table 17 above showed that all indicators used to measure variables in this study had correlation coefficients which were greater than r table, so all of these indicators were declared valid. Validity is very necessary because the data used for analysis must have consistency, so that each indicator used in the questionnaire is not contradictory and has consistency among indicators.

4.3.1 Reliability Test

To know the consistency of measurement variable result to bring reliable data, the reliability test for instrument was done. SPSS 21.0 for Windows gives facility to measure reliability by using statistics test of Cronbach Alpha. A measurement is reliable if it has Cronbach Alpha coefficient of 0,60 or greater.

TABLE 18. Reliability Test Result

No.	Variable	Alpha	Notes
1.	*Mental Time Load*	0,632	Reliable
2.	*Mental Effort Load*	0,936	Reliable
3.	*Mental Psychology Load*	0,900	Reliable

Source: Data Processed

Based on the reliability test result in Table 21, it could be seen that brand trust variable had Alpha coefficient greater than 0,6. Therefore, the questionnaire could be categorized as reliable.

4.4 Comparative Analysis of Physical and Mental Workload

Based on the decision, the sample of respondents for both public and private hospital was 30 respondents for each. The result of comparative analysis is presented as follows:

TABLE 19. Result of Comparative Analysis for Physical Workload of Emergency Room Paramedics in Public Hospital of Riau Province and Private Hospital

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Diff.	Std. Error Diff.	95% Confidence Interval of the Difference	
									Lower	Upper
BKF	Equal variances assumed	.040	.843	.697	58	.488	1.058	1.518	-1.980	4.097
	Equal variances not assumed			.697	57.955	.488	1.058	1.518	-1.980	4.097

Source: Data Processed

Based on Table 22 above, it could be seen that sig t count was 0.488> 0.05, which meant there was no significant difference in physical workload of emergency room paramedic in public and private hospitals. This meant that the physical workload experienced by emergency paramedic at both Arifin Ahmad Public Hospital and Pekanbaru private hospital had no difference. Below is a comparative analysis of mental workload on emergency room paramedics from both hospitals.

TABLE 12. Result of Comparative Analysis for Mental Workload of Emergency Room Paramedics in Public Hospital of Riau Province and Private Hospital

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Diff.	Std. Error Diff.	95% Confidence Interval of the Difference	
									Lower	Upper
BKM	Equal variances assumed	.164	.687	-.275	58	.785	-.100	.364	-.829	.629

	Equal variances not assumed			-.275	56.625	.785	-.100	.364	-.829	.629

Source: Data Processed

Based on Table 20 above, it could be seen that sig t count was 0,785 > 0.05, which meant there was no significant difference in mental workload of emergency room paramedic in public and private hospitals. This meant that the physical workload experienced by emergency paramedic at both Arifin Ahmad Public Hospital and Pekanbaru private hospital had no difference.

4.3 Discussion

Based on the results of the validity and reliability test, all questionnaires were valid and reliable which means that the primary data obtained could be accounted for its accuracy. From the results of the descriptive test of the physical and mental workload, it can be seen that the physical workload of emergency room paramedics in Public Hospital of Riau Province and Pekanbaru Private Hospital were in the moderate category, this is quite good but still needed improvement in the future. In addition, mental workload of emergency room paramedics in Public Hospital of Riau Province and Pekanbaru Private Hospital is categorized as good or moderate so that it does not cause under-stress for the paramedics. Comparative analysis also showed that there is no difference between Public Hospital of Riau Province and Pekanbaru Private Hospital regarding to physical and mental workload of their paramedics. It shows that the physical and mental workload experienced by paramedics in the two hospitals are relatively the same.

5 CLOSING

5.1 Conclusion

According to the research result and discussion, it can be concluded that:

5.1.1 Conclusion

- Calorie-based physical workload of emergency room paramedics in Arifin Ahmad Public Hospital in Pekanbaru, Riau Province, is in moderate category so it is considered good but still needs improvement. It also applies for mental workload which is in fairly good or neutral category so that it does not cause overstress or under-stress.
- Calorie-based physical workload of emergency room paramedics in Pekanbaru private hospital is in moderate category so that it is considered good but still needs improvement, so as mental workload which is in fairly good or neutral category so that it does not cause overstress or under-stress.
- There is no significant difference between physical workload of emergency room paramedics in Arifin Ahmad Public Hospital of Riau Province and Pekanbaru private hospital.
- There is no significant difference between mental workload of emergency room paramedics in Arifin Ahmad Public Hospital of Riau Province and Pekanbaru private hospital.

5.2 Suggestion

Based on the conclusion and review of literature, the researcher suggested the following:

- The hospital must increase the number of paramedics according to the standards of Minister of Health Regulation Republic of Indonesia in 1979, so that the physical and mental workload can be improved.
- Good physical and mental workload can increase the productivity of hospital services, so that it needs to be a concern for hospital management in designing work assignments which are given to employees to avoid overstress or under-stress
- Future researchers can improve the research by using other ergonomic analysis methods which are related to physical and mental workloads and can also conduct research by using other ergonomic variables.

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