



(RESEARCH ARTICLE)



## The Relationship between Individual Characteristics, Work Shift and Mental Workload with Work Fatigue in Nurses at Wava Husada Hospital

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### Abstract

Nurses are one of the professions that have a high risk of work fatigue. Almost 80% of nurses in Canada experience work fatigue. Work fatigue occurs due to an imbalance between task demands and work capacity. This study included quantitative research with an analytical observational type of research. The research design used was cross-sectional. The population of this study was all inpatient nurses of Wava Husada Hospital with a sample of 136 respondents. The result showed that 12.5% of nurses experienced low category work fatigue, 69.1% of nurses experienced moderate category work fatigue, 16.9% of nurses experienced high category work fatigue and 1.5% of nurses experienced very high category work fatigue. There was a moderate relationship between age ( $r=0.509$ ) and work fatigue. There was no relationship between sex ( $r=-0.055$ ) and work fatigue and no relationship between length of service ( $r=0.127$ ) and work fatigue. Then there was a moderate relationship between nutritional status ( $r=0.402$ ) and work fatigue, a strong relationship between work shift ( $r=-0.547$ ) with work fatigue and a moderate relationship between mental workload ( $r=0.360$ ) and work fatigue. Gender and length of service are weakly associated with work fatigue. While age, nutritional status and mental workload are associated with moderate work fatigue, and work shift is strongly associated with work fatigue. Hospitals should periodically measure work fatigue to nurses and provide counselling and training related to work fatigue and prevention efforts.

**Keywords:** Nurses; Work Fatigue; Individual Characteristics; Work Shift; Mental Workload

### 1. Introduction

Competition in the service industry is fierce. Health services are included in one of the main service industries and have an important role in the current era of globalization. One form of organization in the health service industry engaged in health services is hospitals. A hospital is a health services institution that provides individual health services in a plenary (comprehensive) manner by providing inpatient, outpatient and emergency services (1). The hospital is a reference for every community to get proper health services (2). This is stated in UUD 1945 article 28H paragraph 1 which states that everyone has the right to get good health services (3).

In the hospital there are many human resources who play a role in the implementation of health services. Human resources who are directly involved in providing services to patients are nurses, midwives and other supporting personnel. Among the workforce, nurses rank the most, which is 40% (4).

Nurses are one of the important workforce because they act as spearheads and are the workforce that interact with patients the longest 24 hour every day (5). The existence of nurses as the spearhead of health services in hospitals must be considered and managed properly so that they can make a positive contribution to society and the progress of the hospital itself.

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Hospital is a health service that applies a work shift system for its workers, especially nurses. Working with a shift system can have a negative impact on health. Fatigue is a health disorder that many workers feel. The result of research conducted on nurses of a hospital in Yogyakarta stated that there was a significant relationship between work shift and work fatigue (6). This is in accordance with Kuswadi's opinion which states that besides causing sleep disturbance, working with a shift system can also cause work fatigue (7).

Nurses as health workers who always have the first contact with patients must always be fast, precise and careful to prevent death and disability in patients (8). The workload of nurses in hospitals varies widely. The presence of a heavy workload will affect the productivity and performance of nurses. The workload of nurses in hospitals includes physical workload and mental workload. Mental workload in the form of job complexity, working shifts or shifts and nurses who are required to concentrate and have high accuracy in caring for patients (8). Excessive mental workload on nurses can trigger the onset of work fatigue (9).

Many studies say that in addition to work shift and mental workload that can affect a person's work fatigue is caused by individual factors. These factors include age, gender, length of service and nutritional status. This is in accordance with the opinion that the occurrence of work fatigue is caused by individual characteristics, including age, gender, education level, length of work, marital status, nutritional status, etc (10).

Wawa Husada Hospital is one of the private hospitals located in the Kepanjen area, Malang Regency. This hospital is a class B hospital that has been operating since 2006. Based on the 2022 hospital profile data obtained, Wawa Husada Hospital, especially the inpatient installation, has 11 inpatient rooms with a total of 206 nurses. The number of hospitalized patients in 2021 was 1437 people, while in 2022 it was 2007 people. Wawa Husada Hospital operates for 24 hours while the number of nurses who work shifts in the inpatient installation is 206 people and is divided into 3 work shifts. The purpose of this study was to determine the relationship between individual characteristics, work shift and mental workload with work fatigue in inpatient nurses at Wawa Husada Hospital.

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## 2. Material and methods

This research includes quantitative research. This type of research is an analytical observational study. This study aims to determine the relationship between individual characteristics, work shift and mental workload with work fatigue. This study used a cross sectional approach because the independent variable and the dependent variable were measured and collected at the same time or simultaneously.

This research was conducted at the Inpatient Installation of Wawa Husada Hospital located on Jalan Panglima Sudirman Number 99A, Dilem, Kepanjen, Malang, East Java. The study time starts on March 1 – May 31, 2023. The study population was all inpatient installation nurses of Wawa Husada Hospital. The number of samples was 136 people taken by proportional random sampling technique. Data collection is carried out using primary data and secondary data. Primary data were obtained through questionnaires and interviews, while secondary data were obtained from hospital profiles. The data analysis used in this study was carried out through univariate and bivariate analysis using the help of data processing software. The results of univariate data analysis are presented in the form of frequency distribution, percentage and cross-tabulation. The bivariate data analysis test used Kendall Tau analysis and spearman correlation coefficient test. The spearman correlation coefficient test is symbolized by rho ( $\rho$ ) with a classification of the strong value of the relationship between variables.

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## 3. Results and discussion

### 3.1. The Relationship between Age and Work Fatigue

Based on the results of the study, it is known that the majority of inpatient nurses at Wawa Husada Hospital who have the age of <26 years old have low category work fatigue as many as 10 people or 7.4%. In the age group of 26-35 years, the majority have moderate category work fatigue as many as 86 people or 63.2% and in the age group of 36-45 years, the majority have moderate and high category work fatigue as many as 3 people or 2.2%.

**Table 1** Distribution of Work Fatigue by Age

Age	Work Fatigue								Total	
	Low		Medium		High		Very High			
	n	%	n	%	N	%	n	%	n	%
< 26 years	10	7.4	5	3.7	0	0.0	0	0.0	15	11.1
26-35 years	7	5.1	86	63.2	20	14.7	0	0.0	113	83
36-45 years	0	0.0	3	2.2	3	2.2	2	1.5	8	5.9
Total	17	12.5	94	69.1	23	16.9	2	1.5	136	100.00

Source: Primary Data, 2023

**Table 2** The Relationship between Age and Work Fatigue

		Age	Work Fatigue
Age	Correlation coefficient	1.000	0.509
	$\rho$ -value		0.000
	N	136	136
Work Fatigue	Correlation coefficient	0.509	1.000
	$\rho$ -value	0.000	
	N	136	136

Source: Primary Data, 2023

Based on the results of the study, it shows that there is a relationship between age and work fatigue in inpatient nurses at Wava Husada Hospital. This can be seen from the results of the spearman correlation test obtained a  $\rho$ -value of 0.000 < (0.05) so that statistically it shows a significant relationship between age and work fatigue. Both variables have a moderate and unidirectional correlation as evidenced by the value of  $r = 0.509$ . Older nurses tend to have higher job burnout and younger nurses tend to have mild burnout, so age is identified as a factor that can cause job burnout in nurses. Age is a variable that is always considered in any epidemiological study. Death and morbidity rates in almost all circumstances show a relationship with age (11). The age possessed by a person will affect the capacity, ability and condition of the body in carrying out each activity. As a person ages, the level of fatigue will also occur faster.

In line with research conducted on nurses at RSJD Dr. Amino Gondohutomo Semarang that there is a significant relationship between age and work fatigue in nurses, the results of the *Odds Ratio* (OR) in the study found that nurses who have an older age (>35 years) are 7,143 times more likely to experience moderate and severe category work fatigue compared to nurses who have a younger age ( $\leq 35$  years) (12).

### 3.2. The Relationship between Gender and Work Fatigue

**Table 3** Distribution of Work Fatigue by Gender

Gender	Work Fatigue								Total	
	Low		Medium		High		Very High			
	n	%	n	%	N	%	n	%	n	%
Male	3	2.2	24	17.6	7	5.1	0	0.0	34	25
Female	14	10.3	70	51.5	16	11.8	2	1.5	102	75
Total	17	12.5	94	69.1	23	16.9	2	1.5	136	100.00

Source: Primary Data, 2023

Based on the results of the study, it is known that the majority of inpatient nurses at Wava Husada Hospital with male gender have moderate category work fatigue as many as 24 people or 17.6% and the majority of nurses with female gender have moderate category work fatigue as many as 70 people or 51.5%.

**Table 4** The Relationship between Gender and Work Fatigue

		Gender	Work Fatigue
Gender	Correlation coefficient	1.000	-0.055
	$\rho$ -value		0.509
	N	136	136
Work Fatigue	Correlation coefficient	-0.055	1.000
	$\rho$ -value	0.509	
	N	136	136

Source: Primary Data, 2023

Based on the results of the study showed that there was no relationship between sex and work fatigue in inpatient nurses at Wava Husada Hospital. This can be seen from the results of the Kendall tau test which obtained a p value of  $0.509 > (0.05)$ . Both variables produce a correlation coefficient with a value of  $r = -0.055$  which means that there is a strong relationship that is very weak or no relationship.

In line with research conducted by Perwitasari, Tualeka (2017) related to factors related to subjective work fatigue in nurses at RSUD dr. Mohamad Soewandhie Surabaya using *Mann-Whitney statistical* test obtained a  $\rho$ -value of  $0.571 (\geq 0.05)$ , it can be concluded that there is no relationship between sex and work fatigue (13). The absence of this relationship means that many factors influence fatigue and gender is not a factor that is directly related to the occurrence of fatigue.

### 3.3. The Relationship between Working Period and Work Fatigue

**Table 5** Distribution of Work Fatigue by Working Period

Working Period	Work Fatigue								Total	
	Low		Medium		High		Very High			
	n	%	n	%	n	%	n	%	n	%
<5 years	10	7.4	42	30.9	11	8.1	0	0.0	63	46.3
5-10 years	7	5.1	45	33.1	8	5.9	1	0.7	61	44.9
>10 years	0	0.0	7	5.1	4	2.9	1	0.7	12	8.8
Total	17	12.5	94	69.1	23	16.9	2	1.5	136	100.00

Source: Primary Data, 2023

Based on the results of the study, it is known that the majority of inpatient nurses at Wava Husada Hospital with a working period of <5 years have moderate category work fatigue as many as 42 people or 30.9%. In the category of nurses' working period between 5-10 years, the majority of nurses have moderate category work fatigue as many as 45 people or 33.1% and in the category of nurses with a working period of >10 years, the majority have moderate category work fatigue as many as 7 people or 5.1%.

Based on the results of the study showed that there was no relationship between working period and work fatigue in inpatient nurses at Wava Husada Hospital. This can be seen from the results of the spearman correlation test obtained a p value of  $0.127 > (0.05)$  so that statistically it shows no significant relationship between working period and work fatigue. The two variables have a strong weak relationship as evidenced by the value of  $r = 0.140$ .

The results did not show that length of service had any association with work burnout. This is because nurses with a working period of >10 years are all >30 years old so they experience more high work fatigue because the ability of the muscles begins to decline due to age. This research is in line with research that says that there is no relationship between working time and work fatigue, one of which is due to age (14).

**Table 6** The Relationship between Working Period and Work Fatigue

		Working Period	Work Fatigue
Working Period	Correlation coefficient	1.000	0.127
	$\rho$ -value		0.140
	N	136	136
Work Fatigue	Correlation coefficient	0.127	1.000
	$\rho$ -value	0.140	
	N	136	136

Source: Primary Data, 2023

Also supported by research from Hospital X East Jakarta which states that there is no relationship between working period and work fatigue, this is because workers who have worked for a long period of time then their bodies have been able to adapt to work and their environment so as not to cause work fatigue for themselves (15). However, in this study, the fatigue caused by the nurse's age is relatively older so that the nurse's muscle ability will decrease with age. In addition, there are other factors that can cause the onset of work fatigue such as the physical environment of work and individual factors (5).

### 3.4. The Relationship between Nutritional Status and Work Fatigue

**Table 7** Distribution of Work Fatigue by Nutritional Status

Nutritional Status	Work Fatigue								Total	
	Low		Medium		High		Very High			
	n	%	n	%	n	%	n	%	n	%
Skinny	6	4.4	1	0.7	0	0.0	0	0.0	7	5.1
Normal	11	8.1	56	41.2	10	7.4	0	0.0	77	56.6
Fat	0	0.0	37	27.2	13	9.6	2	1.5	52	38.2
Total	17	12.5	94	69.1	23	16.9	2	1.5	136	100.00

Source: Primary Data, 2023

Based on the results of the study, it shows that inpatient nurses at Wava Husada Hospital have various nutritional status categories ranging from thin, normal to fat. It is known that the majority of inpatient nurses at Wava Husada Hospital who have nutritional status in the thin category have low category work fatigue as many as 6 people or 4.4%. Nurses with normal nutritional status category had the majority of moderate category work fatigue as many as 56 people or 41.2% and nurses with obese nutritional status the majority had moderate category work fatigue as many as 37 people or 27.2%.

Based on the results of the study, there is a relationship between nutritional status and work fatigue in inpatient nurses at Wava Husada Hospital. This is evident from the results of the spearman correlation test obtained a p value of  $0.000 < (0.05)$ . Both variables have a strong medium and unidirectional relationship as evidenced by the value  $r = 0.402$ . This means that the more excessive the nurse's nutritional status, the nurse will feel more fatigue and vice versa. This is because nurses have high mobility in carrying out nursing care so that nurses who are overweight tend to be difficult to move compared to nurses who have normal nutritional status.

In line with research by Larasati, Wahyuni (2019) those who state that there is a meaningful relationship between nutritional status variables and work fatigue with *p-values* of 0.014 and  $r = 0.365$  (16). In his research, it was found that

employees who experienced high work fatigue were employees with nutritional status in the obesity category as many as 84% of respondents.

**Table 8** The Relationship between Nutritional Status and Work Fatigue

		Nutritional Status	Work Fatigue
Nutritional Status	Correlation coefficient	1.000	0.402
	$\rho$ -value		0.000
	N	136	136
Work Fatigue	Correlation coefficient	0.402	1.000
	$\rho$ -value	0.000	
	N	136	136

Source: Primary Data, 2023

Excess nutritional status occurs when the body obtains excess amounts of nutrients so that it can have a negative impact on the body. Fat contained in the body in large quantities can cause a buildup in the blood vessels which will then potentially obstruct blood flow so that the body and muscles will experience a lack of oxygen. Limited oxygen causes lactic acid to accumulate so that it will have an impact on the emergence of feelings of fatigue and pain (17).

### 3.5. The Relationship between Work Shift and Work Fatigue

**Table 9** Distribution of Work Fatigue by Work Shift

Work Shift	Work Fatigue								Total	
	Low		Medium		High		Very High			
	n	%	n	%	n	%	n	%	n	%
Morning	13	9.6	58	42.6	0	0.0	0	0.0	71	52.2
Afternoon	4	2.9	30	22.1	4	2.9	0	0.0	38	27.9
Night	0	0.0	6	4.4	19	14	2	1.5	27	19.9
Total	17	12.5	94	69.1	23	16.9	2	1.5	136	100.00

Source: Primary Data, 2023

Based on the results of the study, it is known that inpatient nurses at Wava Husada Hospital who have morning shifts have the majority of moderate category work fatigue as many as 58 people or 42.6%. In nurses who work in the afternoon shift, the majority have moderate category work fatigue as many as 30 people or 22.1% and nurses who work in the night shift the majority have moderate category work fatigue as many as 6 people or 4.4%.

Based on the results of the study showed in Table 10 that there was a significant relationship between work shift and work fatigue in inpatient nurses at Wava Husada Hospital. This can be seen from the results of the Kendall tau test which obtained a p value of  $0.000 < (0.05)$ . Both variables produce a correlation coefficient with a value of  $r = 0.547$  which means that there is a strong and unidirectional relationship between the work shift variable and work fatigue. Nurses who work night shifts tend to have higher job fatigue and conversely nurses who work morning shifts tend to have lower work fatigue.

This is due to differences in the length of working time. The division of work shift for inpatient nurses at Wava Husada Hospital includes the morning shift at (07.00-14.00), the afternoon shift at (14.00-21.00), and the night shift at (21.00-07.00). Based on the division of work shift time, it can be seen that nurses on duty in the night shift have a longer working time of 10 hours, while the work shift time in the morning and evening is only for 7 hours. In addition, nurses who have night shifts will have disruptions in circadian rhythms in the body. The occurrence of circadian rhythm disturbances causes the nurse's body to have a higher level of work fatigue.

**Table 10** The Relationship between Work Shift and Work Fatigue

		Work Shift	Work Fatigue
Work Shift	Correlation coefficient	1.000	0.547
	$\rho$ -value		0.000
	N	136	136
Work Fatigue	Correlation coefficient	0.547	1.000
	$\rho$ -value	0.000	
	N	136	136

Source: Primary Data, 2023

This is accordance with research conducted by Juliana (2018) the results of the Chi-Square statistical test with a *p-value* of 0.014 which means there is a significant relationship between night work shifts and work fatigue compared to morning work shifts, and *p-values* of 0.567 which means there is no relationship between afternoon work shifts and work fatigue (18).

### 3.6. The Relationship between Mental Workload and Work Fatigue

**Table 11** Distribution of Work Fatigue by Mental Workload

Mental Workload	Work Fatigue								Total	
	Low		Medium		High		Very High			
	n	%	n	%	n	%	n	%	n	%
Light	1	0.7	0	0.0	0	0.0	0	0.0	1	0.7
Medium	16	11.8	46	33.8	8	5.9	0	0.0	70	51.5
Heavy	0	0.0	48	35.3	15	11	2	1.5	65	47.8
Total	17	12.5	94	69.1	23	16.9	2	1.5	136	100.00

Source: Primary Data, 2023

Based on the results of the study, it is known that the majority of inpatient nurses at Wava Husada Hospital have a mild mental workload of 1 person or 0.7%. Nurses with moderate mental workload had the majority of work fatigue or 46 people or 33.8% and nurses with heavy mental workload had 48 people or 35.3% moderate category work fatigue.

**Table 12** The Relationship between Mental Workload and Work Fatigue

		Mental Workload	Work Fatigue
Mental Workload	Correlation coefficient	1.000	0.360
	$\rho$ -value		0.000
	N	136	136
Work Fatigue	Correlation coefficient	0.360	1.000
	$\rho$ -value	0.000	
	N	136	136

Source: Primary Data, 2023

Based on the results of the study showed that the *p value* was  $0.000 < (0.05)$  so it was known that there was a significant relationship between mental workload and work fatigue in inpatient nurses at Wava Husada Hospital. The results of the spearman correlation test between the variables of mental workload and work fatigue in nurses resulted in a correlation coefficient ( $r = 0.360$ ) with a positive direction. That means there is a strong moderate and unidirectional relationship between mental workload and work fatigue. Nurses who have a heavy mental workload tend to have higher work

fatigue and conversely nurses who have a mild mental workload tend to have lower work fatigue. So that mental workload is identified as a factor that can cause work fatigue in nurses.

Supported by research from Hapis (2019) which states that there is a significant relationship between workload and work fatigue and obtained an OR value of 5.061 which means that heavy workloads are at risk of having a 13.88 times chance of experiencing work fatigue compared to light workloads (19).

In line with research by Larasati, Wahyuni (2019) those who state that there is a meaningful relationship between nutritional status variables and work fatigue with *p-values* of 0.014 and  $r = 0.365$  (16). In his research, it was found that employees who experienced high work fatigue were employees with nutritional status in the obesity category as many as 84% of respondents.

The mental workload of Wava Husada Hospital nurses can be in the form of time pressure in making quick and appropriate decisions to take action on patients, the presence of various types of patients and diseases, and having to deal with the patient's family. In addition, nurses are also required to work by providing maximum service. Excessive mental workload is one of the possible causes of work burnout. This is in line with research that states that the workload of nurses at Yogyakarta Islamic Hospital has a significant relationship with work fatigue. A high workload can cause nurses to experience burnout or burnout. This will have an impact on decreasing the quality of nursing services carried out by nurses (20).

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#### 4. Conclusion

Based on the results of research that has been conducted, it can be concluded that most of the inpatient nurses at Wava Husada Hospital are aged 26-35 years, are female, have a working period of <5 years and have normal nutritional status. Work shift in inpatient nurses at Wava Husada Hospital at the time of the study, the majority were nurses who worked in the morning shift and the majority of the mental workload owned by nurses was a moderate category mental workload. The majority of inpatient nurses at Wava Husada Hospital experienced moderate category work fatigue. There was an association between age and nutritional status and the occurrence of work fatigue, while sex and length of work had no relationship with work fatigue. Work shift and mental workload are associated with the occurrence of work fatigue in inpatient nurses at Wava Husada Hospital. Hospital agencies are expected to measure work fatigue in nurses periodically to determine the level of work fatigue experienced by nurses so that control efforts can be made.

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#### Compliance with ethical standards

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##### *Disclosure of Conflict of interest*

No potential conflict of interest was reported by the authors.

##### *Statement of ethical approval*

The Certificate of Research Ethics has been approved from the Airlangga University, Faculty of Dental Medicine with ethics number 165/HRECC.FODM/II/2023.

##### *Statement of informed consent*

Informed consent was obtained from all individual participants included in the study.

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