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Analysis of Factors Affecting Subjective Fatigue in Hospital Nurses: A Study in the Inpatient Installation

Annisa Rizki Kautsar[1], Winarko[1*], Rusmiati[1], Hadi Suryono[1], Suprijandani[1], Cahyo Widoko Laksono[2]
[1] Departement of Environmental Health, Politeknik Kesehatan Kemenkes Surabaya, Surabay, Indonesia
[2] University of Tokyo, Tokyo, Japan

* Correspondence: win.bonang@yahoo.co.id

Abstract. Fatigue can cause a decrease in worker productivity, especially in human service professions, one of which is nursing staff. The purpose of this study was to analyse the factors influencing the occurrence of subjective fatigue in nurses at the inpatient installation of Hospital X Surabaya City. This study applied analytical observations with a cross sectional approach. The sample size was 90 nurses selected by proportional simple random sampling from a population of 109 female nurses in the inpatient installation. Data processing used univariate and bivariate analysis with $\alpha = 0.05$. The results of this study indicate that there is an influence between work shifts (p = 0.001) and lighting (p = 0.022) on the subjective fatigue of nurses in inpatient installations. While age (p = 0.739), nutritional status (p = 0.206), and working period (p = 0.699) have no effect on the subjective fatigue of nurses in inpatient installations. The conclusion of this study is that work shifts and lighting affect the subjective fatigue of nurses in the inpatient installation of Hospital X Surabaya City. It is recommended to monitor the physical environment, maintain a healthy lifestyle, and proper shift arrangements to prevent fatigue in nurses and improve services.

Keyword: Fatigue, Age, Nutritional Status, Working Period, Work Shift, and Lighting.

1. Introduction

Subjective burnout in nurses is one of the problems that has a direct impact on the physical and mental health of nurses and the quality of patient care. Nurses in inpatient settings often face challenges that contribute to increased job stress and burnout (Yasin et al., 2023). In inpatient settings, nurses are responsible for providing direct patient care and supervision, ensuring fairness to all clients, safeguarding and protecting patient rights, and making informed decisions in urgent situations while adhering to established procedures (Indriati et al., 2018).

Fatigue is a psychological condition problem that is accompanied by excessive physical, mental, and emotional fatigue. This condition causes a person to feel disturbed in his daily life (Alam, 2022). Fatigue occurs in all types of work, especially work related to human services (nurses). Nurses play an important role in providing medical services to patients, considering the number of nurses reaches 50-60% of the total workforce who must care for patients continuously for 24 hours (Afrizal et al., 2022).

The National Safety Council (NSC) revealed that 13% of workplace casualties are caused by fatigue and is considered one of the problems affecting the workforce (Haritsah, 2023). A study in Iran showed that 43.4% of nurses experienced fatigue, while overseas the fatigue rate reached 91.9%. According to the Department of Labour Transmigration of the Republic of Indonesia, more than 65% of workers in Indonesia also experience fatigue, while a survey from the Indonesian National Nurses Association (INNA) found that 50.9% of nurses working in four provinces experienced similar conditions (Hermawan & Tarigan, 2019). Fatigue among

medical personnel, especially nurses, can lead to decreased concentration and productivity, which ultimately impacts the quality of care to patients (Ashipala & Nghole, 2022). Research study from Asif et al. (2024) showed that fatigue was common among nurses of Twin Cities, Pakistan with most experiencing significant levels of fatigue. Most were young, female, and had early to mid-career experience.

Several studies have highlighted the factors that contribute to fatigue, both internally and externally. According to Australia's National Transport Commission (NCT) (2010), fatigue is influenced by three main factors: individual, occupational and environmental factors. Individual factors can be categorised as internal factors, while work and environmental factors are external factors (WorkSafe Victoria, 2020). Age has an important relationship with the triggers of fatigue. Older nurses usually have more work experience, so they are able to improve in work ability and experience less work stress (Imenpanah et al., 2023). However, older workers are also susceptible to physical fatigue, because younger workers tend to have a more optimal metabolism than older workers (Ramdan, 2018). Not only age, nutritional status is also an important aspect that can trigger fatigue. Nurses with good nutritional status have better resistance to physical and mental stress, while nurses with poor nutritional status are more prone to fatigue. According to Mahawati et al. (2021), nutritional status affects productivity and work ability. When nutritional needs are not met both in quantity and quality, it will cause a decrease in work capacity and result in fatigue.

In addition to internal factors, external factors such as continuous work and long working periods can cause mental fatigue due to burnout (Ramdan, 2018). Physical environmental factors such as lighting have an important role in the comfort and effectiveness of nurses at work. According to Adventina & Widanarko (2021), lighting that is inadequate or not according to standards can trigger fatigue in nurses. In addition, the work shift schedule is also a trigger for fatigue. The results of research conducted by Siddiq et al. (2021), that there is a correlation between work shifts and fatigue in COVID-19 nurses.

Although various studies have identified factors that cause subjective fatigue, further research is still needed to understand how the interaction between these factors affects fatigue in nurses in inpatient installations. This study aims to analyse the factors that influence the occurrence of subjective fatigue in nurses in inpatient settings with a focus on the interaction between internal and external factors. Thus, this study is expected to contribute significantly to the understanding of subjective fatigue in nurses in inpatient settings, as well as provide practical recommendations that can be implemented by hospital management to improve nurses' well-being and the overall quality of health services.

2. Methods

2.1 Research Design

This study used a cross sectional design, in which data were collected at one point in time to assess the influence between the independent variables (age, nutritional status, working period, work shift, and lighting) and the dependent variable (subjective fatigue in nurses). The cross sectional design was chosen because of its suitability to describe the prevalence of subjective fatigue and identify factors that influence it in a particular population at a particular time. This design allows researchers to see the interrelationships between variables without the need for intervention or long-term observation.

2.2 Population dan Sample

The population in this study were all female nurses who worked in the inpatient installation of Hospital X Surabaya City. From the existing population, a sample size of 90 female nurses was obtained. This number is based on the calculation of the sample size using the slovin formula with a margin of error of 5%. Sample selection using propotional simple

random sampling technique, with the hope of providing representative results for the population of female nurses in the inpatient installation by considering the inclusion and exclusion criteria. Inclusion criteria in this study include nurses who work in inpatient installations, are female, and are not pregnant. While the exclusion criteria were nurses who were not present during the study.

2.3 Research Instruments

The instrument used in this study was a closed questionnaire. This questionnaire was divided into several sections to measure each research variable. Subjective Fatigue: measured using the Subjective Self Rating Test (SSRT) from the Industrial Fatigue Research Committee (IFRC) Japan. It consists of 30 statement items with each item using a 4-point Likert scale, with answer options from ''never'' to ''very often.''; Age: categorised by age grouped into specific ranges (≤ 40 years and > 40 years); Nutritional Status: measured based on Body Mass Index (BMI) obtained from measuring the weight and height of respondents. Nutritional status was then categorised into two groups: normal and abnormal, according to WHO standards; Working Period: data on nurses orking period was measured in years and categorised into ranges of < 1 year, 1-5 years, and > 5 years; Work Shift: data on work shift was categorised into morning shift, day shift, and night shift; and Lighting: measured using a luxmeter tool with measurement points on the work object in the form of a nurse's work desk in every morning, afternoon, and evening working hours. Also categorised into two (qualified and unqualified).

2.4 Data Collection

Data collection was carried out directly in the inpatient installation. After obtaining permission from the hospital and ensuring that nurses were willing to participate in the study, questionnaires were distributed to respondents. Before filling out the questionnaire, the researcher gave a brief explanation of the purpose of the study and how to fill out the questionnaire, and ensured that the respondent understood each question asked. Respondents were given ± 30 minutes to fill out the questionnaire independently and direct measurement of room lighting was carried out. After the questionnaire was completed, the researcher checked the completeness of the data and ensured that no items were missed before collecting them.

2.5 Data Analysis

The collected data were analysed in several stages, namely univariate analysis: to describe the characteristics of the respondents, including age distribution, nutritional status, working period, work shift, and lighting. This data is presented in the form of a frequency distribution table. Bivariate analysis: to analyse the effect between each independent variable and the dependent variable (subjective fatigue), researchers used the chi-square test, but if the chi-square test criteria were not met, fisher's exact test was used.

3. Results

3.1 Frequency Distribution of Nurse Characteristics in the Inpatient Installation

The following is a table of characteristics of nurses in the inpatient installation in this study including age, nutritional status, working period, work shift, and subjective fatigue presented in the table 1.

Table 1: Frequency Distribution of Nurse Characteristics in the Inpatient Installation at Hospital X Surabaya City

Variables	n	%	N	
			F	%
Age				
≤ 40 Years	80	88,9	90	100
> 40 Years	10	11,1		
Nutritional Status				
Normal	57	63,3	90	100
Not Normal	33	36,7		
Working Period				
< 1 Years	28	31,1		
1-5 Years	27	30,0	90	100
> 5 Years	35	38,9		
Work Shift				
Normal	55	61,1	90	100
Not Normal	35	38,9		
Occupational Fatigue				
Low	58	64,4		
Medium	32	35,6	90	100
High	0	0		
Very High	0	0		

The results of the study in table 1 show that nurses aged ≤ 40 years were 88.9% and aged > 40 years were 11.1%, so it can be concluded that nurses aged ≤ 40 years were more than those aged > 40 years. For the nutritional status of nurses, 63.3% were in the normal nutritional status category and 36.7% were in the abnormal nutritional status category, so it can be concluded that nurses with normal nutritional status categories are more than those with abnormal nutritional status.

Nurses with a working period of less than 1 year amounted to 31.1%, a working period between 1 to 5 years amounted to 30%, and a working period of more than 5 years amounted to 38.9%. Therefore, it can be concluded that nurses who have a working period of more than 5 years are more than those with a working period of less than 5 years. While the work shift of nurses who have a normal work shift category is 61.1% and an abnormal work shift category is 38.9%, so it can be concluded that nurses who have a normal work shift category are more than those with an abnormal work shift category. Not only that, the subjective fatigue experienced by nurses in the low category was 64.4% and the moderate category was 35.6%, so it can be concluded that the majority of female nurses in the inpatient installation of Surabaya City Hospital X experienced subjective fatigue in the mild category and there were no nurses who experienced high and very high categories.

3.2 Frequency Distribution of Lighting Based on Work Shift in Inpatient Installation

Table 2: Frequency Distribution of Lighting Based on Work Shift in Nurses' Room at Inpatient Installation of Hospital X Surabaya City

No.	Lighting Criteria	Number of Nurse Rooms					
		Morning	%	Afternoon	%	Night	%
1.	Qualified	7	77,8	6	66,7	4	44,4
2.	Not Eligible	2	22,2	3	33,3	5	55,6
	Total	9	100	9	100	9	100

The results of the study in table 2 show that in the morning the nurse's room with lighting in the eligible category reached 77.8% and the unqualified category was 22.2%. In the afternoon, eligible lighting was 66.7% and unqualified was 33.3%. While at night the percentage of lighting that meets the requirements is 44.4% and does not meet the requirements of 55.6%.

3.3 The Effect of Age, Nutritional Status, Working Period, Work Shift, and Lighting on Subjective Fatigue in the Inpatient Installation

The following are the results of the analysis regarding age, nutritional status, working period, work shift, and lighting on subjective fatigue in the inpatient installation can be presented in the table 3.

Tabel 3: Analysis of the Effect of Age, Nutritional Status, Working Period, Work Shift, and Lighting on Subjective Fatigue in the Inpatient Installation of Hospital X Surabaya City

Variables	Work Fatigue				N		P-Value
	Low		Medium				
	n	%	n	%	F	%	
Age							
≤ 40 years	52	65	28	35	80	100	0,739
> 40 years	6	60	4	40	10	100	
Nutritional Status							
Normal	40	70,2	17	29,8	57	100	0,206
Not Normal	18	54,5	15	45,5	33	100	
Working Period							
< 1 Years	18	64,3	10	35,7	28	100	
1-5 Years	19	70,4	8	29,6	27	100	0,699
> 5 Years	21	60	14	40	35	100	
Work Shift							
Normal	43	78,2	12	21,8	55	100	0,001
Not Normal	15	42,9	20	57,1	35	100	
Lighting							
Qualified	41	74,5	14	25,5	55	100	0,022
Not Eligible	17	48,6	18	51,4	35	100	

The results of the study in table 3 show that statistically the fisher's exact test found that age does not affect the subjective fatigue of nurses in inpatient installations with a p-value of 0.739> 0.05 which means Ho is accepted. Moderate subjective fatigue is more experienced by nurses who have an age > 40 years by 40% compared to nurses aged ≤ 40 years by 35%.

Statistically using the chi-square test obtained a p-value = 0.206 > 0.05 which means Ho is accepted, meaning that nutritional status does not affect the subjective fatigue of nurses in the inpatient installation. The results showed that moderate subjective fatigue was experienced by nurses with abnormal nutritional status by 45.5% compared to normal nutritional status by 29.8% and conversely low subjective fatigue was experienced by nurses with normal nutritional status by 70.2%.

Statistically using the chi-square test shows that the p-value = 0.699 > 0.05 which means Ho is accepted so that the working period does not affect the subjective fatigue of nurses in the inpatient installation. The results showed that moderate subjective fatigue was more experienced by nurses with a work period of > 5 years by 40% compared to a work period of 1 - 5 years and < 1 year, while low subjective fatigue was experienced by nurses with a work period of 1 - 5 years by 70.4% compared to a work period of < 1 year and > 5 years.

Statistically using the chi-square test obtained a p value of 0.001 ≤ 0.05 which means Ho is rejected so that work shifts affect the subjective fatigue of nurses in inpatient installations. The results showed that nurses experienced moderate subjective fatigue mostly experienced by nurses with abnormal work shifts by 57.1% when compared to normal work shifts by 21.8% and conversely low subjective fatigue was experienced by nurses with normal work shifts by 78.2%.

Statistically using the chi-square test obtained a p value of 0.022 ≤ 0.05 which means Ho is rejected so that lighting affects the subjective fatigue of nurses in the inpatient installation. The results showed that moderate subjective fatigue was experienced by nurses with less qualified lighting by 51.4% compared to qualified by 25.5% and conversely low subjective fatigue was experienced by nurses with qualified lighting by 74.5%.

4. Discussion

Subjective fatigue in nurses in inpatient installations is a fairly complex symptom and is influenced by various factors, both from an internal and external perspective. From this study, there are two factors that are proven to have a significant influence on subjective fatigue, namely work shifts and lighting. Both factors are interrelated with the work environment and the physical and mental burden faced by nurses.

Work shifts or rotating work systems, especially on night shifts, are associated with increased fatigue in workers, including health workers such as nurses. In this study, work shifts have an influence on the level of subjective fatigue in inpatient installations. This is in line with the findings of Jannah & Tualeka (2022), that there is a relationship between work shifts and fatigue in nurses where night shifts have a longer duration of working hours and changes in circadian rhythms so that nurses often feel sleepy and yawn which is one of the symptoms of fatigue. In line with Panwar et al. (2024), that nurses who work on night shifts experience much lower sleep quality and imbalances in body function systems so that they can trigger increased health problems such as disruption of heart rhythm regulation which can contribute to physical and mental fatigue and have a negative impact on performance and long-term health.

One of the main mechanisms explaining the impact of shift work on fatigue is the disruption of circadian rhythms. Circadian rhythms play an important role in regulating sleep and wake cycles and other physiological processes. When nurses work the night shift, the body's rhythms are disrupted, which can cause decreased sleep quality and increased fatigue. According to Ramdan (2018), it is not ideal for humans to work at night because it can alter circadian rhythms. These rhythms can affect physiological functions related to work capacity. Not only that, long duration shifts and shift changes are also important factors that affect fatigue. Alqahtani et al. (2024), that Shift Work Disorder (SWD) is often experienced by health workers who work on night or rotating shifts (especially ≥ 8 hours per night per month), where experiencing increased symptoms of insomnia, fatigue, and depression that can reduce quality of life and ability when working.

In addition to work shifts, physical environmental conditions such as lighting can also contribute to increased subjective fatigue, if these conditions are less qualified in a room. In this study, lighting has an influence on the level of subjective fatigue in the inpatient installation. Sabaruddin & Abdillah (2020) is in line with the findings of this study, that there is a relationship between lighting and job fatigue in nurses at RSIA Kenari Graha Medika, where some of the lighting in the nurse's environment does not meet the requirements. Riadyani & Herbawani (2022), explained that low light intensity (not meeting standards) directly contributes to increased eyestrain among workers, where eyestrain can manifest as discomfort, blurred vision, and headaches that can interfere with workers' ability to perform

tasks effectively. The study Mufiendra et al. (2024) also explained that inadequate lighting can contribute to health problems, including physical and visual fatigue. According to Hidayanti & Lestari (2023), fatigue in the eyes can have an impact on causing a decrease in work efficiency, fatigue, and uncomfortable conditions in the eyes. Therefore, daylighting can play an important role in reducing fatigue. Muhamad et al. (2022), exposure to natural light is related to better psychological health, so it may reduce fatigue among nurses.

Although in this study age, nutritional status, and working period did not show an effect, several other studies suggest that these variables can play a role in triggering the level of subjective fatigue in nurses. Korwa & Widowati (2024), stated that age is related to fatigue because with increasing age the body's ability will decrease so that it cannot do heavy work and easily experience fatigue. However, in this study, age did not show a significant correlation and may be due to the age distribution of the sample being dominated by age ≤ 40 years. Nurses aged ≤ 40 years or > 40 years have the characteristics of being diligent, ready, responsive, and dexterous in handling patients. Not only that, nurses aged > 40 years have more experience and are more effective in regulating emotions and controlling fatigue due to work. This study is in line with Sari (2019), that the age of workers is not related to job fatigue. Older workers tend to be better able to adjust to the environment based on experience so that overall they can work more skilfully and smoothly.

Meanwhile, nutritional status can affect fatigue through the level of energy available to the body. Nutritional status can affect productivity and work ability, if the nutritional needs of the body are not met both in terms of quantity and quality, it will cause a decrease in work capacity and result in fatigue (Mahawati et al., 2021). In this study, nutritional status was not shown to have a significant effect. This may be due to nurses' flexible break times that allow them to eat snacks during working hours, as long as it does not interfere with their work as nurses. Nurses also have no difficulty finding food because there are canteen facilities or mini supermarkets that provide food if they are hungry. Research by Santriyana et al. (2023) is in line with this study, that there is no relationship between nutritional status and fatigue. The reason why there is no significant relationship is because the Bolu Talas Home Industry provides food and mineral water facilities for workers to prevent dehydration and maintain their work productivity.

As for working period, such as a study from Ferusgel et al. (2022) stated that nurses with a longer working period are at risk of fatigue because it can have a negative effect on workers such as being exposed to hazards posed by the work environment. However, in this study, working period did not show a significant effect. This may be due to nurses with longer working periods usually tend to be more proficient and adapt to their work environment because they have more experience as well as differences in work patterns in certain institutions that do not give too heavy a workload to nurses with longer working periods. This study, in line with research from Sitanggang et al. (2024), that there was no effect of working period on job fatigue in heavy equipment operators of the Mining Department of PT X. The longer heavy equipment operators work, the more accustomed and adaptive they are in doing their work so that it can help them minimise the occurrence of fatigue.

5. Conclusions and Suggestions

Based on the results of this study, work shifts and lighting have a significant influence on subjective fatigue in nurses in inpatient installations. Night shifts and inadequate lighting conditions can increase the risk of physical and mental fatigue, which in turn can affect the quality of health services provided. Meanwhile, other variables such as age, nutritional status, and tworking period did not show a significant effect. These results are expected to provide advice or recommendations, namely for the hospital to make more specific interventions related

to managing shift schedules and monitoring the physical environment in each room to reduce nurse fatigue, which in turn can improve the quality of care to patients and nurse welfare. In addition, nurses must also continue to pay attention to a healthy lifestyle and adequate rest time.

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