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RESEARCH **Open Access**

Characteristics and Physical Workload of Nurses on Night Shifts with Work Fatigue

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Abstract
At RSUD Sidoarjo, it was discovered that 44% of nurses experienced fatigue. Fatigue occurs due to several factors, one of which is the physical workload. The objective of this study is to examine the physical workload and characteristics of nurses on night shifts on the fatigue of inpatient tulip nurses at RSUD Sidoarjo in 2022. The number of samples was 30 respondents with the sampling technique encompassing all of population of nurses on night shifts. The results demonstrated that there was no influence between physical workload on work fatigue with a value of 0.717, as well as characteristics incorporating age, length of service and gender which had no effect on work fatigue with a value of 0.636, respectively; 0.747 and 0.235. The result of the study indicates that workload, age, working period, and gender of nurses have no effect on nurses' work fatigue. The conclusion is there was no influence between physical workload and characteristics of nurses on night shifts on the fatigue of inpatient tulip nurses at RSUD Sidoarjo in 2022. It is recommended that future researchers will conduct research on nurse fatigue employing various variables such as mental workload on nurses, hospital physical environment, distance of residence, and marital or family status.

Keywords: Work Fatigue, Physical Workload, Nurses, Night Shift.

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1. INTRODUCTION

Work fatigue is a condition where individuals and groups experience a decrease in body resistance in performing an activity (Hijriahni, 2017). Fatigue decreases efficiency and performance in conducting a job and reduces physical endurance (Rosmiati, Abdullah & Nurlinda, 2021). Work fatigue can be affected by several factors encompassing individual factors, work factors, environmental factors and psychological factors (Perwitasari & Tualeka, 2017).

Individual factors involving age, gender and nutritional status possess a significant relationship with work fatigue on nurses at RSUD Dr. H. BOB Bazar Kalianda South Lampung (Natizatun, & Nurbaeti, 2018; Allo et al., 2020; Oksandi & Karbito, 2020). In addition to individual factors, physical workload also produces a significant relationship with nurse fatigue at Kalideres Hospital (Handayani & Hotmaria, 2021). However, it is contradictory to the results of research conducted on nurses at RSJD Dr. Amino Gondohutomo Semarang that physical workload is not associated with work fatigue (Astuti, Ekawati & Wahyuni, 2017). Meanwhile, sleep patterns also create a significant relationship with work fatigue in nurses (Allo et al., 2020; Sari, Setyaningsih & Suroto, 2020). Workers performing job on night shifts, rarely possess optimal sleep quality. Poor sleep quality increases the risk of 2098 times higher experiencing fatigue (Rizky, 2018). Another factor in the occurrence of fatigue in nurses is mental workload (Ardiyanti, et al., 2017). The workload provided required to be adjusted to the psychological and physical abilities of the worker. Mental coaching which is performed periodically can change the level of worker fatigue (Ardiyanti, et al., 2017).

Work fatigue can occur in employees who work in industries that produce goods as well as industries that provide services or products, one of which is health care, specifically hospitals. The hospital is a full-service health-care facility that offers inpatient, outpatient, and emergency services 24 hours a day, seven days a week (Kementerian Kesehatan Republik Indonesia, 2020). Hospital services require resources in patient care administered by health workers (Hijriahni, 2017). Health workers providing health services with their knowledge are nurses (Muslimah, 2015). Nurses in performing their work cannot be separated from the work shift system divided into three rotations, encompassing morning shifts, afternoon shifts and night shifts (Presiden Republik Indonesia, 2020). It makes nurses feel exhausted with various burdens provided for 24 hours.

Nurses possess responsibility of providing nursing care, counseling and being a counselor to patients and their families, managing nursing services, implementing tasks in accordance with the authority provided and completing tasks in certain limited circumstances (Kementerian Kesehatan Republik Indonesia, 2019). In general, nurse workload involves offering direct care, administering treatments and evaluating patients, administering medical programs such as drug administration, laboratory examinations, radiology, and preparing patients for surgery, attending to patients' physical, mental, and spiritual needs, and training patients to be able to help themselves based on their abilities that the patient has and not conflicting with the treatment the patient is undergoing, immediately providing assistance to patients who are experiencing death or in an emergency condition, maintaining the cleanliness, safety and comfort of the patient's room, accompanying visiting doctors and recording the program to be implemented, reporting the patient's condition both verbally and in writing to doctors, compiling daily reports, maintaining good relations with patients, patient families, team members and doctors, conducting responsibilities both verbally and in writing and assisting the head of the room in room management administratively (Maharja, 2015).

In a preliminary survey conducted on tulip inpatient nurses at RSUD Sidoarjo (Sidoarjo Public Hospital), RSUD Sidoarjo is a class B Government General Hospital which has

officially assigned as a Regional Public Service Agency for more than 4 (four) years. Tulip hospitalization is an inpatient treatment categorized as class 1. Tulip hospitalization is incorporated in the category of one of the inpatients with the largest bed capacity in Sidoarjo Hospital with 154 beds (RSUD Sidoarjo, 2022). The rooms in the tulip inpatient installation are divided into five categories, according to the results of a preliminary survey conducted on November 9, 2021, including the western 2 tulip room, the eastern 2 tulip room, the HCU room, the western 3 tulip room, and the eastern 3 tulip room, with an average of 547 patients treated at the tulip inpatient facility in the last three months, with August (436 patients), September (564 patients), and October (641 patients) in 2021.

The results of interviews have been administered conducted on nurses who were taken randomly on August 6, 2021 from 9 nurses, where in each shift there were 3 respondents. According to the findings, 44% of nurses experience fatigue, with 50% experiencing fatigue on shift with an average age of 33 years and an average working period of 8 years, and 25% experiencing fatigue on shift with an average age of 32 years. It is consistent with research conducted on inpatient installation nurses at Herna Hospital Medan in 2018, which revealed that the highest level of fatigue is in nurses who work on shifts, which is due to a lack of rest for nurses, causing nurses to become exhausted (Aini, 2019). The objective of this study is to examine the physical workload and work characteristics of nurses on night shifts on work fatigue of inpatient tulip nurses in Sidoarjo Hospital.

2. RESEARCH METHOD

This research employed analytic method with cross sectional. This research was conducted at the Tulip Inpatient Installation in 2022. The number of samples comprises of 30 respondents with the sampling technique which is all of population of nurses working on night shifts. The variables studied encompassed physical workload, age, gender, length of service and work fatigue on nurses. Data collection techniques utilized the IFRC (Industrial Fatigue Research Committee) sheets and daily log.

Subjective self-rating test from the Industrial Fatigue Research Committee (IFRC) is a questionnaire which can evaluate the level of subjective fatigue incorporating weakened activities, weakened motivation and the description of physical fatigue (Tarwaka, 2019). The assessment data is classified into levels and categories of fatigue according to following the table:

Table 1. Classification of levels and categories of subjective fatigue based on individual

Total score of each individual	Fatigue level	Category	Improvement
0-21	0	Low	No corrective action is required
22-44	1	Medium	There may be a need for corrective action in the future
45-67	2	High	Corrective action is required
68-90	3	Very high	Comprehensive action is required as soon as possible

Source: Tarwaka (2019)

Sheet daily log about tasks conducted in one day written independently according to the number of patients treated and in 1 working day. the nurse was active in handling patients assessed by administering pulse. Pulse rate measurements can be determined by employing a digital watch (smartwatch) (Tarwaka 2019). Recording of pulse is evaluated before and after performing activities while working in 1 day. The percentage of a nurse's pulse is determined by the Cardiovascular Load (CVL) formula.

$$\% \text{ CVL} = \frac{100 \text{ x (work pulse} - \text{rest pulse)}}{\text{maximum pulse} - \text{rest pulse}}$$

The percent CVL results are converted in accordance with the category of workload received by the night shift nurse in 1 day.

Table 2. Categories of workloads based on % CVL

Level of loading	Category % CVL	Value % CVL	Remarks
0	Mild	< 30%	No significant loading occurs
1	Moderate	30-60%	Loading and repairs may be performed
2	Somewhat heavy	61-80%	The load is rather heavy which requires repairment
3	Heavy	81-100%	Heavy loading, thus, repairs are required to be performed as soon as possible and can only work for a short time.
4	Very heavy	>100%	The load is so heavy that it is necessary to stop work until repairs are completed.

Source: Tarwaka (2019)

The data that has been obtained is evaluated by employing simple linear regression test and Mann Whitney to determine the effect of physical workload, age, gender and tenure on work fatigue in night shift nurses. This research was approved by RSUD Sidoarjo Number 893.3/010/438.6.7/2022.

3. RESULTS AND DISCUSSION

Distribution of research result which incorporate work fatigue, workload and characteristics encompassing age, gender and length of service of nurses on night shifts at the Tulip Inpatient Installation of RSUD Sidoarjo.

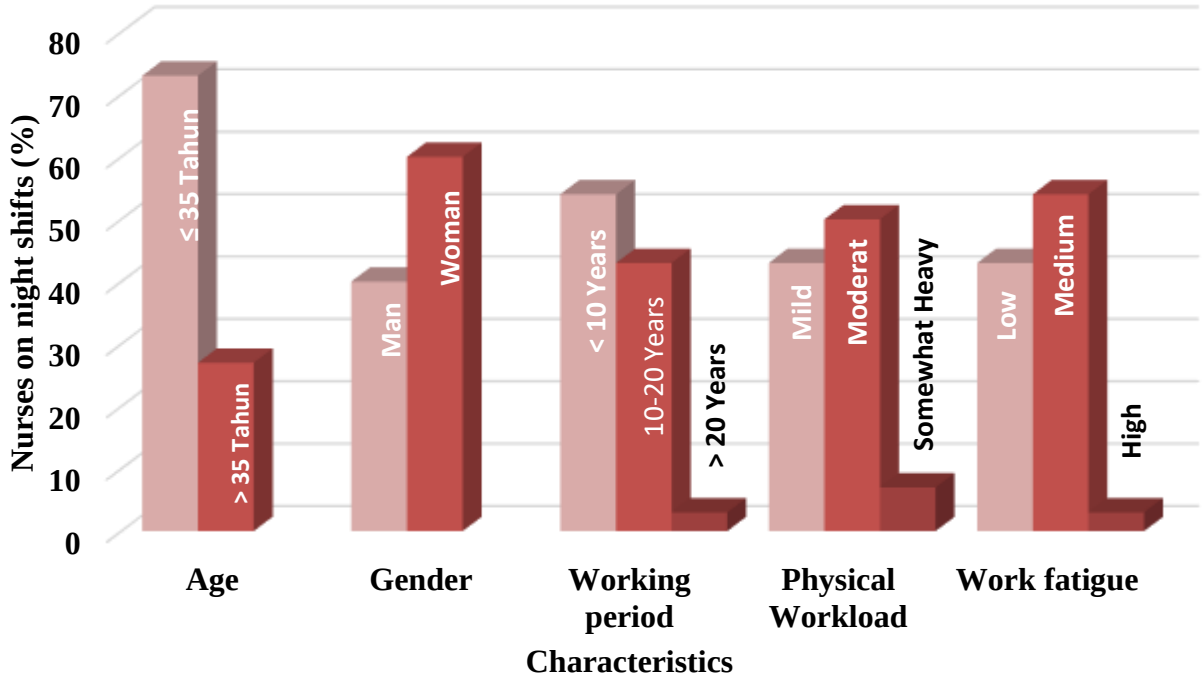

Figure 1. Distribution of the frequency of night shift nurses.

Based on Figure 1, it was discovered that most of the night shift nurses at the Tulip Inpatient Hospital Sidoarjo possessed an age group of 35 years by 73%, with a service period of <10 years by 54%, female by 60%, possessing a workload in the moderate category of 50% and having work fatigue in the moderate category by 54%.

Table 3. The result of characteristic and physical workload against work fatigue.

Variable	***p-value***	**α**
Characteristics of age	0,636	0,05
Characteristics of gender	0,235	
Characteristics of working period	0,747	
Physical workload	0,717	

The results of data analysis illustrate that physical workload on work fatigue possesses no effect with a large *p-value* of 0.717. Likewise, the characteristics encompassing age, gender and working period of nurses have no effect on work fatigue on night shift nurses at the Tulip Inpatient Installation of RSUD Sidoarjo with *p-value* respectively of 0.636; 0.235 and 0.747.

Physical Workload with Work Fatigue in Nurses. The weight and lightness of the workload can be employed in determining how long a worker can perform his work activities in accordance with the ability of the worker. It is interrelated, in which the heavier the workload, the faster the employees will feel exhausted and the shorter the working time of workers in performing their work without feeling exhausted and vice versa (Tarwaka, 2019).

The result of the research which has been conducted demonstrate that the physical workload has no effect on nurses' work fatigue with most nurses possessing a workload in the moderate category. The physical workload conducted by nurses encompasses observing vital sign in each patient, removing patient urine, conducting patient swabs, providing injections to patients, installing and repairing infusions in patients, doing verbed, taking patient laboratory results, distributing drugs to patients, changing infusion fluids in patients, taking patient blood samples, performing surgeries, performing SOAP (Subjective, Objective, Assessment and Plan), transferring patients to the PICU, assisting patients in changing diapers, removing *nephrostomy pods* on patients, changing spooling patients, recording the patient's ECG, conducting visits, providing diet to patients, and handing over responsibilities to nurses serving in the next shift.

Workload is an activity which must be completed within a certain period of time (Rolos, Sambul & Rumawas, 2018). The workload experienced by each worker is different as they possess different abilities to deal with it. The workload can be in the form of physical, mental or social workload. The greater the workload possessed by a person; the more energy required since the contractions in the muscles will also take longer to fight the load obtained. The number of patients was 141 patients from the 154 available beds (91% of the total beds). Of the 141 patients treated, nurses treated a maximum of 10 patients. The number of patients resulted in complaints to nurses on night shifts who felt exhausted.

The more patients treated by nurses; the less free time nurses receive to rest. It affects the sleeping hours of the nurses themselves. Work fatigue can be significantly associated with sleep disturbance factors (*Cirradian rhythm*) as a result of the work shift being conducted (Juliana, Camelia & Rahmiwati, 2018; Allo et al., 2020; Sari, Setyaningsih & Suroto, 2020). This It is in accordance with the nurse's irregular work schedule, hence, it can disrupt sleep patterns which cause the occurrence of work fatigue for nurses (Allo et al., 2020). With poor sleep quality, it is reluctant to cause risk of 2098 times higher to experience fatigue (Rizky, 2018). It can be overcome by enhancing the quality of sleep by utilizing free time to rest (Kuswana, 2014).

Furthermore, work stress is also one of the causes of fatigue. It is because numerous nurses complain that working under pressure is tremendously disturbing as it is affected to

anxiety, tension, loss of enthusiasm, irritability, hence, it triggers fatigue at work (Rahadhi & Sriyanto, 2016; Rudyarti, 2021). In each shift, only 4 nurses were assigned on each floor, while the number of patients on each floor was 20 patients. Therefore, each nurse managed an average of 5 patients, and this number was experienced to be unbalanced and made nurses quite burdened in accompanying patients. Moreover, nurses also experience burdened by unruly patient behavior, such as lack of discipline when taking medication, frequently complaining about the illness, and the presence of pediatric patients who are used to be fussy (Handarizki, 2019). This work stress can be overcome by relaxing tense muscles and stiff limb functions, thus, the body is refreshed (Rudyarti, 2021).

Physical problems such as responsibilities, worries and conflicts are one of the factors affecting work burnout (Tarwaka, 2019). Conflicts experienced by workers both between individuals and groups may cause *burnout*, bad-tempered, depression or even frustration. Conflict between workers owns a negative influence on work fatigue. The higher the conflict between workers, The higher the fatigue experienced (Pretirose, 2018).

Characteristics of Age with Work Fatigue in Nurses. Peak muscle strength in men and women is around the age of 25-35 years. Generally, at the age of approaching 45 years, the muscle strength is decreased (Dewi, Surono & Sutomo, 2016). Increasing age will be followed by a decrease in VO_2 max, sharpness in vision, hearing and speed in performing things such as the ability to remember short-term and the ability to produce decisions (Ardiyanti, et al., 2017).

The results revealed that there was no influence between the age of nurses on work fatigue of nurses. It is in accordance with the research result on nurses at PKU Aisyiyah Hospital Boyolali in which age is not a factor affecting fatigue in nurses (Fatona, Tarwaka & Werdani, 2015). A fatigue can be caused by the numerous activities in the age group of 25-35 years, although theoretically, fatigue is more easily experienced by nurses who possess an older age as at the age of 50-60 years, muscle strength in humans will decrease by approximately 15-25% (Tarwaka, 2019). It can be overcome by providing management regarding the division of tasks or workloads for each nurse, hence, it can be divided evenly for each nurse.

Characteristics of Gender on Work Fatigue in Nurses. In general, women possess physical strength only 2/3 of the physical abilities possessed by men, but in terms of accuracy, women own higher accuracy than men (Perwitasari & Tualeka, 2017). Women have a maximum oxygen volume that is 15-30% lower than men's maximum oxygen volume when working. It is due to the female body having more fat than the male and having lower Hb blood levels than the male. As a result, women are more likely than men to experience fatigue.

The findings revealed that there was no effect of gender on nurses' work fatigue. It indicates that gender has no direct effect on fatigue in nurses who work night shifts. This happens because male nurses do not become tired as easily as female nurses do when performing nursing tasks that require extra energy, such as pushing wheelchairs and beds, assisting with patient lifts, and other emergency actions. It is consistent with the findings of a study conducted by nurses at RSUD directed by Dr. Mohamad Soewandhie, who discovered that gender has no relationship with work fatigue in nurses (Perwitasari & Tualeka, 2017).

Working Period with Work Fatigue in Nurses Working. Period can affect performance both positively and negatively. The period of service can have a positive influence because the longer the period of service, the experience in carrying out their duties will also increase. However, tenure can have a negative influence that can make the workforce appear habitual along with increasing years of service (Soedirman & Prawirakusumah, 2014; Suma'mur, 2014).

The results unveiled that there was no influence between the length of service for nurses on nurses' work fatigue. It implies that the working period is not a factor directly affecting

fatigue in nurses working on night shifts. This result is in accordance with research conducted on nurses at the Haji Makassar Hospital which revealed that the tenure of nurses does not produce a significant relationship with work fatigue in nurses (Mallapiang, Alam & Suyuti, 2016). It is due to a variety of factors, including age. Respondents who have worked for more than 5 years but are still categorized as maximum age own a lower body resistance, making it difficult to feel exhausted. Other factors to consider include work-related habits. Workers with a longer working period and more experience already understand the ideal and most comfortable work position for themselves, reducing the occurrence of fatigue at work.

4. CONCLUSION

The study concluded that physical workload and characteristics such as age, gender, and length of service for night shift nurses at Tulip inpatient installation of RSUD Sidoarjo have no effect on work fatigue. As a result, it is hoped that the hospital concerns more on management in the division of tasks based on each nurse's physical and health conditions.

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