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Factors associated with the Physical and Mental Fatigue Levels of Nurses in the Eastern Region Hospitals, Saudi Arabia

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ABSTRACT

Background: In the health sector, where demands are high, maintaining physical and mental wellness is a bigger challenge among nurses. **Purpose:** The study aimed to determine the factors associated with nurses' physical and mental fatigue in the eastern region hospitals of Saudi Arabia. **Methods:** The study was descriptive, cross-sectional research. 249 nurses from public and private hospitals participated in the study. The Chalder Fatigue Scale (CFQ) was the primary tool utilized for data collection. Mean and standard deviation summarized nurses' demographic characteristics and fatigue levels, while Mann-Whitney U and Kruskal-Wallis were used to compare variables. **Results:** Nurses revealed a fatigue mean score of 22, SD = 6.47, 35.3% reported more than usual fatigue, while 57.4% experienced usual fatigue. Female nurses, aged 30 to 40, divorced with more years of experience, working extended shifts in private hospitals, and assigned to ICU/CCU, emergency, and surgical units are the factors associated with the physical and mental fatigue of nurses.

Conclusion: Strategies such as stress reduction programs, organizational support for the reduction of workload, and targeted interventions on vulnerable groups such as divorced nurses and nurses assigned to surgical units, were endorsed to address the prevalence of work-related fatigue among nurses.

Keywords: *Physical Fatigue; Mental Fatigue; Associated Factors; Nurses; Saudi Arabia*

Introduction

Physical and mental well-being are paramount to effective work performance. In the health sector, where demands are high, maintaining physical and mental wellness among health professionals is a bigger challenge. Nurses, as frontliners in health care and the largest group in the workforce, are among the

most affected. Nurses operate in a high-stress environment, where they are tasked with making critical decisions that directly affect their patients. Significantly, high levels of fatigue are reported among two-thirds of hospital nurses (1). An extremely high percentage of female nurses (84.9%) have experienced mental as well as physical fatigue

(2). Work-related fatigue, which appears to be both physical and mental, is an important issue that affects nurses' performance that calls for immediate attention and should be properly addressed.

Fatigue is a state of tiredness, exhaustion, and a decline in energy to execute one's expected function (3). In the nursing domain, fatigue is a feeling of emotional, mental, or physical fatigue while performing nursing care (4). Physical fatigue is caused by physical labor, such as long hours of standing, lifting, or changing the positions of patients, and appears to be a symptom of full-body discomfort and difficulty in tasks requiring strength. Mental fatigue is caused by work-related emotional stress such as patients' demands and expectations, which results in lethargy, decreased levels of concentration, or a lack of motivation for work (5,6). Most literature claims both physical and mental fatigue affect nurses' biological, psychological, and cognitive processes (7,8).

Physical and mental fatigue are associated with deterioration in the nurses' performance of their nursing functions. This eventually leads to numerous problems that are critical to healthcare delivery and meeting patient outcomes. Prior studies confirmed its relation to compromised patient safety (9-11) and decreased satisfaction with care (12). On the part of the nurse, Kang (13) posited that high levels of physical and mental fatigue affect nurses' personal health and health-promoting behaviors. Fatigue contributed greatly to their low productivity, lack of concentration, and job dissatisfaction. Additionally, Çelik et al. (7) revealed a significant positive association between fatigue levels to anxiety and depression. In the worst cases, it resulted in burnout (14,15) and the risk of medical errors (16,17) Abdulah et al. (18) stated that mental and physical fatigue can predict the rate of medical administration errors; specifically, mental fatigue is associated with deficient documentation of care. Notably, studies conducted in the Saudi Arabian context revealed similar results.

The causes of physical and mental fatigue were pointed out as several relevant factors. Ahmed et al.

(19) identified staff shortages and inadequate resources as among these causes. Equally, the majority of previous studies suggested sleep deprivation, long working hours, and night shift schedules were the primary causes of high levels of fatigue among nurses (20-23). Furthermore, certain socio-demographics were linked to nurses' physical and mental fatigue. The study by Jang et al. (24) found that nurses working in special care units experienced greater degrees of both physical and mental fatigue than those working in general units. However, the effects of fatigue on patient care and the overall health of nurses are still not well understood. While most literature conducted with nurses determined the association of shift schedules, long working hours, and sleep deprivation with physical and mental fatigue, there are limited studies on certain socio- and work demographics of nurses. These factors, when critically explored, will establish a strong basis for formulating organizational programs focused on alleviating the fatigue experiences of nurses. This could result in resolving other factors caused by work-related fatigue in patient care.

Considering these aforementioned contexts, the study aimed to determine the factors associated with the physical and mental fatigue levels of nurses in the eastern region hospitals of Saudi Arabia.

Materials and Methods

Research design

The study was descriptive, cross-sectional research.

Setting and samples

The participants of the study were nurses from public and private hospitals in the eastern region of Saudi Arabia. A total of two hundred forty-nine (N = 249) nurses participated in the study and were recruited through convenience sampling techniques. The following inclusion criteria were used by the researchers to identify the samples for the study: (1) they are registered nurses currently employed in public or private hospitals in the eastern region of Saudi Arabia, and (2) they are working on an 8-hour or 12-hour shift rotational schedule. On the other

hand, (1) student nurses completing the internship program; (2) nurses with managerial positions (e.g., head nurses, supervisors); and (3) newly employed nurses who have less than 3 months of experience were excluded from the study.

Measurement and data collection

The primary data collection tool utilized in this study was the Chalder Fatigue Scale (CFQ 11), a standardized questionnaire developed by King's College London. The CFQ consists of 11 items that assess both physical and mental fatigue levels. Items 1 to 7 are specifically used to measure physical fatigue. The physical fatigue items indicate questions on tiredness, sleep, lack of energy, and feelings of weakness. Items 8 to 11 assess the level of mental fatigue, which covers questions focused on concentration and memory. The CFQ 11 utilizes a four-point Likert scale, with zero points indicating "less than usual," one point indicating "no more than usual," two points indicating "more than usual," and three points indicating "much more than usual." Reliability coefficients for the CFQ 11 have been high in studies of chronic fatigue syndrome (CFS) patients as well as occupational and general population research, ranging from 0.90 for the Likert scoring method and 0.83 for the binary scoring method. In this study, the CFQ effectively measured the physical and mental fatigue levels experienced by nurses working in the hospitals. Also, another section was added to the questionnaire to identify the demographic data of the participants, such as gender, varied shift lengths, type of hospitals, age, marital status, years of experience, and the nurses' hospital department. This part determined the factors associated with the physical and mental fatigue of nurses.

The data collection procedures were conducted in two ways. A total of one hundred-eight participants (N = 108) completed questionnaires directly using researchers' iPads, and the remaining one hundred forty-one participants (N = 141) responded via a link distributed through social platforms. Participants who utilized the researchers' iPads were personally

met by the researchers, ensuring availability in case of questions. Conversely, those participants provided with the link receive a cover letter detailing study purposes and informed consent procedures. Data collection took place for three months, from January to March 2024.

Data analysis

Upon completion of data collection, statistical analyses were conducted to interpret the findings. Descriptive statistics, including frequency, percentage, mean, and standard deviation, were employed to summarize the demographic characteristics and fatigue levels of nurses. Data on the physical and mental fatigue levels were analyzed using the following scale of mean scores: less fatigue = 1–11, usual fatigue = 12–22, more fatigue = 23–33, and extreme fatigue = 34–44. On the other hand, tests such as Shapiro-Wilk were utilized to assess the normality of data distribution, while non-parametric tests like Mann-Whitney U and Kruskal-Wallis were employed to compare variables.

Ethical considerations

Before data collection, the researchers obtained ethical approval from the Institutional Review Board (IRB) at an accredited facility. Ethical approval was obtained from Mohammed Al-Mana College for Medical Sciences with a reference number of SR/RP/136 dated 20/12/2023. The researchers asked permission from the Education Division and the Director of Nursing (DON) office at the selected hospitals. This assured the researchers that the study complied with regulatory standards and institutional research protocols. The participants were asked to sign an informed consent confirming their voluntary participation in the study. The researchers emphasized the rights of the participants to refuse or withdraw from participation and their privacy and confidentiality throughout the process. In addition, anonymity in data collection, ensuring that their identities remain undisclosed, and the purposes for which the gathered data would be utilized were highlighted to facilitate transparency and trust.

Results

The study included responses obtained from two hundred forty-nine (N=249) nurses. It covered factors associated with physical and mental fatigue levels in terms of gender, varied shift lengths, type of hospitals, age, marital status, years of experience, and the nurses’ hospital department.

The survey was completed by 249 nurses, yielding a fatigue mean score of 22 (SD=6.47) (Table 1). Table 2 indicates that 35.3% of the sample reported fatigue more than usual, whereas around 57.4% experienced usual fatigue. Based on the results of the Shapiro-Wilk test (Table 1), it can be concluded that the total fatigue score does not follow a normal distribution ($P=.001$). The Mann-Whitney U test was employed to compare two variables, while the Kruskal-Wallis’s

test was utilized to compare variables beyond two.

As shown in Table 3, the Mann-Whitney U test indicated that there is no statistically significant difference in fatigue scores between males and females ($U= 6666, p=0.104$). However, females reported experiencing more fatigue than males ($M = 22.6, SD = 6.65$).

Table 4 indicates a notable disparity between nurses’ fatigue scores and the duration of their shifts ($U= 6409, p= 0.023$). It can be observed that nurses who worked extended hours had higher degrees of fatigue ($M = 23, SD = 6.72$).

Table 5 reveals a notable disparity in nurses’ fatigue levels based on the type of hospital ($U = 6325, p = 0.014$). Nurses employed in private institutions had higher fatigue levels ($M = 23.1, SD = 6.55$).

Table 1: Descriptive data for Fatigue Level of Nurses

	N	Mean	Median	SD	Shapiro-Wilk	
					W	p
Fatigue Score	249	22.0	21	6.47	0.963	<.001

Table 2: Frequencies of the Nurses' Fatigue Levels

Category total	Counts	%
Less fatigue	7	2.8 %
Usual Fatigue	143	57.4 %
More Fatigue	88	35.3 %
Extreme Fatigue	11	4.4 %

Table3: Fatigue scores among Male and Female Nurses

Group	N	Mean	Median	SD	SE
Male	106	21.1	21.0	6.17	0.599
Female	143	22.6	22.0	6.65	0.556

Mann-Whitney U compared the fatigue levels among male and female nurses.

		Statistic	df	p
Fatigue Score	Mann-Whitney U	6666	247	0.104

Note. $H_a \mu_{Male} \neq \mu_{Female}$

Table 4: Fatigue scores among Nurses Working in Varied Shift Lengths

Group	N	Mean	Median	SD	SE
8 hours shift	135	21.1	21.0	6.14	0.529
12 hours shift	114	23.0	22.0	6.72	0.629

Mann-Whitney U compared fatigue levels among nurses working various shifts.

		Statistic	df	p
Fatigue Score	Mann-Whitney U	6409	247	0.023

Note. $H_a \mu_{8\text{ hours}} \neq \mu_{12\text{ hours}}$

Table 5: Nurses' Fatigue Scores and Type of Hospitals

Group	N	Mean	Median	SD	SE
Private hospital	132	21.0	20.5	6.27	0.546
Government hospital	117	23.1	22.0	6.55	0.606

Mann-Whitney U compared fatigue levels among nurses working at different hospitals.

		Statistic	df	p
Fatigue Score	Mann-Whitney U	6325	247	0.014

Note. $H_a \mu_{Private} \neq \mu_{Public}$

Table 6: Nurses' Fatigue Scores and Age

	Age category	N	Mean	SD	SE
Fatigue Score	Below 30	157	21.8	6.48	0.517
	30-40	74	22.3	6.81	0.792
	above 40	18	22.0	5.18	1.221

Kruskal-Wallis compared nurses' fatigue levels across age groups.

	χ^2	df	P
Fatigue Score	0.0997	2	0.951

The results of the Kruskal-Wallis's test in Table 6 revealed no statistically significant difference in fatigue levels between the nurses and their age ($H(2) = 0.0997, p=0.951$). However, it was observed that nurses within the age range of 30-40 reported higher levels of fatigue ($M = 22.3, SD = 6.81$).

According to the findings shown in Table 7, no statistically significant difference was observed between the nurses' fatigue levels and their marital status ($H(2) = 2.73, p = 0.256$). However, it is worth noting that divorced nurses exhibited higher average fatigue scores ($M = 22.7, SD = 1.527$).

According to the findings presented in Table 8, there was no statistically significant difference in nurses' fatigue levels based on their years of

experience ($H(5) = 4.73, p = 0.450$). However, as nurses gain more experience, their reported fatigue scores tend to increase.

The findings presented in Table 9 indicate that no statistically significant difference was observed in nurses' fatigue levels based on the hospital departments/units in which they were employed ($H(8) = 15.5, p=0.050$). However, it was observed that nurses working in the ICU/CCU, emergency, and surgical departments reported higher levels of fatigue ($M=24.2; M=23.2; M=23.2$, respectively), while those employed in outpatient and obstetrics departments reported lower levels of fatigue ($M=19.0, M=19.9$).

Table 7: Nurses' fatigue Scores and Marital Status

	Marital Status	N	Mean	SD	SE
Fatigue Score	Single	96	21.0	6.33	0.646
	Married	133	22.5	6.54	0.567
	Divorced	19	22.7	6.66	1.528

Kruskal-Wallis compared nurses' fatigue levels across different marital statuses.

	χ^2	df	p
Fatigue Score	2.73	2	0.256

Table 8: Nurses' Fatigue Scores and Years of Experience

	Work experience	N	Mean	SD	SE
Fatigue Score	Less than one year	36	21.6	5.80	0.966
	1 - 5 years	68	21.8	6.91	0.838
	6 - 10 years	80	21.3	6.39	0.714
	10 - 15 years	37	22.6	6.47	1.064
	16 - 20 years	17	22.5	5.85	1.420
	More than 20 years	11	25.7	7.21	2.175

Kruskal-Wallis compared nurses' fatigue levels over their years of experiences

	χ^2	df	p
Fatigue Scores	4.73	5	0.450

Table 9: Nurses' Fatigue Scores and Hospital Department

	Hospital Department	N	Mean	SD	SE
Fatigue Score	Emergency	42	23.2	6.72	1.036
	Medical	44	22.2	6.46	0.973
	Surgical	28	23.2	6.44	1.216
	Outpatient	36	19.0	4.07	0.678
	ICU/CCU	17	24.2	7.78	1.887
	Orthopedic	17	21.9	7.61	1.846
	Long term care	23	21.3	5.04	1.051
	Pediatric	24	23.0	8.52	1.738
	Obstetric/Gyne	18	19.9	4.26	1.005

Kruskal-Wallis compared fatigue levels among nurses working in different hospital departments

	χ^2	df	P
Fatigue Scores	15.5	8	0.050

Discussion

Based on the results, one-third of the nurses are experiencing fatigue levels higher than usual. This implies that a significant number of nurses working in the eastern region hospitals are facing increased levels of fatigue. Such elevated fatigue levels can have harmful effects on both physical and mental well-being and on their ability to perform nursing care effectively. Cho and Steege (25) claimed that fatigue was consistently associated with mental health problems decreased nursing performance and sickness absence. This study confirmed that nurse fatigue is negatively associated with patient safety and organizational outcomes. Similarly, Geiger-Brown et al. (26) attested to the negative impacts of fatigue on the physical health, mental well-being, and job performance of nurses. Conversely, more nurses reported experiencing fatigue levels as usual. While the usual level of fatigue might be perceived by these nurses as acceptable within their current nursing practice, it is worth noting that the usual level of fatigue can likely affect their health and job performance if left unaddressed. In general, fatigue is consistently a prevalent issue among nurses. For nurses who particularly play a crucial role in patient care, the importance addressing fatigue management strategies within health care settings is a must. Interventions to address this issue were likewise affirmed in the study of Stimpfel et al. (27) and Azmoon et al. (28).

There is no significant distinction between the fatigue levels experienced by both genders. Most studies affirmed the weak association and claimed no significant relationship between gender and feelings of fatigue (29,30). However, based on the descriptive data, the findings suggest that a higher level of physical and mental fatigue is experienced by female nurses compared to their male counterparts. This means that gender plays a role in how nurses experience and cope with fatigue. The variation in the findings can be attributed to several factors, such as biological differences, socio-cultural factors, lifestyle, and psychological factors. Males in general

are perceived to have much greater physical tolerance at work. Male nurses may have the ability to cope effectively with demanding work schedules and physical tasks inherent to nursing practice. Kovner et al. (31), claimed that less emotional exhaustion is faced by male nurses compared to female nurses. The researchers in this study posited that male nurses are perceived to have the ability to handle physical tasks more efficiently. On the other hand, females faced more difficulties performing multiple roles and responsibilities at home and work. Female nurses often need to balance between demanding work and responsibilities at home. For these reasons, female nurses are often deprived of sleep, exercise, and self-care practices, contributing to increased fatigue levels. Patterson et al. (32) suggested that a high level of fatigue related to lack of sleep is often experienced by female nurses because of household chores and caregiving duties. Furthermore, female nurses may also experience increased physical and mental fatigue due to some societal norms. The stress and anxiety brought about by societal expectations of caregiving and nurturing roles add more pressure on the part of female nurses. Dall'Ora et al. (33) affirmed this finding. Also, MacPhee et al. (34) revealed that male nurses are more challenged at work with the assumption that female nurses have more caring behaviors than them. Gender stereotyping is a common experience for most male nurses thus, increasing the stress and fatigue they may have experienced. Overall, understanding the complexity of gender differences in the physical and mental fatigue of nurses in the eastern region hospitals in Saudi Arabia is essential.

It can be claimed that nurses working an extended shift schedule happen to have experienced a higher fatigue level than those working a shorter shift. As observed from the results, nurses on a 12-hour shift faced a greater impact on their fatigue levels. Longer shifts may require nurses to increase their work demands. For nurses working longer than usual, this could mean engaging in more physically demanding tasks such as assisting with treatment and

nursing procedures, making rounds in between patient's rooms, or even turning patients on at a specified time. This finding was also affirmed by Chen et al. (35). Furthermore, extended shifts may likewise require nurses to maintain their focus on care and provide immediate yet critical decisions over a prolonged period. This implies that nurses who work longer hours could experience greater mental strain. Many studies also attested to the correlation between limited rest breaks and sleep deprivation to mental fatigue (24,26,21). However, Rhéaume and Mullen (36) claimed that there were no differences between the nurses working on an 8-hour shift and a 12-hour shift concerning cognitive errors. Overall, it can be concluded that shift schedule is an essential factor contributing significantly to the nurses' ability to provide nursing care.

Nurses in private hospitals are more likely to experience greater work-related problems due to physical and mental fatigue. Numerous prior studies have consistently associated these findings with a variety of factors, including resource limitation, poor working conditions, and systemic organizational challenges within the private sector. Most studies suggested that private hospitals were challenged with constraints in resources such as qualified staff, start-of-the-art equipment, and supportive services leading to higher fatigue levels (37-39). Furthermore, nurses in private hospitals are confronted with higher patient acuity and workload since the majority of their clientele are affluent and from a specialized patient population. Basu et al. (40) indicated that the private sector tends to prioritize more groups *with higher income and fewer medical requirements*. Moreover, existing literature consistently correlates organizational factors, such as leadership support and job autonomy within private hospitals, with their impact on fatigue levels among nurses. Steege et al. (41) identified a lack of social support to be associated with both acute and chronic fatigue. Similarly, Han et al. (42) suggested the importance of organizational support, including social support from supervisors and coworkers, as an

advantage to moderate fatigue among hospital nurses.

Age-related fatigue is common among nurses. Mustika (29) indicated that low energy scores and higher fatigue levels were reported by nurses aged 40. However, prior studies suggested that fatigue varies among age groups. Some claimed that age has a moderate relationship with work fatigue (30) while others found no significant relationship (43-44). On the other hand, the finding can also suggest that in this age group, 30-40 years, nurses may often face heightened challenges in navigating their careers, balancing family obligations, and pursuing personal advancement. Taking on more responsibilities and obligations often is associated with a greater amount of stress and demands resulting in fatigue. Maharja (45) attested nurses aged 30-40, facing high expectations and workload, may experience increased stress and fatigue due to responsibilities, potentially impacting their health and performance. These findings were likewise affirmed in the previous studies of Daouda et al. (46) and Jalilian et al. (47).

Likewise, marital status plays an essential role in the physical and mental fatigue experienced by nurses. Though relevant prior studies suggested married nurses (48-49) and single nurses (23,50) have higher fatigue levels, this current study revealed a diverse perspective, suggesting fatigue influences greatly divorced nurses. Generally, divorce is seen as a life experience that involves more emotional stressors because of abrupt life changes and gradual adjustments. Moreover, divorced nurses may feel obliged to work additional hours to maintain financial security, thus increasing physical fatigue. To discuss further, the absence of support systems can worsen feelings of isolation, worry, and loneliness, further contributing to the nurses' mental fatigue. Hald et al. (51) affirmed that divorced nurses may experience higher fatigue due to divorce burnout, influenced by factors like conflict levels and income.

The number of years these nurses have been in nursing practice, in particular for 6-10 years, influences physical and mental fatigue. Most studies revealed a relationship between the length of work experience and fatigue levels (52,49). Based on the findings, it could be acknowledged that repetitive encounters, and continuous exposures to physical strain and mental stressors, as most evident among senior nurses, can lead to a greater amount of fatigue. Furthermore, although longer work experience in nursing could develop proficiency in clinical skills and knowledge, over time, nurses may become less resilient to stressors, thereby increasing their fatigue levels. However, several studies contradicted these findings, stipulating that years of experience and levels of physical and mental fatigue among nurses were not in any aspect significantly related (29,30).

It can be assumed that there are selected hospital departments or units where fatigue levels are high compared with others. As expected, those units that require complex nursing care and a multitude of nurses' functions, such as intensive care units, emergency rooms, and surgical units, contribute to higher fatigue levels. Substantial evidence from previous studies has been found to confirm these findings. For instance, the study by Jang et al. (24,53) identified that the work department had a significant influence on both physical and mental fatigue; that is, nurses working in special care units experienced greater degrees of both physical and mental fatigue than those working in general units. Likewise, Orvurmaz and Mandiracioglu (45) found that emergency room (ER) nurses are more likely to experience high levels of fatigue relative to nurses working in other nursing departments. In Saudi Arabia, Alshammari et al. (54) pointed to similar evidence among ER nurses. Considering these findings, the importance of mitigating fatigue levels and enhancing the well-being of nurses across different hospital departments should be highly considered.

Implication and limitations

The study has implications for the regulatory frameworks, organizational policies, and guidelines for promoting nurses' well-being and patient safety. Also, this study has certain limitations that can be addressed through future research. Instead of a descriptive study, a qualitative design may provide deeper insights into the nurses' experience of fatigue. Furthermore, longitudinal studies to track nurses' fatigue levels over an extended period to help identify trends and patterns in the potential causes of fatigue may be considered. Expanding the scope of research by considering additional variables that may influence fatigue levels, such as physical activity, coping mechanisms, and social support networks, may also be pursued.

Conclusion

Physical and mental fatigue are prevalent among nurses in the eastern region hospitals of Saudi Arabia. Nurses experience usual to more than usual fatigue levels. Factors associated with influencing nurses' fatigue levels were significantly identified as female nurses, aged 30 to 40, divorced with more years of experience, working extended shifts in private hospitals, and being assigned to ICU/CCU, emergency, and surgical units. These associated factors are imperative baseline information crucial for healthcare institutions to address the existing prevalence of work-related fatigue among nurses. Implementing strategies to mitigate fatigue, such as stress reduction programs, targeted interventions focused on vulnerable groups such as divorced nurses and nurses assigned in surgical units, organizational support for the reduction of workload, and periodic reviews of shift scheduling practices, may be considered.

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Author contribution

Conceptualization, M.C.B., R.A.A.; Methodology, M.C.B, E.M.G.H.; Project administration, M.C.B., R.A.A.; Supervision, M.C.B, E.M.G.H., Writing of Original Draft, M.C.B., E.M.G.H., R.A.A. All authors have read and agreed to the published version of the manuscript.

Conflict of interest

The authors have no conflict of interest to declare.

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