

PREVALENCE OF MIGRAINE AMONG NURSES AND ITS RELATIONSHIP WITH NURSING STATION ERGONOMICS

Original Research

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ABSTRACT

Background: Ergonomics, the science of optimizing interactions between individuals and their work environment, plays a crucial role in improving efficiency, comfort, safety, and health. In healthcare, particularly at nursing stations, ergonomic design significantly impacts nurse satisfaction, stress levels, and patient outcomes. Poor ergonomic practices have been associated with increased musculoskeletal discomfort and headaches, making workplace design a critical factor for the well-being of nurses, who often operate in high-stress environments.

Objective: To investigate the prevalence of migraines among nurses and explore its correlation with the ergonomic conditions of nursing stations.

Methods: This cross-sectional study included 100 female nurses with a mean age of 28.89 years (SD = 3.513). Data were collected using two validated tools: the International Classification of Headache Disorders, Third Edition (ICHD-3), to assess migraine prevalence and the Nursing Station Ergonomics Assessment (NSEA) to evaluate ergonomic compliance across 64 factors. Statistical analysis, including the Pearson Chi-Square test, was performed using IBM SPSS (2020) software to determine the relationship between migraines and nursing station ergonomics.

Results: The prevalence of migraines was notably high, with 65% (n = 65) experiencing migraines and 35% (n = 35) categorized as non-migraine. Among participants, 27% (n = 27) reported working in "good ergonomics" environments, while 73% (n = 73) described their conditions as "bad ergonomics." Migraine prevalence was higher in poor ergonomic conditions, with 45 participants reporting migraines compared to 20 in good ergonomic settings. A Pearson Chi-Square test revealed no statistically significant correlation between ergonomics and migraines ($\chi^2 = 1.339$, $df = 1$, $p = 0.247$), but trends suggested an indirect influence of ergonomics on migraine occurrence.

Conclusion: The study identified a high prevalence of migraines among nurses, with trends indicating that poor ergonomic conditions may exacerbate their occurrence, even in the absence of statistically significant results. Improving ergonomic conditions in nursing stations could enhance nurse well-being and mitigate health issues like migraines, highlighting the importance of workplace design in healthcare environments.

Keywords: Ergonomics, headache, health care workers, migraine disorders, musculoskeletal pain, nursing stations, occupational health.

INTRODUCTION

Ergonomics, the scientific study of human interaction with tools, techniques, and work environments, is pivotal in addressing health, safety, comfort, and efficiency challenges. It integrates physical, cognitive, and organizational knowledge within a systems theory framework, focusing on the dynamic interplay between workers and their tasks. This approach offers considerable economic benefits, such as cost reduction and enhanced productivity, alongside professional advantages, including improved job satisfaction and reduced workplace hazards (1). In healthcare, particularly, ergonomic design is essential to promote recovery and safeguard the health and safety of employees. The physical arrangement of spaces such as nursing stations, where work procedures, tools, and structural elements converge, has a profound impact on nurse job satisfaction, stress levels, and, ultimately, patient outcomes (2).

Healthcare environments that fail to meet ergonomic standards contribute to various health issues, including musculoskeletal discomfort and headaches, which are influenced by psychological, administrative, and physical factors. Notably, headache disorders, including migraines, are significant contributors to global disability, with low-back pain and headache ranking among the leading causes of lost healthy life years worldwide (3). These ailments carry heavy economic and personal burdens, underlining the importance of adopting sound labor practices to mitigate such costs.

Migraine, a complex neurovascular condition, manifests as recurrent, often unilateral, and pulsating headaches, frequently accompanied by nausea, vomiting, photophobia, and phonophobia. This condition progresses through prodrome, aura, pain, and postdrome phases, and its pathogenesis involves a multifaceted interplay of genetic, metabolic, environmental, and epigenetic factors that remain incompletely understood (4, 5). Affecting over a billion individuals globally, migraine is one of the most prevalent neurological disorders, with a worldwide prevalence of approximately 10%, varying by region and demographic factors (6, 7). Epidemiological data suggest that gender, body mass index, smoking, family history, and environmental influences are risk factors for primary headache disorders, with healthcare workers, particularly nurses, showing significantly higher prevalence rates compared to the general population due to the demands of their profession (8).

The relationship between ergonomic compliance and occupational health is particularly pertinent for nurses, whose performance is often hindered by musculoskeletal disorders, exhaustion, and neurological symptoms, including migraines. Despite the importance of ergonomics in mitigating these challenges, evidence indicates a widespread lack of awareness and application of ergonomic principles in clinical settings. Proper training and adherence to ergonomic guidelines are essential for fostering long-term health and enhancing professional performance among nursing staff (9). The nursing station, as a central hub in hospital settings, is critical to these dynamics. It serves as a focal point for care coordination, communication, and data documentation, with its design and layout significantly influencing the efficiency of healthcare delivery (10, 11). Effective ergonomic assessment tools, such as the Nurse Station Ergonomic Assessment (NSEA) instrument, provide structured frameworks to evaluate essential elements, including layout, workstation configurations, environmental conditions, and seating arrangements, thereby facilitating improvements in these critical spaces (2).

Given the high prevalence and significant impact of migraines on the quality of life, the International Classification of Headache Disorders (ICHD-3) framework offers precise diagnostic criteria to distinguish migraines from other headache disorders, ensuring accurate diagnosis and effective treatment (12). This research aims to explore the prevalence of migraines among nurses and its association with the ergonomic design of nursing stations, seeking to identify actionable insights that can improve health outcomes and occupational well-being.

METHODS

After obtaining approval from the institutional ethical committee, a total of 200 participants were recruited based on predetermined inclusion and exclusion criteria. Written informed consent was obtained from all participants, ensuring their voluntary involvement in the study and the use of their data for research purposes. Confidentiality of personal information was strictly maintained throughout the study to uphold ethical standards. Demographic data, including name, age, gender, and ward information, were collected from each participant as part of the baseline assessment. Due to incomplete responses or withdrawal from the study, data analysis was ultimately conducted on 100 participants, and this adjusted sample size formed the basis of the findings.

The study employed the Nurse Station Ergonomic Assessment (NSEA) tool, a validated instrument comprising 64 items across eight domains. These domains included layout and placement, workstation, safety and security, environmental conditions, counter, chair, desk, and monitor configurations. Participants answered each question with either “Yes” or “No.” Based on their responses, nursing stations were categorized into “good ergonomics” or “bad ergonomics” environments. Nursing stations with 75% or more “Yes” responses were classified as “good ergonomics,” while those below this threshold were categorized as “bad ergonomics.”

Additionally, the International Classification of Headache Disorders, Third Edition (ICHD-3), was used to diagnose migraine. Participants who met the ICHD-3 criteria were classified as “migraine” subjects, while those who did not were categorized as “non-migraine.” A Pearson Chi-Square test was used to assess the correlation between migraine prevalence and nursing station ergonomics.

Although statistical significance was not achieved ($\chi^2 = 1.339$, $df = 1$, $p = 0.247$), trends suggested that better ergonomic environments might be associated with a lower prevalence of migraines. To strengthen future research, increasing the sample size and investigating additional ergonomic and occupational variables are recommended to validate these observations. This study highlights the importance of robust ergonomic assessments and their potential implications for reducing occupational health issues such as migraines among nurses.

RESULTS

The analysis of demographic data revealed that the mean age of the nurse participants was 28.89 years, with a standard deviation of 3.513. Most participants (45%, $n=45$) were within the 26–30 age range, followed by 34% ($n=34$) in the 31–35 range, and 21% ($n=21$) in the 21–25 range. This age distribution reflects a predominantly young cohort in their active professional years, which may influence their susceptibility to occupational health issues such as migraines and musculoskeletal discomfort. All participants were female, indicating a gender-specific focus in the study.

Migraine prevalence among the nurses was notably high, with 65% ($n=65$) diagnosed as migraine sufferers based on ICHD-3 criteria, while 35% ($n=35$) were categorized as non-migraine. In terms of ergonomic conditions, only 27% ($n=27$) of participants reported working in “good ergonomics” environments, while 73% ($n=73$) identified their environments as “bad ergonomics.” Among those with migraines, 85% ($n=55$) reported poor lighting conditions, in contrast to 50% ($n=18$) among non-migraine participants, suggesting lighting as a critical factor associated with migraine prevalence. Additionally, common ergonomic inadequacies included improper seating adjustments, insufficient desk dimensions, and inadequate access to storage or equipment.

A Pearson Chi-Square test evaluated the relationship between nursing station ergonomics and migraine prevalence. While the association did not reach statistical significance ($\chi^2 = 1.339$, $df = 1$, $p = 0.247$), a discernible trend suggested a potential link. Specifically, 74.1% ($n=20$) of participants in “good ergonomics” environments reported migraines, compared to 61.6% ($n=45$) in “bad ergonomics.” Conversely, a higher proportion of non-migraine participants worked in poor ergonomic conditions. These findings, although inconclusive, underscore the relevance of workplace ergonomics in influencing migraine prevalence and highlight the need for further studies with larger sample sizes and domain-specific ergonomic assessments.

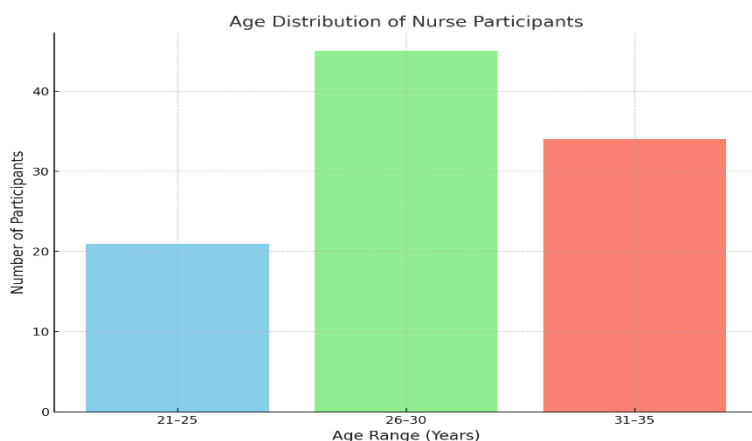


Figure Presents the age distribution of the 100 participants, with the majority (45%, $n=45$) falling within the 26–30 age range, followed by 34% ($n=34$) in the 31–35 range, and 21% ($n=21$) in the 21–25 range. The mean age of the participants was 28.89 years, with a standard deviation of 3.513, reflecting a relatively young cohort predominantly in their late twenties to early thirties.

Figure 1 Age Distribution of Nurse Participants

Table 1 Prevalence of Migraine Among Nurses and Distribution of Nursing Station Ergonomics (n=100)

Category	Frequency	Percent (%)
ICHD-3 (International Classification of Headache Disorders - 3)		
Migraine	65	65.0
Non-migraine	35	35.0
Nursing Station Ergonomics		
Good ergonomics	27	27.0
Bad ergonomics	73	73.0
Total	100	100.0

Table 2 highlights the prevalence of migraines among the study's 100 participants, with 65% (n=65) diagnosed as migraine sufferers and 35% (n=35) categorized as non-migraine. Additionally, 27% (n=27) of nurses were identified as working in "good ergonomics" environments, while 73% (n=73) reported working in "bad ergonomics" conditions, underscoring the predominance of suboptimal ergonomic settings in the nursing profession.

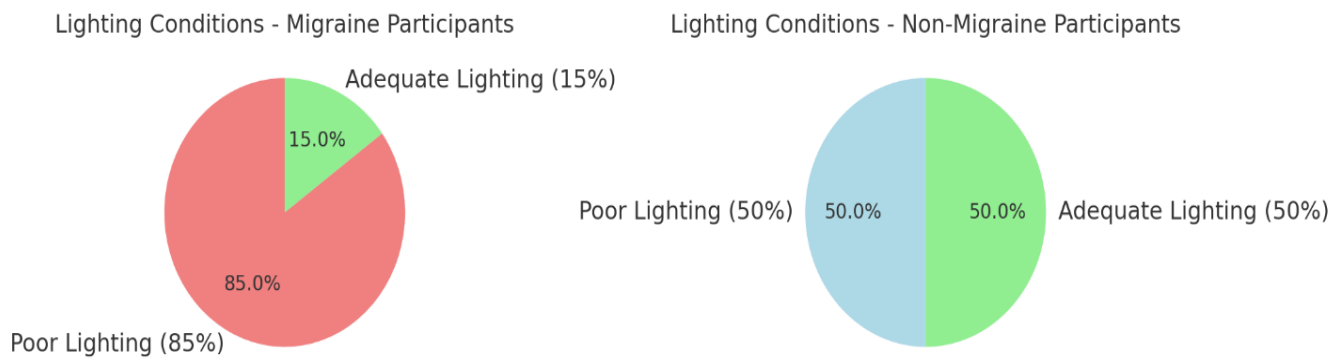


Figure 2 Lighting Conditions - Non-Migraine Participants

Migraine Participants: 85% reported poor lighting conditions, while 15% had adequate lighting.

Non-Migraine Participants: 50% reported poor lighting conditions, and 50% had adequate lighting.

Table 2 Relationship of Nursing Station Ergonomics and Migraine

Nursing Station Ergonomic Assessment (NSEA)			ICHD-3 (International Classification of Headache Disorder - 3)		
			Migraine	Non-Migraine	Total
1	The location of the nurse station is in accordance with the design of the section and in the center of the patients' rooms	No	12	9	21
		Yes	53	26	79
2	The nurse station is not in the way of ward traffic	No	24	16	40
		Yes	41	19	60
3	The nurse station is in a location where the entrance is visible	No	33	16	49
		Yes	32	19	51
4	All patients can be directly observed and monitored from the nurse station	No	57	29	86
		Yes	8	6	14
5	The nurse station is located to allow broadly equal access to all patients	No	17	9	26
		Yes	48	26	74
6	The nurse station is located to allow good communication and easy access and view of the medication room	No	28	19	47
		Yes	37	16	53
7	The nurse station is located to allow good communication and easy access to storage space for required medical equipment	No	33	19	52
		Yes	32	16	48
8	The charting space is embedded in the quiet part of the nurse station	No	28	19	47
		Yes	37	16	53
9	There is adequate space for a charting system in the nurse station	No	34	15	49
		Yes	31	20	51
10	The nurse station includes a separate space for secretarial activities	No	28	19	47
		Yes	37	16	53
11	A separate space for group meetings is provided in or near the nurse station.	No	45	28	73
		Yes	20	7	27
12	The nurse station includes a permanent space next to the charting desk for the medical records trolley	No	16	10	26
		Yes	49	25	74
13	At the nurse station, there are drawers and shelves for keeping files, records, and medical forms	No	28	19	47
		Yes	37	16	53
14	The height of the shelves and cabinets at the nurses' station is easily accessible to nurses	No	46	25	71
		Yes	19	10	29
15	In the nurse station, the placement of equipment such as cabinets, desks, monitors, nurse call system, etc. is appropriate	No	28	19	47
		Yes	37	16	53
16	At the nurse station, equipment, items and fixtures that are used frequently are readily available	No	47	24	71
		Yes	18	11	29
17		No	28	19	47

Nursing Station Ergonomic Assessment (NSEA)			ICHD-3 (International Classification of Headache Disorder - 3)		
			Migraine	Non-Migraine	Total
	The dimensions of the nurse station are proportional to the space, facilities, equipment, and the number of nurses and physicians per shift	Yes	37	16	53
18	The nurse station allows a choice of working sitting or standing	No	48	26	74
		Yes	17	9	26
19	At critical times, staff can easily enter and exit the nurse station	No	0	0	0
		Yes	65	35	100
20	Security measures are in place to prevent non-authorized people from entering the nurse station	No	28	19	47
		Yes	37	16	53
21	The nurse station includes facilities to maintain the health and safety of nurses	No	12	9	21
		Yes	53	26	79
22	A duct is used to cover all wires and cables in the nurse station	No	12	9	21
		Yes	53	26	79
23	The furniture (shelves, counters, etc.) in the nurse station are securely fixed and suitable for the load they support	No	28	19	47
		Yes	37	16	53
24	There is correct lighting in the nurse station to perform tasks	No	12	9	21
		Yes	53	26	79
25	Lighting is uniformly distributed at all points in the nurse station	No	28	19	47
		Yes	37	16	53
26	An appropriate combination of yellow and white lights is used at the nurse station	No	12	9	21
		Yes	53	26	79
27	The nurse station has a window to provide natural light	No	65	35	100
		Yes	0	0	0
28	There is an acceptable sound level in the nurse station and its surrounding areas	No	47	21	68
		Yes	18	14	32
29	The temperature of the nurse station is adjustable and maintained at a comfort level	No	28	19	47
		Yes	37	16	53
30	There is an air conditioner system in the nurse station	No	28	19	47
		Yes	37	16	53
31	The air conditioner system is effective	No	28	19	47
		Yes	37	16	53
32	The design of the counter enables patients using a wheelchair to see and communicate with nurses	No	12	9	21
		Yes	53	26	79
33	The counter surface dimension is sufficient for writing activities	No	12	9	21
		Yes	53	26	79
34	The dimensions of the counter surface level are adequate for placing computer equipment and other necessary accessories	No	12	9	21
		Yes	53	26	79
35	The counter surface edges are not sharp	No	0	0	0

Nursing Station Ergonomic Assessment (NSEA)			ICHD-3 (International Classification of Headache Disorder - 3)		
			Migraine	Non-Migraine	Total
		Yes	65	35	100
36	The counter surface level is not rough	No	16	10	26
		Yes	49	25	74
37	The light reflection over the surface is not bothering	No	0	0	0
		Yes	65	35	100
38	Under the counter surface, there is enough space for nurses to move their feet	No	29	18	47
		Yes	36	17	53
39	Nurses can rest their feet can rest on the floor or another support when sitting behind the counter	No	49	25	74
		Yes	16	10	26
40	The seat height of chairs in the nurse station is easily adjustable	No	47	24	71
		Yes	18	11	29
41	The chairs in the nurse station have armrests	No	12	9	21
		Yes	53	26	79
42	The height of armrests can be adjusted	No	65	35	100
		Yes	0	0	0
43	The dimensions of the armrests of the chairs in the nurse station provide good support for nurses' forearms	No	12	9	21
		Yes	53	26	79
44	The armrests of chairs in nurse station do not prevent the worker from approaching the work surface (desk, counter, etc.)	No	12	9	21
		Yes	53	26	79
45	The chairs in the nurse station support the lower back	No	45	28	73
		Yes	20	7	27
46	The backrest of chairs in nurse station support the upper extremities	No	53	26	79
		Yes	12	9	21
47	The seat has an adjustable width and depth, to suit the nurses' anthropometric features	No	64	33	97
		Yes	1	2	3
48	The frontal edge of the seat is not sharp	No	0	0	0
		Yes	65	35	100
49	The seat cover is anti-perspiration and prevents nurses from slipping forward	No	65	35	100
		Yes	0	0	0
50	The chairs of nurse station have strong legs	No	0	0	0
		Yes	65	35	100
51	There are swivel chairs in the nurse station	No	28	19	47
		Yes	37	16	53
52	There are enough chairs at the nurse station	No	49	25	74
		Yes	16	10	26
53	There is a charting desk at the nurse station	No	12	9	21
		Yes	53	26	79

Nursing Station Ergonomic Assessment (NSEA)		ICHD-3 (International Classification of Headache Disorder - 3)			
			Migraine	Non-Migraine	Total
54	The design of the charting desk provides workspace for several nurses	No	0	0	0
		Yes	65	35	100
55	The height of desks at nurse station (computer desk/charting desk) is appropriate for the forearm height in sitting position	No	45	28	73
		Yes	20	7	27
56	The dimensions of the computer desk at the nurse station are suitable for placing the monitor, keyboard, mouse, etc.	No	16	10	26
		Yes	49	25	74
57	The edges of desks at the nurse station are not sharp	No	0	0	0
		Yes	65	35	100
58	The surfaces of desks (computer desk, charting desk) are not bothering	No	12	9	21
		Yes	53	26	79
59	Light reflection from the desk surface (computer desk, charting desk) is not bothering	No	12	9	21
		Yes	53	26	79
60	Under the surface of desks at nurse station (computer desk, charting desk), there is enough space for nurses to place and move their feet	No	29	18	47
		Yes	36	17	53
61	While sitting behind desks at nurse station (computer desk, charting desk), the nurses' feet are supported by the ground or a footrest	No	12	9	21
		Yes	53	26	79
62	The computer monitor can be placed in an appropriate distance from the nurse	No	28	19	47
		Yes	37	16	53
63	The monitor is directly in front of the user	No	28	19	47
		Yes	37	16	53
64	To prevent light reflection, the monitor is perpendicular to the window or light sources vertically	No	45	28	73
		Yes	20	7	27

Table 3: The ergonomic assessments pertaining to the layout and operation of nursing stations are shown in the table and are divided into two categories: those who have migraines and those who do not. For example, while assessing whether the position of the nurse station is in line with the architecture of the patient room, 12 out of 21 nurses who responded "no" reported having migraines, whereas 53 out of 79 nurses who responded "yes" also reported having headaches. This trend is noticeable in all of the ergonomic criteria that were evaluated, including the entry's visibility, patient accessibility, and the area allotted for charting. One noteworthy and important conclusion is that most nurses said they could monitor every patient directly from the nursing station; however, 57 out of 86 nurses who had this arrangement also reported having headaches.

Table 3 Correlation of migraine prevalence and nursing station ergonomics.

			Nursing Station Ergonomics Assessment (NSEA)		
			Good ergonomics	Bad ergonomics	Total
ICHD-3 Classification Disorder - 3)	(International of Headache Migraine		20	45	65
		Non-migraine	07	28	35
Total			27	73	100
Correlation					
			Value	df	Asymptotic Significance (2- sided)
Pearson Chi-Square			1.339	1	.247

Above Table data examines the correlation between migraine prevalence and nursing station ergonomics among 100 nurse participants, 27 participants reported good ergonomics, while 73 reported bad ergonomics. Migraine prevalence revealed that 65 participants experienced migraines and 35 did not. Notably, 74.1% (n=20) of participants with good ergonomics experienced migraines, compared to 61.6% (n=45) with bad ergonomics. Conversely, 25.9% (n=7) with good ergonomics did not experience migraines, whereas 38.4% (n=28) with bad ergonomics did not.

Although the association between nursing station ergonomics and migraine prevalence did not reach statistical significance ($\chi^2 = 1.339$, $df = 1$, $p = 0.247$), the trend observed suggests potential relevance. Specifically, a greater proportion of participants in 'bad ergonomics' environments reported migraines compared to those in 'good ergonomics' environments. This trend highlights the possible impact of workplace ergonomics on health outcomes. Future studies with larger sample sizes and additional ergonomic variables are warranted to confirm these findings and to explore potential underlying mechanisms.

DISCUSSION

The findings of this study contribute to the understanding of the relationship between nursing station ergonomics and health outcomes, particularly migraines, among nurses. Existing research has consistently demonstrated that inadequate ergonomic settings exacerbate musculoskeletal discomfort and health issues, including headaches (13). While the results of this study align with the theoretical expectation that poor ergonomics could contribute to migraines, statistical analysis did not reveal a direct association between nursing station ergonomics and migraine prevalence. However, the high migraine prevalence observed among nurses, at 65%, underscores the need for a broader evaluation of workplace conditions and their impact on health outcomes.

This study emphasizes the importance of ergonomic interventions for enhancing workplace comfort and productivity. Despite the non-significant statistical relationship ($p = 0.247$), the observed trends suggest that poor ergonomics, such as inadequate lighting and seating arrangements, may act as indirect triggers for migraines (14). Supporting evidence from prior studies highlights the broader implications of ergonomic improvements, which include reductions in physical discomfort and potential enhancement of overall quality of life (15). The limitations of this study include the focus on a singular workplace factor, as migraines are multifaceted conditions influenced by

both physiological and psychological factors. Psychological stress, work overload, and irregular shift patterns are critical variables that may significantly affect migraine prevalence and should be further explored in future research (16).

The inconsistency between this study’s findings and previous research underscores the complexity of migraine etiology. Studies indicate that psychological stress may outweigh ergonomic inadequacies in determining migraine prevalence among nurses (17). Comprehensive interventions targeting both physical and psychological workplace factors are necessary to achieve meaningful improvements in health outcomes. For instance, the role of shift work in disrupting circadian rhythms and increasing stress levels has been shown to elevate the risk of headaches and migraines (18). Incorporating evidence-based design principles to address both ergonomic and psychological demands could holistically improve workplace satisfaction and reduce occupational health issues (19). While this study identifies ergonomic settings as a contributory factor, the findings suggest that interventions should encompass a broader scope, addressing environmental, psychological, and occupational stressors in tandem to achieve optimal health and well-being among nursing professionals (20).

The strength of this study lies in its focus on a specific workplace factor, providing targeted insights into ergonomic influences on health. However, the inability to isolate other contributing factors, such as stress and work schedules, presents a limitation. Future research should adopt a multidimensional approach to account for these variables, ensuring that strategies for mitigating migraines among nurses are evidence-based and comprehensive. This study highlights the need for holistic workplace interventions that integrate ergonomic improvements with psychological support to enhance the overall health and job satisfaction of nursing staff (20).

CONCLUSION

The study highlights the significant health challenges faced by nurses, particularly the high prevalence of migraines, which underscores the critical importance of workplace ergonomics in healthcare environments. While a direct statistical correlation between nursing station ergonomics and migraines was not established, the findings suggest that poor ergonomic conditions may contribute indirectly to health issues, including migraines, by exacerbating stress and discomfort. This emphasizes the need for comprehensive workplace interventions aimed at improving ergonomic design and functionality, fostering a healthier and more supportive work environment. Addressing these factors has the potential to enhance the overall well-being, productivity, and job satisfaction of nursing professionals. Future research should delve deeper into the multifaceted causes of migraines and explore tailored strategies for their management, ensuring a holistic approach to occupational health in high-pressure healthcare settings.

AUTHOR CONTRIBUTIONS

Author	Contribution
Javeria Sami	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Kiran Shehzadi	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Humaira Sadique	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Sayed Sidra Tasneem	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Rubina Jabeen	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Muhammad Zeeshan Anwar	Substantial Contribution to study design and Data Analysis Has given Final Approval of the version to be published

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