Sudan Journal of Medical Sciences
Volume 19, Issue no. 2, DOI 10.18502/sjms.v19i2.12686
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Research Article

Nurses' Awareness and Practice Toward Pain Assessment and Management as Fifth Vital Sign in Sudan: A Cross-sectional Study

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Received: 30 January 2023
Accepted: 11 November 2023
Published: 28 June 2024

Production and Hosting by KnE Publishing

Editor-in-Chief:
Prof. Nazik Elmalaika Obaid Seid Ahmed Husain, MD, M.Sc, MHPE, PhD.

Abstract

Background: Pain is globally prevalent, affecting quality of life and driving most people to seek medical care. Nurses are essential for pain assessment and treatment. Adequate nursing awareness, attitudes, and skills are vital for optimal management. This study investigates nurses' awareness and practice toward pain assessment and management as the fifth vital sign in Sudan.

Methods: This study was a cross-sectional, hospital-based study. Convenience sampling was performed to collect information from nurses working at four government hospitals using a self-administered questionnaire 24 November 2020 and 18 April 2021. The study utilized descriptive and inferential statistics for data analysis.

Results: A total of 393 registered nurses participated in this study. Most (66.7%) were women, 46.6% were aged 20–25 years, and 69.2% had a bachelor degree. More than half of the nurses had low awareness of pain assessment (51.7%) and management practices (53.7%). A weak positive correlation was observed between awareness and practice (r = 0.280, P = 0.000). Women nurses showed a higher awareness (204.80, P = 0.048). Nurses with a high level of education showed higher awareness (249.32, P = 0.031) and higher practice (272.00, P = 0.029). Nurses working in the critical care unit performed significantly better than others (234.61, P = 0.001).

Conclusion: There is a low level of awareness regarding pain assessment and management practices. This study suggests the need for more research and training programs, especially for nurses with low educational levels.

Keywords: nurses, awareness, practice, pain management, Sudan

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1. Introduction

Pain is globally prevalent and drives most people to seek medical care, affecting their quality of life [1, 2]. In addition, a patient's physical, emotional, and spiritual well-being is also affected [3]. Pain as a part of one's life becomes a primary protective mechanism to alert the body of environmental and health risks [4]. It is an unpleasant sensation and emotional experience associated with acute tissue damage [5, 6]. The American Pain Society introduced pain as the "fifth vital sign" in 1996 to improve pain assessment and management [7]. The concept of pain was formally confirmed as the "fifth vital sign" in the Accreditation of Healthcare Organizations (2001) [6]. These organizations now require pain assessment as the fifth vital sign in all healthcare facilities, increasing awareness among health professionals to routinely assess, document, and control pain for all admitted patients as a central part of the healthcare process [10, 11]. Pain can originate from various causes such as trauma, surgical procedures, childbirth, chronic postsurgical pain, chronic inflammatory disorders, and low back pain [12]. Pain control is essential in all healthcare systems [13]. According to the World Health Organization [14], pain is a health issue that requires a multidisciplinary approach; its treatment is fundamental to human rights [15]. Untreated pain can progress to chronic pain and have several adverse effects on all aspects of patients' lives, including physiological, psychological, and socioeconomic factors, thereby increasing costs, prolonging hospital stays, and contributing to poor health outcomes and quality of life [16–18].

Nurses play a crucial role in regular pain assessment and recording, and are considered one of the main contributors to pain treatment [19, 20]. They spend more time with patients than other healthcare providers [21]. To assess and effectively and accurately manage pain, nurses must understand the concepts, acquire precise knowledge, and possess the necessary skills and attitudes toward optimal pain management [22–25]. Adequate nursing awareness, attitudes, and skills are vital for optimal management [26, 27].

However, studies conducted in different countries have shown that nurses in various medical fields lack knowledge and skills for effective pain assessment and management [28–31]. Moreover, studies conducted in Jordan and Nigeria revealed that nurses have poor knowledge of pain treatment [32, 33]. Another study conducted in Spain found that the major barriers to pain management were deficits in knowledge, skills, and time [17, 34]. Additionally, a study in Iran found that nurses had inadequate knowledge and moderate attitudes toward pain treatment [35]. Similarly, a study in Eritrea revealed that emergency nurses had poor knowledge and attitudes toward pain management regarding opioid use and an absence of clinical guidelines for pain assessment and management [36]. Another study conducted in Saudi Arabia showed that most critical care and intensive care unit nurses lacked knowledge and had inadequate attitudes, with several obstacles and challenges toward pain management [25, 28]. Furthermore, an Ethiopian study demonstrated that nurses had insufficient knowledge and skills regarding pain management in acute coronary syndrome care [35]. Furthermore, a systematic review and meta-analysis, including studies from different countries among 7942 nurses, reported that professional nurses have poor knowledge toward pain management [37].

The lack of knowledge, poor attitude, and practice gap among nurses toward pain treatment are major challenges in providing effective pain

management [38, 39]. Furthermore, a recent study conducted in Sudan showed that nurses' workload and lack of protocols, guidelines, and resources, including equipment and materials for pain assessment and management, were perceived barriers to postoperative pain management [40]. However, there is a paucity of information on the challenges and barriers confronting Sudanese nurses toward effective pain assessment and management. In addition, there is limited information on nurses' awareness of pain assessment and management in different healthcare facilities in Sudan. Hence, this study aimed to assess nurses' awareness and practice toward pain assessment and management by adopting the concept of pain as a fifth vital sign. The study was conducted in five different governmental hospitals in Sudan to determine whether there were any correlations or differences between the study variables. The findings of this study can provide useful information for hospital administrators and policymakers as a starting point for implementing future continuous educational program strategies to improve nurses' awareness and practices for effective pain management in Sudan.

1.1. Study hypothesis

H0: There is no significant correlation between the awareness and practice of the study variables.

H1: There is a significant correlation between the awareness and practice of the study variables.

2. Materials and Methods

2.1. Study design and period

This study was a cross-sectional, hospital-based descriptive study. We report this study according to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guideline [41, 42].

2.2. Study setting

This study was conducted between 24 November 2020 and 18 April 2021 in four government hospitals in Sudan to collect an adequate sample size because of a shortage of nurses. The first geographical data collection region was the Kosti Teaching Hospital in Kosti City. This hospital serves patients from Kosti City and neighboring towns in the state territories [43]. It coordinates geographically at 13°10′N, 32°40′E, found on the western bank of the White Nile, and is situated in the southern part of the capital of Sudan, namely Khartoum [44]. Three other government hospitals, namely Khartoum Teaching Hospital, Bahari Teaching Hospital, and Sudan Heart Center, are located in Khartoum State, the federal capital of Sudan [45].

2.3. Sample size and method

The sample size was determined using the following information (47): $n = P(1\text{-}P)$ Z2/d2 with an unknown prevalence of 50%, $Z = 1.96$, $d = 0.05$, and confidence level = 95% (margin of error = 5%). The calculated sample size was 385 participants. Nurses were selected using a convenience sampling technique, and 393 nurses were employed in government hospitals, indicating an adequate sample size.

2.4. Inclusion and exclusion criteria

The researchers invited nurses to voluntarily participate in the study. The inclusion criterion was nurses working in government hospitals who

agreed to be included in this study. The exclusion criteria were nurses working in private hospitals, those who were not nurses, and those who refused to participate or did not complete the questionnaire.

2.5. Data collection instrument

We developed a self-administered questionnaire for this study after an extensive review of the literature; some items were adapted from the validated questionnaire of the Knowledge and Attitudes Survey Regarding Pain (KASRP), which was originally developed by Ferrell and McCaffery in 1987 [47]. The KASRP was updated in 2014 and translated into other languages [48]. The KASRP has been validated in previous studies for healthcare workers, including medical and nursing staff and pain experts for older persons [49]. The components of the KASRP were derived from modern guidelines for pain management from the American Pain Society, World Health Organization, and National Comprehensive Cancer Network Pain Guidelines, which were validated by pain experts [50]. The test–retest reliability of the older version of the KASRP was $r > 0.8$, and Cronbach's alpha was > 0.7 in the internal consistency of the study domains in both knowledge and attitude [51].

2.5.1. Questionnaire components

The modified questionnaire was subjected to a panel of experts who judged and approved its contents in three parts. Part one: Demographic characteristics of the nurses included five items: sex, age, education level, years of experience, and working area. Part two: Ten questions measuring nurses' pain assessment and management awareness. The responses were based on a 5-point Likert-type scale, and each question had five possible options: always true (5 points), often true (4 points), neutral (3 points), rarely true (2 points), and never true (1 point). The points of awareness ranged from 10 to 50. Higher scores indicate a higher level of awareness regarding pain assessment and management. Part three included 10 practical questions to assess nurses' levels of practice toward pain assessment and management. This was based on a 5-point Likert-type scale, and each question had five possible responses: always (5 points), usually (4 points), sometimes (3 points), seldom (2 points), and never (1 point). We conducted a pilot study with 30 nurses to test the reliability of internal consistency in the study domain of awareness and practice. According to the pretest findings, we made corrections for feasibility and content applicability before beginning the actual data collection stage. The nurses who participated in the pilot test were excluded from the study. The reliability test results showed that Cronbach's alpha coefficients were 0.803 and 0.70 for assessing awareness and practice regarding pain management, respectively, which were considered acceptable.

2.5.2. Scoring method

According to the scoring method, initially, we computed the total mean scores of each study domain of awareness and practice. Then, we categorized them into three levels and quartiles based on a scale of 100% to determine the level of nurses' awareness and practice toward pain management as follows: Good (>75–100%), Moderate (>50–75%), and Low (≤50%) [52–57].

2.6. Data analysis

The quantitative data were coded and analyzed using the Statistical Package for Social Sciences

(SPSS version 28). We used descriptive and inferential statistics to analyze the data. Descriptive statistics were used to calculate the frequencies and percentages of categorical variables, whereas continuous variables are presented as means and standard deviations. Regarding inferential statistics, we initially tested the nature of the data for normal distribution using the Kolmogorov–Smirnov test, which showed a non-normal distribution. A variety of nonparametric tests are analogous to parametric tests for continuous variables. The Mann–Whitney U-test is analogous to the independent *t*-test, which compares the means between two independent groups with the assumption that the data are not normally distributed. The Spearman rank correlation coefficient is equivalent to the Pearson product-moment coefficient [58]. The Kruskal–Wallis test is a nonparametric alternative to one-way analysis of variance for comparing more than two independent samples for the mean ranks [59]. Thus, we performed nonparametric tests of inferential statistics to determine the significance of the study variables. These included the Mann–Whitney U-test to compare the significant mean difference in nurses' awareness and practice among the demographic characteristics of the two independent groups and the Kruskal–Wallis test to compare the significant mean difference of more than two independent groups. In addition, we applied the Spearman correlation coefficient to examine the correlations between the study variables of awareness and practice of nurses toward pain management. The significance level was adjusted to $P < 0.05$ in all results.

3. Results

3.1. Demographic characteristics

A total of 393 registered nurses participated in the study. Most study respondents, 266 (67.7 %), were women, and only 127 (32.3%) were men. A total of 183 (46.6%) were aged 20–25 years, and the majority of nurses, 272 (69.2%), had a bachelor's degree. Approximately half of the study participants, 181 (46.1%), had three to five years of nursing experience, and 138 (35.1%) worked in the emergency department (Table 1).

3.2. Nurses' pain management awareness and practices

Most participants, 262 (66.7%), said that the vital signs are always reliable indicators of a patient's pain intensity. A total of 219 (55.7%) participants said that pain assessment is part of the vital signs, and 125 (31.8%) said that pain assessment as the fifth vital sign was the doctor's job (Table 2).

In the responses regarding the practices of nurses toward pain management, the majority, 257 (65.4%) nurses, answered that they assessed pain as the fifth vital sign whenever a patient was admitted for the first time, followed by 232 (59%) who answered that they reported patient pain to the physician, and 232 (59%) put the patient in a comfortable position when in pain (Table 3).

3.3. Categorization of the awareness level and practice for pain management

To ascertain the pain management awareness level and practice among nurses, the researchers divided the total mean scores into three quartile groups based on a 100% scale: good (>75–100%), moderate (>50–75%), and low (50%). The results of the mean category showed that more than half of

the participants had low levels of awareness of pain assessment and management practices, with 203 (51.7%) and 211 (53.7%), respectively. The nurses' moderate levels of awareness of pain assessment and management practices were 102 (26.0%) and 104 (26.5%), respectively. Only 88 (22.4%) nurses had a good level of awareness, and 78 (19.8%) nurses had a good level of practice regarding pain assessment and management (Table 4).

3.4. Correlation between awareness and practice of study variables

3.4.1. Testing correlation hypothesis

H0: There is no significant correlation between the awareness and practice of the study variables.

H1: There is a significant correlation between the awareness and practice of the study variables.

We tested H1 using Spearman's Rho test to evaluate the strength and direction of the correlations between the study variables. The results indicated a significantly positive weak correlation between awareness and practice (r = 0.280, P = 0.000) (Table 5).

3.4.2. Comparison of differences in the mean scores of awareness and practice with demographic characteristics of the nurses

We applied the Mann–Whitney U-test to compare two independent groups and the Kruskal–Wallis test to compare more than two groups in the mean scores of pain management awareness and practices with their demographic characteristics to determine any differences. The results revealed significant differences between the mean awareness scores and sex. Women nurses (mean rank = 204.80, P = 0.048) had significantly higher pain management awareness than men. In addition, the results showed significant differences between the mean awareness and practice scores concerning education level. Nurses with master's and PhD degrees showed statistically significant higher awareness (249.32, P = 0.031) and practice (272.00, P = 0.029) than others.

Nurses in the critical care unit demonstrated significantly more pain management practices (234.61, P = 0.000) than those working in other areas. However, we did not observe any statistically significant differences in the mean scores of awareness and practice according to the age and experience of the nurses (Table 6).

4. Discussion

Nurses play an essential role in pain assessment and management [60]. Optimal pain treatment depends on the healthcare providers' knowledge, attitudes, and skills [26]. This study assessed nurses' awareness and practice of pain assessment and management as the fifth vital sign in Sudan. The present study's findings show that most participants were women aged 20–25 years with bachelor's degrees and three to five years of experience working in the emergency department. These results are similar to those of a study demonstrating that most nurses had a baccalaureate degree, age between 18 and 34, and 0–5 years of experience, in contrast to men [61]. In our study, most nurses were women, which aligns with a study conducted in Saudi Arabia, where most participants were women nurses [62]. This evidence supports the notion that there are more women in nursing. Furthermore, nursing has historically been a woman-dominated profession, however, equal education for men and women and efforts to promote healthcare equality have

been made [63]. From this perspective, pain management strategies should focus on improving patient outcomes in both groups.

This study revealed that more than half of the participants had low levels of awareness. These results are consistent with those of previous studies reporting nurses' inadequate awareness of pain assessment and management in different hospitals worldwide [61, 64–68]. A possible explanation for the low level of awareness among nurses may be a lack of pain assessment and management strategies in the nursing curriculum at the undergraduate level. Moreover, nurses in clinical settings may have limited exposure to a comprehensive education program, resulting in knowledge gaps regarding pain assessment and management. However, this, in contrast to a previous study conducted in Sudan, revealed that more than half of the nurses had good knowledge of pain definition, causes, pathophysiology, pain assessment tools, and other aspects [69]. The variability of our findings compared with an earlier study in Sudan may be because we targeted nurses from various hospital settings. Although there is only one study in Sudan, the majority of studies in different countries demonstrate that nurses have poor awareness of pain management, aligned with our study findings, which may be attributed to a deficiency in training programs. When nurses do not have a good awareness of pain experiences, they assess pain poorly as the fifth vital sign, and patients do not receive optimal pain management. Thus, educational programs are urgently required for all Sudanese nurses to enhance their awareness of pain management. As nurses are always around patients, they must be knowledgeable about caring for those experiencing pain [70] This study showed that more than half of the nurses had low levels of practice in pain assessment and management. A possible explanation might be that the nurses' lack of training courses in their practice area was one of the causes of their inadequate practices of pain assessment and management. Our findings align with those of previous studies, which found that nurses have low practice in pain assessment [71]. Similarly, another study found a gap in nurses' practices toward pain assessment and documentation [72]. Nevertheless, according to another study conducted in Ethiopia, nearly half of nurses had adequate practice in pain assessment [73]. Therefore, our study endorses specific training services that may enhance nurses' skills and performance toward pain assessment and management in Sudan.

This study tested the correlation between the study variables, namely awareness and practices. The results showed a significantly positive weak correlation between the awareness and practice of nurses toward pain assessment and management, which aligns with other studies that have shown a significant positive correlation between knowledge and practice related to pain management [74]. This positive correlation indicated that good awareness improves pain assessment and management practices. Accordingly, nurses who knew more about the consequences of pain could perform well in managing pain, such as regularly assessing pain as the fifth vital sign with appropriate pain rating scales, administering analgesics on a round-the-clock basis, reporting patient pain to the physician, and putting the patient in a comfortable position. These results agree with a cross-sectional study conducted in Palestine that found a positive correlation between nurses' knowledge and practice scores [74]. Training in the nursing profession is a key element for improving competence in pain assessment and patient clinical outcomes [75].

Table 1: Demographic characteristics (*N* = 393).

Variables	Frequency (n)	Percentage (%)
Sex		
Men	127	32.3%
Women	266	67.7%
Age (yr)		
20–25	183	46.6%
26–31	135	34.4%
32–37	50	12.7%
>37	25	6.4%
Educational level		
Diploma	89	22.6%
Bachelor	272	69.2%
Master	28	7.1%
PhD	4	1.0%
Experience (yr)		
1–2	154	39.2%
3–5	181	46.1%
>10	58	14.8%
Working area		
Emergency department	138	35.1%
General ward	83	21.1%
Intensive care unit	121	30.8%
Critical care unit	51	13.0%

Therefore, the current study suggests the need for continuous education and training programs to strengthen the correlation between awareness, pain assessment, and management practices.

This study compared the differences between awareness and practice of pain assessment and management based on the demographic characteristics of the nurses in the study. The findings revealed significant differences in the mean scores of awareness and the sex of nurses. Women nurses showed significantly higher awareness of pain assessment and management, consistent with prior studies showing that women nurses have high knowledge of pain assessment and management [76, 77]. In addition, the results demonstrated significant differences between the mean scores of awareness and practice of pain management with the education level variable. Nurses with master's and PhD degrees showed significantly higher awareness and practices than those with other education levels. This result aligns with another study that found that nurses with bachelor's degrees had better professional skills [25]. This variation in the level of awareness among nurses in our study could be because of a lack of educational resources and clinical practice exposure among Sudanese nurses with low levels of education, such as baccalaureates and diplomas. Therefore, this study suggests that nurses with low educational levels should participate in comprehensive education programs to improve their skills. Moreover, there were

Table 2: Awareness of nurses toward pain management (*N* = 393).

Awareness items	Number of nurses (%)				
	Always true	Often true	Neutral	Rarely true	Never true
Vital signs are always considered reliable indicators of a patient's pain intensity.	262 (66.7)	84 (21.4)	18 (4.6)	18 (4.6)	11 (2.8)
Pain assessment is part of the vital signs.	219 (55.7)	93 (23.7)	27 (6.9)	26 (6.6)	28 (7.1)
The numeric scale can be used to assess pain in children and adults.	143 (36.4)	107 (27.2)	54 (13.7)	36 (9.2)	53 (13.5)
The usual time duration of analgesia of 1–2 mg morphine IV is 4–5 hr.	123 (31.3)	114 (29)	72 (18.3)	30 (7.76)	54 (13.7)
Older patients cannot tolerate opioids for pain relief.	113 (28.8)	113 (28.8)	56 (14.2)	47 (12)	64 (16.3)
Giving patients an injection of sterile water (placebo) is a useful test to determine if the pain is real.	131 (33.3)	91 (23.2)	71 (18.1)	35 (8.9)	65 (16.5)
When the patient asks for the medication, analgesics for postoperative pain should initially be given.	130 (33.1)	101 (25.7)	50 (12.7)	37 (9.4)	75 (19.1)
The person who most accurately judges the intensity of the pain is the patient's primary nurse.	161 (41)	111 (28.2)	69 (17.6)	25 (6.4)	27 (6.9)
Pain assessment as the fifth vital sign is the doctor's responsibility.	125 (31.8)	98 (24.9)	68 (17.3)	32 (8.1)	70 (17.8)
The recommended route of opioid analgesics for patients with severe pain of sudden onset, such as trauma or postoperative pain, is intravenous.	198 (50.4)	102 (26)	53 (13.5)	26 (6.6)	14 (3.6)

Table 3: Nurses' practice towards pain management (*N* = 393).

Awareness items	Number of nurses (%)				
	Always do	Often do	Undecided	Rarely do	Never do
I assess pain as the fifth vital sign whenever a patient is admitted for the first time.	257 (65.4)	79 (20.1)	13 (3.3)	32 (8.1)	12 (3.1)
Do you assess other vital signs in your unit?	187 (47.6)	110 (28)	40 (10.2)	35 (8.9)	21 (5.3)
Do you use any pain rating scales before giving analgesia?	149 (37.9)	119 (30.3)	37 (9.4)	47 (12)	41 (10.4)
Do you give a patient in pain enough time to freely describe it in his own word?	165 (42)	131 (33.3)	42 (10.7)	39 (9.9)	16 (4.1)
Do you observe patients' behaviors and overall posture when a patient is in pain?	201 (51.1)	117 (29.8)	33 (8.4)	34 (8.7)	8 (2)
Do you report patient pain to the physician?	232 (59)	81 (20.6)	36 (9.2)	27 (6.9)	17 (4.3)
Do you try to arrange a quiet environment when a patient is in pain?	204 (51.9)	115 (29.3)	37 (9.4)	21 (5.3)	16 (4.1)
Do you put the patient in a comfortable position when they are in pain?	232 (59)	104 (26.5)	32 (8.1)	13 (3.3)	12 (3.1)
Do you adhere to administering painkiller medication around the clock?	138 (35.1)	131 (33.3)	62 (15.8)	37 (9.4)	25 (6.4)
Do you reassess the pain level after giving a painkiller?	219 (55.7)	84 (21.4)	28 (7.1)	34 (8.7)	28 (7.1)

significant differences in the practices of nurses from different working areas. Nurses working

Table 4: Categorization of the overall level of awareness and practice of nurses regarding pain management (*N* = 393).

Variable	n (%)		
	Low(≤50%)	**Moderate (>50–75%)**	**Good (>75–100%)**
Awareness	203 (51.7%)	102 (26.0%)	88 (22.4%)
Practice	211 (53.7%)	104 (26.5%)	78 (19.8%)

Table 5: Correlation between nurses' awareness and practice (*N* = 393).

Variable	rho	P-value
Awareness and practice	0.280**	0.000
Spearman's Rho test used, ** *P*-values ≤ 0.001		

Table 6: Differences in awareness and practice with demographic characteristics (*N* = 393).

Variables	n	A-mean score 3.76 ± 0.628 Mean rank	P-value	P-mean score 4.10 ± 0.615 Mean rank	P-value
Sex			**0.048***		0.907
Men	127	180.65		197.96	
Women	266	**204.80**		196.54	
Age (yr)			0.428		0.944
20–25	183	192.41		193.65	
26–31	135	198.96		198.23	
32–37	50	191.29		203.16	
≥37	25	231.44		202.54	
Education			**0.031***		**0.029***
Diploma	89	208.39		169.66	
Bachelor	272	188.46		202.07	
Master	28	**249.32**		223.93	
PhD	4	158.00		**272.00**	
Experience (yr)			0.323		0.253
1–2	154	186.39		186.59	
3–5	181	204.67		206.97	
>10	58	201.23		193.54	
Working area			0.278		**0.000****
ER	138	201.42		173.71	
General ward	83	213.82		179.98	
ICU	121	185.69		219.38	
CCU	51	184.52		**234.61**	

A-Mean: Awareness mean score (range = 1–5); P-Mean: Practice mean score (range = 1–5); ER: Emergency room; ICU: Intensive care unit; CCU: Critical care unit; Mann–Whitney U and Kruskal–Wallis tests used
**P*-values ≤ 0.05; ***P*-values ≤ 0.001

in critical care units demonstrated significantly more pain management practices than those working in other areas. These findings may be because nurses working in the critical care unit are exposed to more critically ill patients experiencing pain.

4.1. Strengths and limitations of the study

The data for this study were collected from four government hospitals in different regions of Sudan. This study highlighted a low level of awareness of pain assessment and management practices,

regardless of the cause. Therefore, the study results may help healthcare policymakers adopt a continuous education and training program for nurses in any setting to enhance their pain assessment and management competency in Sudan. However, this study has some limitations. First, the pain study was not based on a specific disease or symptoms. We used items from a tool previously developed by Betty that can be used and duplicated for any purpose in whole or part to assess nurses' knowledge and attitudes [78]. Second, convenience sampling was used for the data collection. Third, the data were not normally distributed. Thus, in the data analysis, we used non-parametric analysis. Accordingly, these findings may not be representative of all nurses in Sudan. Therefore, additional research on nurses is required in other areas of Sudan.

5. Conclusion

This study highlighted nurses' low levels of awareness regarding pain assessment and management practices in government hospitals in Sudan. These results may be attributed to insufficient hospital education programs and training services. The study suggests nurses need continuous education and training programs because adequate awareness, attitudes, and skills are cornerstones of optimal management. In addition, without an accurate pain assessment, patients may not receive optimal pain management. Thus, our results have several implications for hospital administrators, healthcare policymakers, and nursing educators.

6. Implications of the study

First, hospital administrators should implement continuous education and training programs to improve nurses' awareness and practice toward pain assessment and management, focusing on nurses with low educational levels in Sudan. Second, healthcare policymakers should invest in innovation to develop and implement updated protocols, guidelines, and standards for pain management based on evidence-based practices to improve nurses' awareness and practical skills. Third, nursing educators in colleges and schools should incorporate mandatory pain management into the curricula of undergraduate nurses to prepare nursing students for effective pain assessment and management. Finally, further research is required to identify other factors that might contribute to inadequate nurses' competency toward pain management and to cover different areas of Sudan and nursing in the private sector.

Declarations

Acknowledgements

The authors thank the nurses who voluntarily participated in this study and the hospital administration.

Ethical Considerations

Before data collection, researchers obtained ethical clearance from the Ministry of Health of White Nile State (MHWNS. Ref. #02/2021). After explaining the study's aims, informed consent was obtained from each participant. The respondents were informed that they had the right to accept, freely refuse, or withdraw at any time. All the nurses' responses were anonymous, kept strictly confidential, and used only for research purposes. We did not personally identify the respondents.

Competing Interests

The authors declare no conflicts of interest with respect to the research, authorship, or publication of this study.

Availability of Data and Material

The data for this study is available from the authors upon request.

Funding

None.

Abbreviations and Symbols

STROBE: Strengthening the Reporting of Observational Studies in Epidemiology

KASRP: Knowledge and Attitudes Survey Regarding Pain

SPSS: Statistical Package for Social Sciences

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