

Pediatric pain management: Knowledge and attitudes among nursing students in Saudi Arabia (A cross-sectional study)



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ARTICLE INFO

Article history:

Received 14 March 2019

Received in revised form

6 July 2019

Accepted 9 July 2019

Keywords:

Knowledge

Attitudes

Pediatric pain management

Nursing students

Saudi Arabia

ABSTRACT

Pediatric pain is a common experience and one of the main reasons for hospital visits and admissions. However, it is often undertreated, underdiagnosed and poorly assessed and managed. Limited knowledge, understanding, and attention given to pediatric pain management in nursing curricula and practice may be a significant factor for ineffective and/or poor pediatric pain. To examine the knowledge and attitudes of pediatric pain management among undergraduate nursing students in Saudi Arabia. This is a descriptive cross-sectional study, which included a sample of 173 bachelors of nursing students studying at Majmaah University in Saudi Arabia. The study used the Pediatric Nurses' Knowledge and Attitudes Survey Regarding Pain (PNKAS) as an instrument. Poor knowledge and attitudes towards Pediatric pain and its management were found amongst the nursing student participants. The mean correct score for the entire scale was 32.1% (SD=9.9). There was a significant difference in the nursing students' scores with regards to gender, age, clinical experience, and qualification. Nursing students, in general, had poor scores of knowledge and attitudes regarding pediatric pain and its management. Intensive education and training on pediatric pain are urgently needed for nursing students in Saudi Arabia.

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1. Introduction

Pain can be defined as an "unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage" (Loeser and Treede, 2008). Pain is one of the main reasons behind children's hospital visits, admissions and stays (Twycross et al., 2009). Pain episodes in children are usually a result of illnesses, headaches or injuries; additionally, inflicted pain can occur when children undergo diagnostic testing, medical and surgical procedures, or receive an intravenous or intramuscular injection (Burns et al., 2016; Oakes, 2011; Wilson et al., 2017).

Pain and its management in pediatric patients are challenging tasks for health professionals, including nurses. Children may not possess the cognitive ability and/or communication skills to effectively describe the nature, location and severity of their pain (Wilson et al., 2017; James et al., 2013).

Unrelieved pain in early life can lead to long-term negative consequences, not only for the child's sensitivity and perception to pain but in terms of their stress responses, behaviors and learning skills. It can also lead to negative psychological, physiological and behavioral consequences, such as behavioral disturbances, fear, anxiety, sleep disturbances and mental regression (Bowden and Greenberg, 2012; Twycross et al., 2009). Conversely, effective pediatric pain management has been shown to have positive consequences, such as positive experiences about hospitalization and pain relief, diminished childhood anxiety, shorter hospital stays and enhanced healing and recovery, which in turn help to minimize costs and efforts associated with health care (Ball et al., 2016).

Children have a right to receive effective pain assessment and management from doctors, nurses and other health professionals involved in their care and treatment (Carter, 2013; Twycross et al., 2009; Wilson et al., 2017). However, they do not always receive this, which leads to them suffering needlessly from pain (Wilson et al., 2017). Research has consistently shown that pediatric pain is still undertreated, unaddressed and poorly managed owing to several reasons, including poor knowledge of and understanding about pediatric pain and its care and/or management (Alotaibi et al., 2019;

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<https://doi.org/10.21833/ijaas.2019.09.010>

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Dongara et al., 2015; Ekim and Ocakçı, 2013; Lunsford, 2015; Manworren, 2001; Stanley and Pollard, 2013).

There are a few studies exist on the aspect of nursing students' knowledge and attitudes in relation to pediatric pain management, and these studies all have shown low scores for nursing students in this area.

Ortiz et al. (2015) conducted a cross-sectional study among 300 nursing students to examine their knowledge and attitudes in relation to pediatric pain management; the authors found that the students' knowledge regarding pain management for children was poor across many different areas, including assessment, pharmacology and non-pharmacological interventions.

Similarly, Al Omari (2016) found insufficient knowledge and attitudes regarding pediatric pain and its management, with a total mean score of 18.36% (SD: 6.30) on the PNKAS scale for 101 nursing students at three private universities in Jordan. A recent cross-sectional study in Egypt was conducted by Gadallah et al. (2017) to assess third-year and fourth-year nursing bachelor's students' attitudes and knowledge of pediatric pain management; the study also used the PNKAS scale. The study found that three-fourths of participants (76.2%) answered less than half of the questions correctly, particularly those relating to pharmacology and its interventions.

The mentioned research studies concluded that nursing students need extensive education and that nursing curricula should be improved to incorporate comprehensive content for pain assessment and its non-pharmacological management. The studies also emphasized the urgent need for professional education and training for nursing students to enable them to learn effectively before they complete their studies so they can provide effective pain care to their future patients.

No study to date has examined the knowledge and attitudes of undergraduate nursing students regarding pediatric pain management in Saudi Arabia (SA)—a gap filled by the current study. This study has the potential to provide information that will help to improve undergraduate nursing curricula and to identify the developmental strategies that may improve nursing student's knowledge regarding pediatric pain management.

2. Methodology

2.1. Aims

This study aims to 1) examine the knowledge and attitudes of undergraduate nursing students at Majmaah University (MU) regarding pediatric pain management in SA and 2) determine if there are any significant differences in knowledge and attitudes regarding pediatric pain management of nursing students on the basis of demographic factors.

2.2. Design

The design of the study is a descriptive cross-sectional.

2.3. Setting and sampling

This study was conducted at MU in the Riyadh region of SA. It is a newly established university developed in 2009 that offers a bachelor's degree in nursing. English is the main language used in the teaching of the program. Convenience sampling was used in this study. The target population consisted of all nursing students who met the inclusion criterion: nursing students at MU from the third and fourth year of a bachelor's degree. Exclusion criteria were non-nursing students and nursing students studying at the first year (preparation), second year and internship year.

2.4. Measurement

The questionnaire used in this study consisted of two parts. The first part was a questionnaire on students' demographic data, including gender, age, current academic year, educational qualifications, years of clinical experience (bridging students) and self-evaluation by nursing students of their knowledge regarding pain assessment and management (Table 1). The second part was the PNKAS questionnaire, developed by Manworren (2001) as a modification of the original questionnaire by McCaffrey and Ferrell (1997) to assess both knowledge and attitudes in relation to pediatric pain assessment and management. The PNKAS consists of 25 true/false statements and 13 multiple-choice questions. In addition, the last two questions (Q39 and Q40) are case studies, each of which has two multiple-choice questions. The PNKAS was selected for this study to examine the knowledge and attitudes of nursing students regarding pediatric pain management because of its high level of reliability and validity according to local and international studies (Alotaibi et al., 2019; Chiang et al., 2006; Gadallah et al., 2017; Lunsford, 2015; Manworren, 2001; Ortiz et al., 2015; Al Omari, 2016).

2.5. Procedure

The researcher collected the data between April 2018 and June 2018 after the study was approved by the ethical committee of MU (approval number: MUREC- May. I 4 I COM-201817). Given the importance of maintaining participant anonymity and research confidentiality (Polit and Beck, 2008), student participation in this study was voluntary and participants were free to withdraw from the study at any time. To collect data from the female students at the college, the primary researcher sought help from a female research assistant who was an expert in the area of pain management. The researcher and female

research assistant met the students in the lecture classroom to distribute the questionnaires and explain the necessary information, such as the aim of the study and its significance, the benefits of participation and the voluntary nature of participation. Students were asked to answer the PNKAS questions, which were expected to take about 25 to 35 minutes, and return the questionnaires to a locked box, labelled 'completed questionnaires', located in the research office for confidentiality purposes. Consent in this study was implied, which means that students volunteered to complete and return the questionnaire.

2.6. Data analysis

SPSS software, version 25 developed by IBM was used to analyze the data from the questionnaires. Descriptive statistics including frequencies with percentages and the mean with standard deviation (SD) were used in this study. As the data of the present study were normally distributed parametric inferential tests, such t-test and one-way ANOVA tests were used. Statistical significance was considered to be a p value <.05.

Following the approach of the author of the PNKAS in analyzing data, correct answers for the questions were given a score of one, while incorrect answers were assigned a score of zero. A student who received 50% or more of the total score (100%) was considered to have satisfactory knowledge.

3. Results

The questionnaires were distributed among 217 students. Of these, 176 students responded, representing a response rate of 81.1%. Three participants returned incomplete questionnaires and were excluded from data analysis, bringing the total sample to 173 students. Table 1 shows the participants' demographic characteristics. Most of the participants were male (60.9%), about one-third (30.1%) of students had a secondary school certification and the rest had a diploma. More than half (53.8%) of the participants were between the ages of 20 and 30 years. During the data collection, 48% of the students were in their third year, while the rest were in their fourth year. About two-thirds of the students (67%) rated themselves as having good knowledge of pediatric pain management.

The mean total score of correctly answered items was 13.5 (SD: 3.4) out of a possible score of 42, or 32% out of 100%. None of the nursing students in this study attained 100% correct answers. The range of possible scores for each participant for the PNKAS was between 0 and 42. Of the 42 items, only seven items had a correct answer rate of more than 50%. The highest correct scores were related to the adjustment of opioid analgesic dosage (Q22) with a percentage of 75.5, followed by item 8 with a percentage of 65.9, followed by item 20 with a percentage of 65.3. For more detail about the ten

questions with the most correct responses, refer to Table 2.

Table 1: Nursing student's demographic characteristics (N= 173)

Variable	Number of participants (N)	Percentage (%)
Age range		
20-24 years	59	34.1
25-29 years	34	19.7
30 years and more	80	46.2
Total	173	100.0
Gender		
Male	104	60.9
Female	69	39.1
Total	173	100.0
Highest qualification		
Secondary school	52	30.1
Diploma degree	121	69.9
Total	173	100.0
Current academic year		
Third year	83	48.0
Fourth year	90	52.0
Total	173	100.0
Clinical experience (bridging students)		
Less than five years	69	39.9
Five years and more	104	60.1
Total	173	100.0
How would you rate your knowledge		
Poor	13	7.5
Fair	25	14.5
Good	116	67.0
Excellent	19	11.0

Conversely, the lowest correct score was item 39B (the first case study pain assessment), where 166 students (96%) incorrectly marked the patient's pain on the scale from 0 to 10. This was followed by item 26 (94.6% incorrect), then item 38 (94.2% incorrect). For more detail about the ten questions with the most incorrect responses, refer to Table 3.

Table 4 reveals significant differences in the mean total score on the PNKAS according to nursing students' demographic characteristics. Female nursing students had significantly higher scores than males ($t = -2.168$; $p < .05$). Nursing students under 30 years of age had significantly higher scores than those over 30 years ($t = 2.540$; $p < .05$). The analysis also showed a significant difference regarding their years of experience ($t = 2.939$; $p < .05$); students who had 5 years of experience or less had lower scores regarding pediatric pain management. Additionally, analysis of variance (ANOVA) tests showed a significant difference in the mean total score based on participants' qualifications ($F = 6.681$; $p < .05$). Nursing students who had secondary school qualifications had higher scores than those who had 2-year or 3-year diplomas.

4. Discussion

This study has shown that most nursing students reported themselves as having a good level of knowledge of pediatric pain and its management; however, their mean total correct score on the PNKAS was low, at 32.1%. This result is consistent with scores reported in previous studies (Al-

Khawaldeh et al., 2013; Al Omari, 2016; Chiang et al., 2006; Chow and Chan, 2015; Gadallah et al., 2017;

Khalaileh and Qadire, 2013; Ortiz et al., 2015; Rahimi-Madiseh et al., 2010).

Table 2: Top 10 questions answered correctly by nursing students (frequency and percentage distribution) (Manworren, 2001)

Items	Answer	N	%
22. "After the initial recommended dose of opioid analgesic, subsequent doses should be adjusted in accordance with the individual patient's response".	True	131	75.7
8. "Children who will require repeated painful procedures (i.e., daily blood draws) should receive maximum treatment for the pain and anxiety of the first procedure to minimize the development of anticipatory anxiety before subsequent procedures."	True	114	65.9
20. "Based on one's religious beliefs, a child/adolescent may think that pain and suffering is necessary."	True	113	65.3
5. "Comparable stimuli in different people produce the same intensity of pain." Answer:	True	97	56.1
9. 'Respiratory depression rarely occurs in children/adolescents who have been receiving opioids over a period of months.'	True	92	53.2
10. "Acetaminophen 650 mg PO is approximately equal in analgesic effect to codeine 32 mg PO."	True	90	52.0
34. "Which of the following drugs are useful for treatment of cancer pain?"	All of the above	87	50.3
33. "The most likely explanation for why a child with pain would request increased doses of pain medication is:"	The child is experiencing increased pain	86	49.7
21. "Anxiolytics, sedatives and barbiturates are appropriate medications for the relief of pain during painful procedures."	False	78	45.1
14. "Parents should not be present during painful procedures."	False	76	43.9

Table 3: Top 10 questions answered incorrectly by nursing students (frequency and percentage distribution) (Manworren, 2001)

Items	Answer	N	%
39B. "Your assessment, above, is made 2 hours after he received morphine 2 mg IV. After he received the morphine, his pain ratings every half hour ranged from 6 to 8 and he had no clinically significant respiratory depression, sedation or other untoward side effects. He has identified 2 as an acceptable level of pain relief. His physician's order for analgesia is "morphine IV 1-3 mg q2 h PRN pain relief". Check the action you will take at this time."	Administer morphine 3 mg IV now	166	96
26. "The recommended route of administration of opioid analgesics to children with prolonged cancer-related pain is:"	oral	164	94.8
38. "Narcotic/opioid addiction is defined as psychological dependence accompanied by overwhelming concern with obtaining and using narcotics for psychic effect, not for medical reasons. It may occur with or without the physiological changes of tolerance to analgesia and physical dependence (withdrawal). Using this definition, how likely is it that opioid addiction will occur as a result of treating pain with opioid analgesics?"	Less than 1%"	163	94.2
39A. "Patient A: Andrew is 8 years old and this is his first day following abdominal surgery. As you enter his room, he smiles at you and continues talking and joking with his visitor. Your assessment reveals the following information: BP 1/4 105/65; HR 1/4 80; R 1/4 20; on a scale of 0 to 10 (0 1/4 no pain/discomfort, 10 1/4 worst pain/discomfort), he rates his pain as 8. On the patient's record you must mark his pain on the scale below. Choose the number that represents your assessment of Andrew's pain:"	8	162	93.6
37. "What do you think is the percentage of patients who over-report the amount of pain they have?"	0%-10%	157	90.8
40B. "Patient A: your assessment, above, is made 2 hours after he received morphine 2 mg IV. After he received the morphine, his pain ratings every half hour ranged from 6 to 8 and he had no clinically significant respiratory depression, sedation or other untoward side effects. He has identified 2 as an acceptable level of pain relief. His physician's order for analgesia is."	Administer morphine 3 mg IV now.	155	89.6
40A. "Patient A: Andrew is 8 years old and this is his first day following abdominal surgery. As you enter his room, he smiles at you and continues talking and joking with his visitor. Your assessment reveals the following information: BP 1/4 105/65; HR 1/4 80; R 1/4 20; on a scale of 0 to 10 (0 1/4 no pain/discomfort, 10 1/4 worst pain/discomfort), he rates his pain as 8. On the patient's record you must mark his pain on the scale below. Choose the number that represents your assessment of Andrew's pain:"	8	152	87.9
35. "The most accurate judge of the intensity of the child's pain is:"	The child	149	86.1
25. "To be effective, heat and cold should be applied directly to the painful area."		143	82.7
1. "Observable changes in vital signs must be relied upon to verify a child's/adolescent's statement that he has severe pain." (F)	False	143	82.7

The items with the most correct answers were 'the modification of opioid analgesic doses depend on patient's response to their pain' (item 22), 'attendance of child parents isn't important during painful procedures' (item 8) and 'religious beliefs of a child about suffering and pain' (item 20). The simplicity of these questions may help explain why students were able to answer such items correctly. Nevertheless, this result is in line with previous studies (Al Omari, 2016; Ortiz et al., 2015; Stanley and Pollard, 2013).

Many of the items related to pharmacology and addiction were answered incorrectly by most of the nursing students, indicating poor knowledge and attitudes in the area of pharmacological pain management. For example, 94.8% incorrectly chose oral as the preferable method of opioid administration for prolonged cancer-related pain. This is consistent with Al Omari's (2016) study in which three-quarters of participants incorrectly answered this item. This result is also in agreement with previous studies that found most incorrectly answered items related to pharmacology, including

medication actions, side effects and administration (Chiang et al., 2006; Chow and Chan, 2015). Similarly, the present study found that nursing students have poor knowledge of non-pharmacological approaches to pediatric pain

management. For instance, only 34 (13.9%) correctly answered the question related to the effectiveness of applying heat and cold to painful areas.

Table 4: Significant difference in the mean total PNKAS score according to nursing students' demographic characteristics

Characteristics	Mean (SD)	T-test or one-way ANOVA	df	P
Gender				
Male (104)	13.06(3.41)	-2.168	171	0.03
Female (69)	14.19(3.29)			
Age group: 20-29 years 30 years and more	14.1 (3.60); 12.8 (3.01)	2.540	171	0.01
Last academic qualification	14.54 (3.38)	F (6.681)	2	.002
Secondary school (52)	12.46(2.72)			
Two-year diploma (72)	13.96(3.90)			
Three-year diploma (49)				
Current academic year	13.75 (3.46)	.886	171	.377
Third year (83)	13.29 (3.34)			
Fourth year (90)				
Years of clinical experience				
Below 5 years (69)	14.42 (3.34)	2.939	171	0.004
5 years and above (104)	12.40 (3.31)			

Further, a high percentage of nursing students in this study gave incorrect answers for most questions relating to pain assessment. For example, 82.7% of nursing students incorrectly answered that changes in vital signs are an indicator of the intensity of a patient's pain, a result similar to that reported in the work of Al Omari (2016). Children aged three years or more have been found to use self-report tools reliably to assess their pain levels (Herr et al., 2011), which is considered the most dependable parameter of pain and its intensity. However, only 13.9% of participants in this study believed correctly that the child patient is the best person to evaluate his or her pain intensity, which is also in line with previous studies (Alotaibi et al., 2019; Ekim and Ocakci, 2013; Stanley and Pollard, 2013). A high proportion of participants (93.6%) in this study also incorrectly answered the question regarding the presence of pain in children who smile or grimace, suggesting that a child's facial expression has no warning effect and is not even considered by nursing students for pain management. These results are supported by Ortiz et al. (2015) and Rahimi-Madiseh et al. (2010).

There was a significant difference in the level of knowledge and attitudes of pediatric pain management based on the student's gender. Female nursing students had higher scores than male nursing students. This is consistent with the studies by Manworren (2001) and Ekim and Ocakci (2013). However, other studies have not found a significant difference between the genders in the knowledge and attitudes of pediatric pain management (Al-Khawaldeh et al., 2013; Al Omari, 2016). There were also significant differences in scores based on age. Nursing students under 30 years of age scored higher than those whose age was 30 years or older, similar to the findings of Ekim and Ocakci (2013). However, other studies have found no significant age-based difference in nursing students' knowledge and attitudes (Al-Khawaldeh et al., 2013; Gadallah et al., 2017). The above differences may be due to

differences in setting, sampling method and size, and subjects' characteristics.

Additionally, the present study found that nursing students with less than 5 years of experience scored higher than those with 5 or more years of experience. This result was consistent with the study by Ekim and Ocakci (2013). A possible explanation for this result is that nursing students may receive appropriate education and training that was not offered to their colleagues with 5 or more years of experience.

Further, students who had a secondary school qualification scored higher than those who only had a diploma. One possible explanation behind this result is that a nursing student who has a secondary school qualification began their studies in their preparation year and studied according to the new model of nursing education in SA, which adopts English as the official language and includes deeper preparation courses, giving these students deeper knowledge than their colleagues with diplomas. Conversely, Gadallah et al. (2017) found no significant difference in knowledge and attitudes based on qualifications. Finally, the present study found there was no significant difference related to the current year of study. This result is consistent with the study by Gadallah et al. (2017).

The present study found poor knowledge and attitudes of pediatric pain assessment and management. There may be several possible reasons behind these results, one being the nursing curricula which has limited hours and topics devoted to pediatric pain management. Pain and pain management are often included as a unit or chapter in nursing courses, such as fundamentals of nursing, medical-surgical nursing, pediatrics nursing and pharmacological courses. Similarly, Lunsford (2015) found that there is limited information on pain assessment and management in current undergraduate nursing curricula.

The other reason is that most of the current teaching methods in SA are traditional, meaning the

instructor delivers a traditional lecture for the students and then the students must memorize information in the exam, leading to subsequent loss of information about pediatric pain. In addition, practical nursing pediatric classes that take place either in the lab or in the hospital do not provide students with an appropriate teaching environment for this important topic. Nursing students at MU perform their clinical training in a small hospital and their clinical practice is mostly limited to observations.

Although the present study provides valuable information about nursing students' knowledge of pain and its management, it has some limitations. First, this study used a descriptive cross-sectional design, which does not establish causality between the variables. Second, the study employed a self-reported questionnaire to examine the nursing students' knowledge of and attitudes towards pediatric pain management, whereas a combination of a self-reported and observational methodology would be more beneficial. Third, this study was only conducted in one setting, which may also affect the generalizability of results to another setting in SA.

5. Conclusions and implications

Overall, the knowledge and attitudes of nursing students in SA were generally poor in several areas, including pain assessment and management with either pharmacological or non-pharmacological approaches. Extensive professional education in SA needs to offer to improve the knowledge of undergraduate nursing students in relation to pediatric pain management.

This study has important implications for nursing practice, education and research. The current content of pediatric pain management in SA needs to be improved in terms of its depth and breadth. Attention should be given to the manifestations of pain in children and its physiology, mechanisms, assessment and management. Emphasis needs to be given to both pharmacological and non-pharmacological interventions.

Teaching methods need to be re-evaluated based on international standards to ensure quality teaching for nursing students regarding pain management for children. Nursing labs need to be sufficiently equipped with the necessary facilities for teaching and learning in relation to pediatric pain management and its care. Finally, the assessment and management of pain in children should be part of practice in nursing training to increase confidence and skills.

Compliance with ethical standards

Conflict of interest

The authors declare that they have no conflict of interest.

Ethical committee approval

The study was approved by the ethical committee of Majmaah University (approval number: MUREC-May. I 4 I COM-201817).

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