

Nursing student's knowledge and attitudes toward pain management at Hail University, Saudi Arabia



Salman H. Alsaqri *

Medical Surgical Department, College of Nursing, University of Hail, Hail, Saudi Arabia

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ABSTRACT

The objective of this study is to examine undergraduate nursing students' knowledge and attitudes toward pain management in the University of Hail and differences between groups defined in terms of socio-demographic and other selected characteristics students in knowledge and attitude with regard pain management scores. The descriptive, cross-sectional design included a sample of 150 undergraduates Saudi nursing students of the University of Hail in the kingdom of Saudi Arabia to investigate the knowledge and attitudes regarding pain management. The Knowledge and Attitudes Survey Regarding Pain scale (KASRP) was used to measure knowledge and attitudes regarding pain management. Data were analyzed by descriptive statistics and independent sample t test. Data were collected over a two month period from April 2017 through June 2017. Of the 220 distributed questionnaires; 150 completed questionnaires were returned. The data revealed that nursing students were found to have a lack of knowledge and attitudes towards pain management. The mean correct score for the entire scale was 41.8% (SD=3.71). Findings revealed that there were significant differences found in the students' scores related to the frequency of using pain scales ($p < 0.05$). The study showed that Saudi students lacked the appropriate knowledge and attitudes regarding pain and its management and it is recommended that additional training education should be addressed.

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1. Introduction

Pain is the most common reason why people visit a healthcare professional (Foster, 2011; Goldberg and McGee, 2011). Effective control of the pain is an important consideration for healthcare professionals to ensure good quality of care and it would be unfair to make the patients feel pain without suitable pain relief or to deliver treatment with high-quality (Issa and Khraisat, 2017).

Poorly controlled pain has a debilitating effect and significantly interferes on both physical and psychological well-being of the patient that may potentially change the patient's quality of life (Thorn et al., 2011; Karamjeet, 2017). Even with significant developments in pain research and management, lots of patients continue to suffer because of inadequate pain control (Vijayan, 2011). This may be due to lack of proper knowledge and education or

related to negative attitudes toward the patients' experience of pain (Abdallah et al., 2011).

Graduates in nursing are the key players in prescribing and administering medication and have an essential role in the management of pain (Sulosaari et al., 2011; Ung et al., 2016). However, applying these roles require that nursing students attain an adequate knowledge toward pain and its management based on the international standers in the nursing programs for both undergraduates and postgraduates. Plaisance and Logan (2006) underscored the significance of nurses' knowledge and attitudes with respect to management of patients with pain and how behaviors derived from pain management education are carried over into the clinical setting (Plaisance and Logan, 2006).

2. Background

The International Association for the Study of Pain (IASP) being recommended for the importance of undergraduate education in pain and its management, however pain has been found to be inadequately addressed in undergraduate curricula (Simon, 2012). The absence of this content from

* Corresponding Author.

Email Address: slmn44@gmail.com

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undergraduate curricula is striking in light of the magnitude of the issues surrounding pain and pain management, thus producing students who are less well prepared to address needs of patients and their families as the subject of highest priority in the pain management (UCDAVIS, 2016). As members of the nursing academe in the University of Hail in the Kingdom of Saudi Arabia, the research investigators recognize that the current undergraduate nursing education curriculum's content in terms of knowledge and education in pain management is not enough to create and make a professional, and competent nurse who is capable of effectively assessing and managing pain. Furthermore, the nursing program of the university evaluated offers a singular course in Pharmacology. It is highly unlikely for nursing students to understand and comprehend the various concepts of pharmacology on a per systems basis and the pharmacology for pain management in a singular course offering that provides a measly 30 contact hours (two hours per week) in a semester. Moreover, a limited number of credit units have been dedicated in the area of pain management in the nursing programs at undergraduate and post-graduate degree (Rahimi-Madiseh et al., 2010).

Many studies have revealed that nursing students' lack of knowledge and negative attitude toward patients' pain and its management (Rahimi-Madiseh et al., 2010; Kaki, 2011; Morris et al., 2012; Al-Khawaldeh et al., 2013; Duke et al., 2013). The results of these studies as well showed that students tended to underestimate patients' reported intensity of pain and under-administer of the prescribed analgesic drug. Moreover, students' values, judgment and personality may specify if the patient's discloses of pain are regarded as genuine or unreal.

The research investigators recognize that no other studies have been conducted to examine baccalaureate nursing students' knowledge and attitudes regarding pain and its pain management in the Kingdom of Saudi Arabia. This has left a major research gap in the examining the nursing students' knowledge and attitudes regarding to pain and its management. To enhance pain management quality and in-turn, patients' quality of life, there is a clear need to better evaluate the adequacy and effectiveness of Saudi nursing students' knowledge and their attitudes toward pain and its management and identify optimal developmental strategies that may improve overall nurses' pain management and in-turn lessen the pain intensity. Moreover, it is emphasized that this study offers essential information on the knowledge and attitudes toward pain and its management that are essential for more improvement of undergraduate nursing curricula as well as education services of hospitals. Therefore, the specific aims of this study were to examine undergraduate nursing students' knowledge and attitudes toward pain management in the University of Hail and differences between groups defined in terms of socio-demographic and other selected

characteristics students in knowledge and attitude with regard pain management scores.

2.1. Research questions

1. What are the current knowledge and attitudes regarding pain management among undergraduate nursing students in the University of Hail?
2. Are there significant differences in knowledge and attitudes regarding pain management among undergraduate nursing students between subgroups of socio-demographic and other selected characteristics students?

3. Methods

3.1. Study design, sample size, and setting

This descriptive, quantitative research study used a cross-sectional design to investigate the knowledge and attitude regarding pain and its management among Saudi nursing students of the University of Hail. The target population consisted of all nursing students who satisfied the inclusion criteria, namely: (1) a fourth-year nursing students (Level 8), in an RN-BSN program; (2) conversant in English (able to read and write English); and (3) voluntarily participate in the study. Utilizing the statistical software G-Power version 3.1.3 (Faul et al., 2009) with the following input parameters (one tailed independent sample t-test, alpha error probability= 0.05, power= 0.80 and effect size of 0.5), the estimated sample size needed was 102. However, a larger sample size is required to make a firm conclusion.

3.2. Instrument

The research instrument utilized in our study consisted of two parts. Part (1) provided information on participant demographics, more specifically, their age, gender, reading textbooks about management of pain, using of pain assessment tools such as the visual analog scale (VAS) or numerical rating scales during clinical training, courses or trainings attended on pain management and experience working in clinical (bridging students). Part (2) the modified knowledge and Attitudes Survey Regarding Pain (KASRP) questionnaire developed by Ferrell and McCaffery (2008) was utilized in this study. This tool has been used in several settings and countries among nursing professionals as well as nursing students and revised from time to time to reflect the changes in pain management in clinical practice. This instrument contains 39 closed-ended questions in three different formats: (1) twenty-two (22) true or false questions; (2) sixteen (16) multiple choice questions; and (3) two (2) case studies each having two (2) questions that necessitate the participant to assess and then reassess a patient. The authors of the KASRP recommend not to separate items into

either knowledge or attitude only questions because several items measure both of them at the same time. Thus, the scores are meant to reflect both knowledge and attitudes together (Yildirim et al., 2008, Rahimi-Madiseh et al., 2010). Validity of the KASRP has been established by content and constructs validity. The reliability of this tool was 0.80 and it has the internal consistency (Cronbach's $\alpha = 0.70$) (Ferrell and McCaffery, 2008). An English version of the questionnaire was administered as this is the medium of instruction in all nursing schools in the Kingdom of Saudi Arabia. The questionnaire was pilot tested among 15 students for comprehensibility, languages' appropriateness, questions' sensitivity and average duration of administration.

3.3. Ethics approval and consent to participate

The study was carried out with the approval of the ethical committee of University of Hail (reference no. H-2017-033). Permission was secured from the Dean of the College of Nursing to conduct the study. Informed consent was received from each participant prior to dissemination of the questionnaire. Participants were assured that their responses would be confidential and anonymous, and that refusal to participate would in no way jeopardize their studying.

3.4. Data collection

Potential study respondents were invited to participate in the study through an advertisement in the Banner System of the University of Hail. Actual data gathering was conducted in lecture halls of Building 9. Prior to administration of the research instrument, the participants were explained about aims, and objectives of the study, as well as the rights of the study participants. Students were requested to accomplish the research instrument and subsequently place them in a designated drop box. No freedom was given to students to either consult medical texts or discuss the indicators among themselves. Data were collected over a two month period from April 2017 through June 2017.

3.5. Statistical analysis

The collected data entered into a database and subsequently analyzed using SPSS software version 22.0 for windows, with the significance level of 0.05 having been established. Descriptive statistics were used to summarize the demographic information and the results of the nursing students' levels of pain management knowledge and attitudes. Examine of significant differences between groups defined in terms of socio-demographic and other selected characteristics students in knowledge and attitude with regard pain management scores was analyzed using an independent sample t-test. The KASRP is found to be most useful for analyzing the data in

terms of the percentage of complete scores as well as analyses of individual items. Responses to the questionnaire items were dichotomized to correct/incorrect answers. Each correct question was given a score of one (1) and each incorrect question and those without an answer were given a score of zero (0). For ease of interpretation, these scores were converted to indicate the percentage of correct answers given. According to the authors of the KASRP instrument, an 80% score on the instrument should be the minimum acceptable level for the test (Ferrell and McCaffery, 2008).

4. Results

4.1. Characteristics of the study participants

Of the 220 questionnaires distributed, 150 completed questionnaires were obtained (with response rate of 68%). Findings showed that more than half of the students were females (58.7%, $n=88$), whose average age was 24.9 years ($SD=4.02$). A majority of the students (92%) reported that they had read textbooks on pain management and more than half of them (62.7%) had attended a training course on pain management. Regarding the frequency of using pain scales, 94 (62.7%) of students said that they use them sometimes or always. Participant characteristics are detailed in Table 1.

Table 1: Participant characteristics of the sample ($N=150$)

Variables	n	(%)
Age, mean= 24.9 years ($SD=4.02$, range=20-39)		
<= 24	90	60
25+	60	40
Gender		
Male	62	41.3
Female	88	58.7
Experience working in hospitals (Bridging Students)		
Yes	92	61.3
No	58	38.7
Reading textbooks about pain management		
Yes	92	60
No	60	40
Attendance a training course on pain management		
Yes	94	62.7
No	56	37.3
Frequency of using of pain scales		
Never OR rarely	56	37.3
Sometimes OR always	94	62.7

4.2. Knowledge and attitude towards pain and its management

The overall percentage of correct answers of the 150 students who completed the questionnaire was 41.8 % ($SD=3.71$) correct answers in KASRP. Table 2 shows the percentages of correct answers on every question for nursing students. Only 12 items (more than 50%) from the pool of 39 items got a correct answer. Within the pain indicators assessment, most of the students (70%) know the definition of narcotic/opioid addiction. Moreover, patients who are subsequent increased dosing of pain medication, less than half of the participants (40%) reported that

the increased pain was the most likely reason. Most of nursing students (80%) also wrongly believed that vital signs are all the time reliable signs of the intensity of a patient's pain, and that (61.3%) of students wrongly believed that a patient who can be distracted from pain does not have severe pain. Regarding the use of medications indicators, (52%) of students known that morphine is considered as the best drug for the treatment of prolonged

moderate to severe pain for patients with cancer, (32 %) known that the peak effect of morphine administered orally is 1–2 hours, whereas only (25.3%) of students known that the oral route of opioid medication administration is suggested for patients with persistent cancer related pain. Furthermore, just a few of the students (30%) thought that patients were the most precise judge of the pain intensity.

Table 2: Percentage of students' correct answers for each question of KASRP (N=150).

Questions' Description	n	%
Vital signs are reliable indicators of the intensity of a patient's pain	30	20
Children under two years of age have decreased pain sensitivity and limited memory of painful experiences	48	32
Patients who can be distracted from pain usually do not have severe pain	58	38.7
Patients may sleep in spite of severe pain	61	40.7
Aspirin and other nonsteroidal anti-inflammatory agents are NOT effective analgesics for painful bone metastases	59	39.3
Respiratory depression rarely occurs in patients who have been receiving stable doses of opioids over a period of months	90	60
Combining analgesics that work by different mechanisms may result in better pain control with fewer side effects than using a single analgesic agent	95	63.3
The usual duration of analgesia of 1-2 mg morphine IV is 4-5 hours	52	34.7
Opioids should not be used in patients with a history of substance abuse	48	32
Elderly patients can tolerate opioids for pain relief	61	40.7
Patients should be encouraged to tolerate as much pain as possible before using an opioid	42	28
Children less than 11 years old can reliably report pain	70	46.7
Patients' spiritual beliefs may lead them to think pain and suffering are necessary	96	64
Subsequent doses should be adjusted in accordance with the individual patient's response	95	63.3
Effectiveness of placebo injection to assess pain	54	36
Vicodin PO is approximately equal to 5-10 mg of morphine PO	90	60
If the source of the patient's pain is unknown, opioids should not be used during the pain evaluation period, as this could mask the ability to correctly diagnose the cause of pain	50	33.3
Anticonvulsant drugs such as gabapentin (Neurontin) produce optimal pain relief after a single dose	59	39.3
Benzodiazepines are not effective pain relievers and are rarely recommended as part of an analgesic regimen	100	66.7
Narcotic/opioid addictions' definition	105	70
The term 'equianalgesia' means approximately equal analgesia and is used when referring to the doses of various analgesics that provide approximately the same amount of pain relief.	87	58
Sedation assessment is recommended during opioid pain management because excessive sedation precedes opioid-induced respiratory depression	102	68
The recommended route of administration of opioid analgesics for patients with persistent cancer-related pain is oral	38	25.3
Intravenous is the recommended route administration of opioid analgesics for patients with brief, severe pain of sudden onset such as trauma or postoperative pain	65	43.3
Morphine is considered the drug of choice for the treatment of prolonged moderate to severe pain for cancer patients	78	52
A 30 mg dose of oral morphine is approximately equivalent to morphine 10 mg IV	56	37.3
Analgesics for post-operative pain should initially be given around the clock on a fixed schedule	58	38.7
Likelihood of cancer patient experiencing respiratory depression following increase in IV morphine is <1%.	34	22.7
The most likely reason a patient with pain would request increased doses of pain medication is increased pain	60	40
All of the following ((Ibuprofen (Motrin), Hydromorphone (Dilaudid), and Gabapentin (Neurontin))) is useful for treatment of cancer pain	49	32.7
The most accurate judge of the intensity of the patient's pain is the patient	45	30
The best approach for cultural considerations in caring for patients in pain is patients should be individually assessed to determine cultural influences	60	40
Likelihood of patients who develop pain already have an alcohol and/or drug abuse problem is 5 - 15%	79	52.7
The time to peak effect for morphine given IV is 15 min.	83	55.3
The time to peak effect for morphine given orally is 1 – 2 h.	48	32
Following abrupt discontinuation of an opioid, physical dependence is manifested by the following: (sweating, yawning, diarrhea and agitation) with patients when the opioid is abruptly discontinued	40	26.7
Obstructive sleep apnea is an important risk factor for opioid induced respiratory depression	51	34
A. pain assessment in the absence of vital sign and behavioral changes for patient with relaxed manner	67	44.7
B. morphine administration for reported persistent postoperative pain in the absence of vital sign indicators and side-effects for patient with relaxed manner	21	14
A. pain assessment in the absence of vital sign and behavioral changes for patient who grimaces	71	47.3
B. morphine administration for reported pain in the absence of vital sign and behavioral changes for patient who grimaces	21	14

To discover students' knowledge for decisions making concerning assessments of patients' pain and suitable choice of interventions, a two comparative case studies offered two scenarios in which two patients who are the similar age, have experienced the similar surgical procedure and state the similar pain level. However, the main difference is the patient behavior and facial expressions. In the first case study patient shows a comfortable and smiling expression whereas the patient in the second case

study shows a grimaced. Participants were asked to identify the pain intensity on the line corresponding to the data assessment and behavior of patient. They were then requested to provide an intervention depending on the assessment. In both case studies, slightly less than half of the students (44.7% for case study 1 and 47.3% for case study 2) made the correct assessment of the client's pain level of 8/10. Similarly, for both case studies, a low 14% of the

students selected the correct intervention of administering 3 mg of morphine IV now.

4.3. Influencing factors associated with participants' knowledge and attitudes to pain management

Table 3 summarizes the differences between groups defined in terms of socio-demographic and other selected characteristics in knowledge and attitude with regard pain management scores. In

comparison to those used pain scales never or rarely ($M=16.33$, $SD=3.8$), students who use pain scales more frequently had significantly higher KASRP scores ($M=17.67$, $SD=3.5$). Moreover, statistical analysis revealed that there were no significant differences found in the students' mean scores in terms of age, gender, reading textbooks regarding pain management, attendance a training course on pain management and experience working in hospitals (Bridging Students).

Table 3: Differences between groups for selected demographics in knowledge and attitude with regard pain management (N=150)

Variable	n	Mean (SD)	t	P – value
Age				
<= 24	90	16.73(3.66)	-1.79	.07
25+	60	17.83(3.71)		
Gender				
Male	62	16.79 (3.64)	-1.06	.29
Female	88	17.44 (3.75)		
Reading Textbooks about Pain Management				
Yes	90	16.86(3.51)	-.82	.41
No	60	17.37 (3.84)		
Attendance a Training Course on Pain Management				
Yes	94	17.35(3.83)	.46	.64
No	56	17.06 (3.65)		
Experience Working in Hospitals (Bridging Students)				
Yes	92	16.67(3.37)	-1.31	.19
No	58	17.48(3.89)		
Frequency of Using of Pain Scales				
Sometimes OR always	94	16.33(3.82)	-2.15	.03*
Never OR rarely	56	17.67(3.56)		

* All P values are two tailed and considered significant at the 0.05 level using independent sample t-test.

5. Discussion

The study was designed to assess nursing students' knowledge and their attitude toward pain management of Hail University. Nursing students had a mean percentage of correct answers of 41.8% on the KASRP indicating lack of satisfactory knowledge and attitudes towards pain management as the majority of the students' scores were below the acceptable level [i.e., 80% or higher KASRP scores] (Brown et al., 1999). This may be due to the limited amount of time and the mode of delivery of the topic of pain management in nursing curricula. Pain and pain management are often included as a unit or chapter in a particular course offering like Pathophysiology or Nursing Therapeutics. This fragmentation and multidisciplinary format may lead to gaps in student knowledge as students have to integrate knowledge across different modules. Watt-Watson et al. (2009) determined the designated time for mandatory pain content in curricula of major Canadian universities for students in health science and veterinary programs before being licensed. They posited that the average total hours for designated mandatory formal content among nine nursing centers of faculties were 31 ± 4.2 hours (range: 0–48) (Watt-Watson et al., 2009). The results of this study support the findings of previous research findings (Rahimi-Madiseh et al., 2010; Al-Khawaldeh et al., 2013; Karamjeet, 2017). Therefore, it is important for the nursing schools to consider the possibility of integrating pain education into the

conventional nursing curricula in a systematic manner to better prepare students in their future career.

Regarding the level of pain (intensity) in the two clinical cases of the in the research instrument, the correct value of the level of pain for both cases was eight. It was noted that 44.7% of nursing students correctly answered the evaluation of the patient who had a pain level of eight but that the patient was quiet and smiled, while (47.3%) answered correctly assessing that the patient had a pain level of eight but that the patient grimaced. This indicated that students depend on physical appearance of patients in assessing the pain and did not depend their assessment of pain mainly on patients' statements. Fourteen percent (14 %) of student respondents in both case studies showed they would administer the recommended dose of morphine after implementation of the pain assessment. A possible explanation for this outcome is that the study respondents lacked sufficient training that would otherwise lead them to select the correct dose and time of administration of the opioid. These results are in line with previous studies (Rahimi-Madiseh et al., 2010). Furthermore, the study revealed the presence of a disparity between the pain assessment and the students select of therapeutic and supportive intervention. Even when correctly assessed the patients' level of pain, numerous students chosen to administer either one a suboptimal dosing or no pain medication at all.

Similar results were also reported by other research findings (Duke et al., 2013).

Notably, a significant strength was observed in many parts of the pain management knowledge test, although these scores were relatively low at baseline. For illustration, more than half of the students precisely recognized that sedation assessment is recommended during opioid pain management. Also, the findings revealed that a highest percentages of correct answers on KASRP test by students who reported use of pain scales sometimes or always. These findings highlight the importance pain management training in the clinical setting. The study revealed that reading textbooks regarding pain management was not associated with knowledge level of nursing students. This may be clarified by these students did not update their knowledge in pain and its management. Therefore, nursing curricula for undergraduate nursing students need to critically review to identify whether the student information regarding pain and pain management are being taught in depth and last updated that met evidence-based practice and high quality of care.

Further analyses also revealed no significant differences on KASRP scores when contrasting nursing students with work experience to nursing students without work experience in hospitals, which is matched with previous studies (Rahimi-Madiseh et al., 2010; Duke et al., 2013). This result may be related to the lack of educational facilities, lack of focus on continuing and in service education on the pain management in hospitals as well poor access for updating references regarding pain management. The students' participating in this study had an insufficient knowledge of the fundamental physiology and pathophysiology of pain-sensing nerve fibers and pharmacology of opioids may have had an influence on their attitudes toward pain and its management. The study showed that slightly more than a quarter (28%) of the student respondents did not conform to the statement that "patients should be encouraged to endure as much pain as possible before using an opioid". On the other hand, four out of every ten student respondents conformed to the statement that "the most likely reason a patient with pain would request increased doses of pain medication is because the patient is experiencing increased pain". Being cognizant that increased opioid doses are a result of tolerance to opioids and that they do not necessarily cause sedation and respiratory depression would have been possible if the student respondents possessed adequate comprehension both the physiology of pain and the pharmacology of opioids. Thus, if such were the case, they would have likewise possessed a more positive attitude with respect to pain management.

The findings generated by this investigation give rise to significant concerns in the nursing curriculum that requires immediate attention. Such concerns are: (1) the insufficient emphasis provided to pain education that is currently generalized in various

course offerings of the present nursing curriculum; and (2) the insufficiency of total contact hours earmarked for pain education that produces graduates who lack the basic knowledge and skills needed to effectively manage nursing problems related to clinical pain. More importantly, the findings may connote a dearth in the presence or availability of pain management nurse educators in the academe. Such shortage hampers the effective delivery and dissemination of the most updated, scientific and detailed knowledge with respect to pain management (Voshall et al., 2013).

6. Limitations

The current investigation delved on nursing students' knowledge and attitudes toward pain management. It utilized a descriptive cross-sectional design that does not establish causality between the variables considered. The study was conducted in a singular tertiary nursing institution and employed a research instrument composed of structured closed-ended questions that provided self-reported assessments of study subjects' knowledge and attitudes regarding pain and its management. As such, further research investigations on knowledge and attitudes toward pain management utilizing objective assessments of nursing students from various higher education institutions kingdom-wide would lead to highly generalizable research findings.

7. Conclusion and recommendations

The current study revealed that the nursing students' knowledge and their attitudes toward pain management were unsatisfactory. So the nursing students in the University of Hail require educational program and continues training regards pain management. Educational programs such as using e-learning for empowering nursing students may be one way to handle these obstacles for quality pain care (Keefe and Wharrad, 2012). All nursing educators and registered nurses who are employed in hospitals act as role models for nursing students during their clinical training, it is crucial that information about acute and chronic pain management are extensively discussed in continuing education programs and workshops (Holstein et al., 2012; Al-Khawaldeh et al., 2013). Pain control has been successful in most cases following the implementation of such a nursing education program. In the United Kingdom, Owens et al. (2014) conducted an intervention study by examines the effects of a structured educational program on pain management schedules through the administration of a pre-/post-intervention. This study showed that level of knowledge on pain and its management and students' assessment of pain improved after administer intervention (Owens et al., 2014).

Assessment of pain and its management must be included into the usual nursing program does not require additional lectures. Academic nursing programs should pay more attention to pain

management in clinical practice training rather than on theoretical knowledge courses. Preparing new graduates function as advocates for their patients and must be knowledgeable, not allowing their own attitudes to influence the patients' pain management negatively, puts greater emphasis on the importance of current faculty members and clinical preceptors are effectively prepared to ensure consistency in pain management teaching within undergraduate nursing curricula.

Competing interests

The research investigators declare not to have any financial and non-financial competing interests regarding the publication of this paper.

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References

- Abdalahim MS, Majali SA, Stomberg MW, and Bergbom I (2011). The effect of postoperative pain management program on improving nurses' knowledge and attitudes toward pain. *Nurse Education in Practice*, 11(4): 250-255.
- Al-Khawaldeh OA, Al-Hussami M, and Darawad M (2013). Knowledge and attitudes regarding pain management among Jordanian nursing students. *Nurse Education Today*, 33(4): 339-345.
- Brown ST, Bowman JM, and Eason FR (1999). Assessment of nurses' attitudes and knowledge regarding pain management. *The Journal of Continuing Education in Nursing*, 30(3): 132-139.
- Duke G, Haas BK, Yarbrough S, and Northam S (2013). Pain management knowledge and attitudes of baccalaureate nursing students and faculty. *Pain Management Nursing*, 14(1): 11-19.
- Paul F, Erdfelder E, Buchner A, and Lang AG (2009). Statistical power analyses using G* Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, 41(4): 1149-1160.
- Ferrell B and McCaffery M (2008). Knowledge and attitudes survey regarding pain. Retrieved on April 12, 2009, from City of Hope Web site: <http://prc.coh.org>
- Foster NE (2011). Barriers and progress in the treatment of low back pain. *BMC Medicine*, 9(1): 108-113.
- Goldberg DS and McGee SJ (2011). Pain as a global public health priority. *BMC Public Health*, 11(1): 770-775.
- Holstein K, Klamroth R, Richards M, Carvalho M, PÉREZ-GARRIDO R, and Gringeri A (2012). Pain management in patients with haemophilia: A European survey. *Haemophilia*, 18(5): 743-752.
- Issa MR and Khraisat FS (2017). Knowledge and attitude about pain and pain management among critical care nurses in a tertiary hospital. *Journal of Intensive and Critical Care*, 3(1). <https://doi.org/10.21767/2471-8505.100071>
- Kaki AM (2011). Medical students' knowledge and attitude toward cancer pain management in Saudi Arabia. *Saudi Medical Journal*, 32(6): 628-632.
- Karamjeet K (2017). Knowledge and attitude regarding pain management among staff nurses. *Nursing and Care Open Access Journal*, 2(1): 1-3.
- Keefe G and Wharrad HJ (2012). Using e-learning to enhance nursing students' pain management education. *Nurse Education Today*, 32(8): e66-e72.
- Morris H, Ryan C, Lauchlan D, and Field M (2012). Do medical student attitudes towards patients with chronic low back pain improve during training? A cross-sectional study. *BMC Medical Education*, 12(1): 10-22.
- Owens D, Smith J, and Jonas D (2014). Evaluating students' knowledge of child pain and its management after attending a bespoke course: Denise Owens and colleagues discuss the results of a study to assess whether a targeted education programme improved practitioners' skills in managing young patients. *Nursing Children and Young People*, 26(2): 34-40.
- Plaisance L and Logan C (2006). Nursing students' knowledge and attitudes regarding pain. *Pain Management Nursing*, 7(4): 167-175.
- Rahimi-Madiseh M, Tavakol M, and Dennick R (2010). A quantitative study of Iranian nursing students' knowledge and attitudes towards pain: implication for education. *International Journal of Nursing Practice*, 16(5): 478-483.
- Simon LS (2012). Relieving pain in America: A blueprint for transforming prevention, care, education, and research. *Journal of Pain and Palliative Care Pharmacotherapy*, 26(2): 197-198.
- Sulosaari V, Suhonen R, and Leino-Kilpi H (2011). An integrative review of the literature on registered nurses' medication competence. *Journal of Clinical Nursing*, 20(3-4): 464-478.
- Thorn BE, Day MA, Burns J, Kuhajda MC, Gaskins SW, Sweeney K, McConley R, Ward LC and Cabbil C (2011). Randomized trial of group cognitive behavioral therapy compared with a pain education control for low-literacy rural people with chronic pain. *Pain*, 152(12): 2710-2720.
- UCDAVIS (2016). Strengthening pain content in baccalaureate nursing curricula. University of California, Davis, Sacramento, USA.
- Ung A, Salamonson Y, Hu W, and Gallego G (2016). Assessing knowledge, perceptions and attitudes to pain management among medical and nursing students: A review of the literature. *British Journal of Pain*, 10(1): 8-21.
- Vijayan R (2011). Managing acute pain in the developing world. *International Association for the Study of Pain*, 19(3): 1-7.
- Voshall B, Dunn KS, and Shelestak D (2013). Knowledge and attitudes of pain management among nursing faculty. *Pain Management Nursing*, 14(4): e226-e235.
- Watt-Watson J, McGillion M, Hunter J, Choiniere M, Clark AJ, Dewar A, and Thie N (2009). A survey of prelicensure pain curricula in health science faculties in Canadian universities. *Pain Research and Management*, 14(6): 439-444.
- Yildirim YK, Cicek F, and Uyar M (2008). Knowledge and attitudes of Turkish oncology nurses about cancer pain management. *Pain Management Nursing*, 9(1): 17-25.