Asian Pacific Journal of Nursing

APJN

ASSESSMENT OF POSTOPERATIVE PAIN BY NUMERIC RATING SCALE AND VERBAL RATING SCALE AMONG SURGICAL PATIENTS AND PROFESSIONALS IN SELECTED HOSPITALS, MANGALORE

Lynet Jenifer Dsouza[1*] and Larissa Martha Sams[2]

[1]Department of Medical Surgical Nursing (M.Sc Nursing), Laxmi Memorial College of Nursing, Mangalore, Karnataka, India.
[2]Principal cum HOD of Medical Surgical Nursing (Ph.D in Nursing), Laxmi Memorial College of Nursing, Mangalore, Karnataka, India.

ABSTRACT

Pain is a complex disease process whose treatment management is very complicated and pain management challenges every healthcare team member. The intensity of pain should be evaluated and recorded at intervals depending on the severity of pain and the clinical situation.[6] A study was conducted to understand the client's perception of pain and to measure the characteristics of the pain to implement pain management techniques, by Numeric Rating Scale and Verbal Rating Scale among surgical patients and professionals. A descriptive, comparative approach research design with descriptive correlative research design was used to assess the postoperative pain of patients. Purposive sampling technique was used to select the study subjects 100 patients and 80 professionals (100 observation with 20 repeated). The mean score of NRS (6.2 ± 1.63) was greater than VRS (2.18 ± 0.75) among patients and the mean score of NRS (5.36 ± 1.88) was greater than of VRS (2.03 ± 0.75) among professionals. Unpaired 't' test showed that there was no significant difference between the postoperative pain scores between male and female patients using NRS ($t_{198}=0.001$; $p>0.05$) and post operative pain score between male and female patients using VRS ($t_{198}=0.05$; $p>0.05$). There was a significant difference between the post operative pain score among professionals using NRS scale ($t_{198}=1.06$; $p>0.05$) and postoperative pain score among professionals using VRS ($t_{198}=0.63$; $p>0.05$). The findings of the study concluded that there was no difference between the pain assessed by using NRS and VRS among patients and professionals. Study also showed there was a significant correlation between the post-operative pain assessed using NRS and VAS among patients and professionals. This indicated that proper interpretation of pain can provide a strong basis to enhance pain management in the post operative units.

Key words: Postoperative pain; orthopaedic surgery patients; abdominal surgery patients; health professionals; numeric rating scale; verbal rating scale.

INTRODUCTION

One of the most common problems reported by patients is pain [1]. Pain is a multidimensional phenomenon and is thus difficult to define. It is a personal and subjective experience, and no two people experience pain in exactly the same manner. Margo McCaffery, one of nursing's pain pioneers, defined pain as 'whatever the experiencing person says it is and existing whenever the person says it does [2]. Nurses have a professional, moral and humanitarian obligation to provide adequate pain relief in order to alleviate any unnecessary pain, as well as sustaining the patients legitimate right to the relief of pain [3]. If pain is to be managed health care providers need to ask patients to describe their pain experiences [4]. Pain management challenges every health care team member, because there is no single, universal treatment.

Pain assessment and management is a significant part of nursing care and mostly pain is assessed through verbal communication with the patient. The Numeric Rating Scale (NRS) is frequently used for this purpose. The patient's NRS score was leading indicator in the postoperative pain treatment. Many guidelines for pain management recommend prescription of analgesics on the basis of the patient's NRS pain score [5]. Numeric pain scores have become important in clinical practice to assess postoperative pain and to develop guidelines for treating pain. Professionals need the patients' pain scores to administer analgesic medication.

The primary goals of pain assessment are to identify the cause of the pain, to understand the client's perception of the pain, and to measure the characteristics of the pain to implement pain management techniques. To assess a client's pain, obtain a pain history, a daily account of the current pain history, which includes pain aggravating and alleviating factors, and a collection of subjective and objective data through use of measurement tools. Lack of pain assessment will cause difficulty in understanding pain, resulting inappropriate pain management.Inadequate postoperative pain management is a problem of every health care institution and need to be improved. Reviews outline some of the commonly used treatments such as multimodal analgesia, patient controlled analgesia, epidural infusions and adjuvant drugs. Barriers to improvement including inaccurate pain assessment, communication issues, knowledge [6].

The effective management of pain should incorporate pharmacological and non-pharmacological therapies. Best practice standards recommended an integrated approach to pain management which should comprise of the utilisation of the combination of both pharmacological and non-pharmacological therapies for the optimal alleviation of pain [7]. Inadequate post-operative pain relief may result in clinical and psychological changes that may increase the morbidity and mortality as well as the cost of treatment as a whole, in addition to decreasing the quality of life post-operatively. It may be associated with deep vein thrombosis (DVT), and pulmonary embolism, pneumonia, delayed wound healing and demoralization. During clinical experience, the investigator observed that in the postoperative wards, patients experienced pain after the surgery and were less co-operative and less adjustable with hospital environment. Hence, it motivated the investigator to conduct a study on the assessment of postoperative pain and to understand the client's perception of pain and to measure the characteristics of the pain to implement pain management techniques, by Numeric Rating Scale and Verbal Rating Scale among surgical patients and professionals.

Objectives of the Study

1. To determine the postoperative pain level based on Numeric Rating Scale (NRS) by patients and professionals.
2. To determine the postoperative pain level based on Verbal Rating Scale (VRS) by patients and professionals.
3. To find out the correlation between the Numeric Rating Scale and Verbal Rating Scale among the patients.
4. To find out the correlation between the Numeric Rating Scale and Verbal Rating Scale among the professionals.
5. To find out the correlation between the Numeric Rating Scale and Verbal Rating Scale among the patients and professionals

Hypotheses
The hypotheses were tested at 0.05 level of significance.
H1:There will be a significant relationship on postoperative pain between NRS and VRS of patients.
H2:There will be a significant relationship on postoperative pain between NRS and VRS among professionals.
H3:There will be a significant relationship on postoperative pain between NRS and VRS of patients and professionals

MATERIALS AND METHODS
A descriptive, comparative approach research design with descriptive correlative research design was used to assess the postoperative pain of patients. Purposive sampling technique was used to select the study subjects 100 patients and 80 professionals (100 observation with 20 repeated). The tools used were Numeric Rating Scale and Verbal Rating Scale. The content validity of demographic proforma was done by giving the tools to seven experts in the field of nursing and tools were translated to Kannada language. Prior to the data collection, permission would be obtained from the hospital authority for conducting the study. Subject would be selected according to the selection criteria and confidentiality would be assured and Postoperative assessment of pain will be done with numerical rating scale (NRS) and verbal rating scale (VRS) respectively by patients and professionals. Both descriptive and inferential statistics were used for data analysis.

RESULTS
Section A: Description of Demographic Characteristics of Patients and Professionals
Least (29%) of patients were in the age group of 18-29 and majority (60%) of patients in the study were males. Highest percentage of patients (73%) belonged to Hindu religion. Majority of patients were married (79%) and belonged nuclear family (58%). Majority (88%) of patients received GA. Maximum percentage of the patients (95%) received non-opioid analgesics. Majority of the patients underwent orthopaedic surgery (56%) and least percentage (44%) of patients underwent abdominal

surgery. Majority of professionals (81.25%) were in the age group of 18-29 years and majority of subjects were females. Least percentage of professionals (27.5%) had studied GNM course. Majority of professionals (57.5%) had 1-5 years of clinical experience. Majority of professionals (57.5%) had gained knowledge from experience and 37.5% from hospital manual. Highest percentage of Professionals (73.25%) had not undergone additional education of pain assessment in any form. Highest percentage of (37.5%) of professionals worked in postoperative ward.

Section B: Assessment of postoperative pain level by patients and professionals on Numeric Rating Scale and Verbal Rating Scale.

The data in Table 1 and Figure 1 show that mean score of NRS (6.2±1.63) was greater than VRS (2.18±0.75). The data also depicts the range of score in NRS was higher (3-9) where as in VRS it was less (1-3).
The data in Table 2 and Figure 2 show that mean score of NRS (5.36±1.88) was greater than of VRS (2.03±0.75). The data also depicts the range of score in NRS was (9) where as in VRS it was less (3).

Data presented in table 3 show that there was no significant difference between postoperative pain score among patients using NRS ($t_{198}=0.001$; $p>0.05$) and postoperative pain score among patients using VRS ($t_{198}=0.05$; $p>0.05$). Data also show that there was significant difference between postoperative pain score among professionals using NRS scale ($t_{198}=1.06$; $p>0.05$) and postoperative pain score among professionals using VRS ($t_{198}=0.63$; $p>0.05$).

Kruskal Wallis test is a non-parametric test used to find difference between two or more independent group based on the rank score [8]. Data presented in Table 4 show that there was no significant relationship between mean pain score of NRS and VRS among professionals and patients as per age.

According to the Pain Level Measured by VRS and NRS

Data presented in Table 5 and Figure 3 show that pain level measured by patients and professionals using VRS majority (55%) of professionals and majority (58%) of patients experienced moderate level of pain. Pain measured using NRS majority (75%) of professionals and majority (77%) of patients experienced moderate level of pain.

Section C: Comparison of Postoperative Pain Level by Patients and Professionals

To find the significant difference between postoperative level of pain with patients and professionals on Numeric Rating Scale and Verbal Rating Scale, Mann Whitney U test was computed. As the data is non-parametric and samples were selected using purposive

sampling method (not strictly random) from a population which is not normal distribution [8]. In order to test significance between postoperative level of pain of patients and professionals with NRS and VRS the following Null hypothesis was formulated:
$H0_1$: There will be no significant relationship on postoperative pain between NRS and VRS among patients and professionals.

According to data depicted in Table 6, Mann Whitney U test showed that there was a significant difference between postoperative pain score of NRS of patients and professionals (p=0.001). Hence the null hypothesis $H0_1$ was rejected and research hypothesis H_1 was accepted.

Data presented in Figure 4 show that the mean pain score of patient is (6.2) and professionals (5.36). Hence there was a no significant difference between postoperative pain score of NRS among patients and professionals (p=0.16).

Data depicted in Table 7 show that there was no significant difference between postoperative pain score of VRS among patients and professionals (p=0.16). Hence null hypothesis $H0_2$ was accepted and research hypothesis H_2 was rejected.

Data presented in Figure 5 show that the mean pain score of patient is (2.18) and professionals (2.03) hence there was a no significant difference between postoperative pain score of VRS among patients and professionals (p=0.16).

Section D: Correlation of postoperative pain score between patients and professionals on Numeric Rating Scale and Verbal Rating Scale

This section deals with correlation of postoperative pain score between patients and professionals on NRS and VRS using Spear man Correlation Coefficient.
$H0_3$: There will be no significant difference between NRS and VRS of patients and professionals.
Spearman Correlation Coefficient was used to test the hypothesis.

Data presented in Table 8 show that there was a highly significant correlation between the postoperative pain score of NRS and VRS among patients (r=0.802) and professional (r=0.735) at 0.01 level of a significance. Hence null hypothesis $H0_3$ was rejected and research hypothesis H_3 was accepted.

Data presented in Figure 6 show that there was a high positive correlation between the postoperative pain score of NRS and VRS among patients.

Data presented in Figure 7 show that there was a high positive correlation between the postoperative pain score of NRS and VRS among professionals.

Data presented in Table 9 shows that there was a very high significant linear relationship between VRS and NRS among patients and professionals.

Table 1. Range, Mean, Median, and SD of pain scores NRS and VRS of Patients N=100

Pain scale	Max. possible score	Range	Mean$\pm$SD	Median	Stand. Error
NRS	10	8	6.20±1.63	6	0.16330
VRS	4	3	2.18±0.75	2	0.07572

Table 2. Range, Mean, Median and SD of pain scores between NRS and VRS of Professionals

N=80+ (20 repeated)

Pain scale	Max. possible score	Range	Mean$\pm$SD	Median	Stand. Error
NRS	10	9	5.36±1.88	5.5	0.180
VRS	4	3	2.03±0.75	2.0	0.075

Table 3. Unpaired 't' test Showing the Mean Pain Scores of NRS and VRS among Patients and Professionals as per the Gender

Group	Scale	Gender	Mean±SD	t value	p value
Patients N=100	NRS	Male	6.20±1.75	0.001	1.000
		Female	6.20±1.45		
	VRS	Male	2.18±0.79	0.050	0.957
		Female	2.17±0.71		
Professionals N=100 (including 80 + 20 repeated)	NRS	Male	5.68±1.79	1.060	0.295
		Female	5.24±1.92		
	VRS	Male	2.11±0.83	0.630	0.529
		Female	2.00±0.73		

t_{198}=1.98, $p<0.05$.

Table 4. Kruskal Wallis Test Showing Mean Pain Score of NRS and VRS among Patients and Professionals as per the Age

Group			NRS	VRS
Patients N=100		H	1.826	1.888
		df	4	4
		p	0.768	0.756
Professional N=100 (including 80 + 20 repeated)		H	0.785	1.671
		df	2	2
		p	0.675	0.434

H=Kruskal Wallis Test, $p<0.05$

Table 5. Frequency Distribution of Patients and Professionals According to the Pain Level Measured by NRS and VRS

N=100+80 (+20 repeated)

Level of pain	VRS		NRS	
	Patients	Professionals	Patients	Professionals
Mild	15	23	3	15
Moderate	58	55	77	75
Severe	21	18	20	10
Extreme severe	6	4	-	-

Table 6. Mann-Whitney U Test Showing the Comparison of Postoperative Pain Score of NRS Between Patients and Professionals

N=100+100 (including 80+20 repeated)

Group with NRS	Mean±SD	Mann Whitney U	Z	P
Patients	6.20±1.63	3720	3.189***	0.001
Professionals	5.36±1.88			

Z=Mann Whitney U test   *=significant, $p<0.05$; **=highly significant, $p<0.01$;
***=very highly significant, $p<0.001$

Table 7. Mann-Whitney U test showing the comparison of postoperative pain score of VRS between patients and professionals

N=100+100 (including 80+20 repeated)

Group with VRS	Mean±SD	Mann Whitney U	Z	p	Inference
Patients	2.18±0.76	4484	1.46	0.16	Not significant
Professionals	2.03±0.76				

Z=Mann Whitney U test.

Table 8. Spearman Correlation Coefficient test showing the correlation of postoperative pain score between patients and professional on Numeric Rating Scale and Verbal Rating Scale

N=100+100 (including 80+20 repeated)

		VRS	
		Patients	Professionals
NRS	r	0.802**	0.735**
	p	0.001	0.001

r=Spearman Correlation Coefficient, $p<0.01$ ** significant

Table 9. Linear regression analysis between NRS and VRS

N=100+100 (including 80+20 repeated)

Group	Model	Unstandardized Coefficients		Standardized Coefficients	t	Level of significance
		B	Std. Error	Beta		
Patients	(Constant)	2.305	.281		8.190**	<0.001
	VRS	1.786	.122	.828	14.638**	<0.001
Professional	(Constant)	1.546	.355		4.351**	<0.001
	VRS	1.879	.164	.756	11.450**	<0.001

Linear regression. $p < 0.001$ *=significant, $p<0.05$; **=highly significant, $p<0.01$; ***=very highly significant, $p<0.001$.

Fig 1. Bar Diagram Showing Mean pain Score of NRS and VRS of Patients
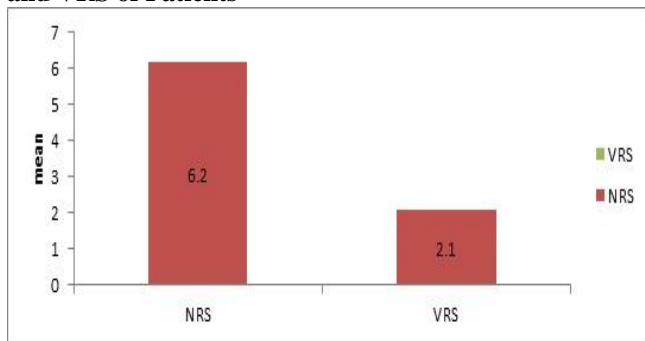

Fig 2. Bar Diagram Showing Mean Pain Score NRS and VRS of Professionals
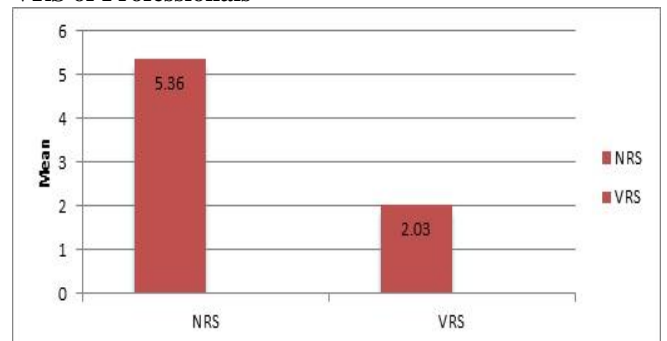

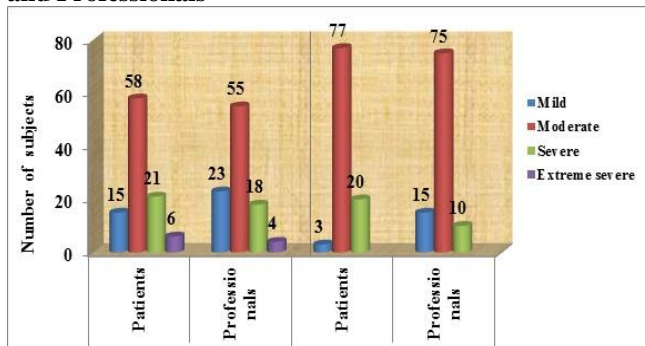**Fig 3. Bar Diagram Showing the Distribution of Patients and Professionals**

Fig 4. Error Bar diagram represents Mean difference of postoperative pain score of NRS between patients and professionals
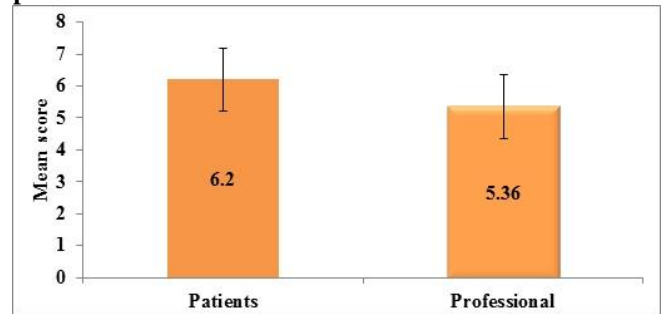
Fig 5. Error Bar diagram represents Mean difference of postoperative pain score of VRS between patients and professionals
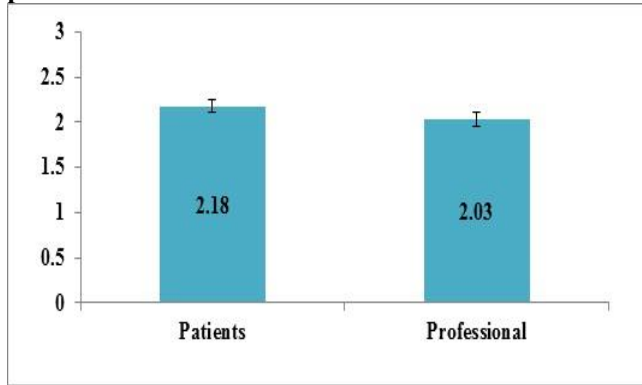

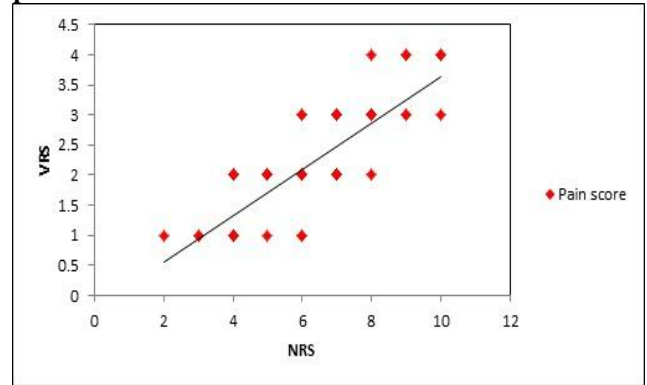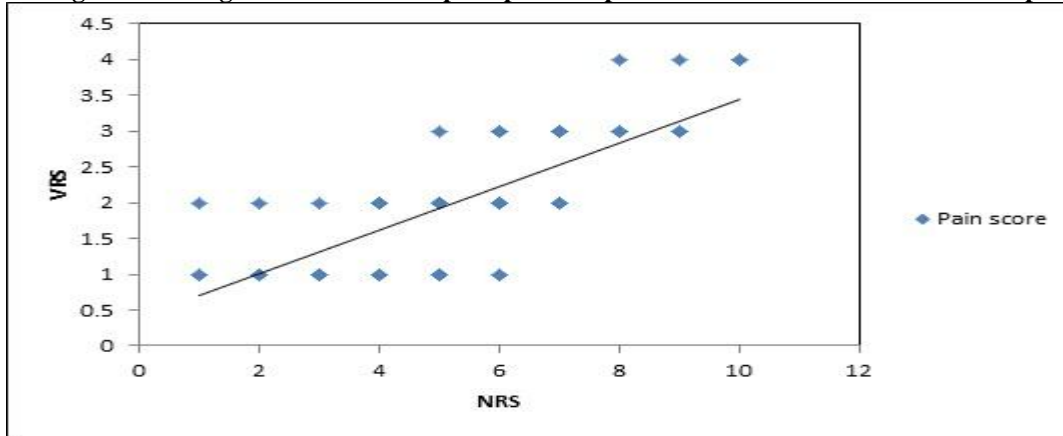**Fig 6. Scatter diagram showing the correlation of postoperative pain score between NRS and VRS of patients**

Fig 7. Scatter diagram showing the correlation of postoperative pain score between NRS and VRS of professionals.

DISCUSSION
Section A: Description of demographic characteristics of patients and professionals

A similar study conducted on postoperative pain assessment based on NRS among the patients and professionals, showed that least percentage of (25.6%) patients belonged to the age group <65 years, whereas in the present study least number (29%) of patients were in the age group 18-19 years. Majority percentage of patients (88%) had received general anaesthesia, and least (20%) of patients under went general surgery, 10% of patients underwent orthopaedics surgery, and (17.5%) of patients underwent abdominal surgery [9]. Another study conducted for computing quantification of severity by verbal rating scale and numerical rating scale result showed that majority (81%) patients were males. Highest (28%) number of patients belonged to the age group of 20-29 years and 21% of patients belonged to age group of 52-69 years.

Another study conducted for comparison of nurses and patients assessment of postoperative pain findings showed that majority (55%) of patients were females, and married (68.3%). Majority (60.7%) of patients had undergone general surgery and least (19.3%) of patients had undergone gynaecological surgery. The findings of study also showed that mean age group of the nurses were (24.66±7.57). Education status of nurses depicted as per the study show that the highest (41.7%) nursing high school, (33.3%) bachelor degree and (25%) had associate degree of 2 years.

Section B: Assessment of postoperative pain level by patients and professionals on Numeric Rating Scale and Verbal Rating Scale

In the present study showed pain measured by using Verbal Rating Scale (VRS), showed that majority of professionals (55%) and patients (58%) experienced moderate level of pain.

A supportive study for assessment of postoperative pain based on VRS also showed that the highest (38.9%) number of patient reported little pain (29.4%). reported painful but bearable and (22.7%) reported no pain. In a study of pain measured using NRS by patients and professionals, majority (77%) of patients reported moderate level of pain. Whereas support to study show that least (17%) of patients experienced bearable pain and (5%) experience unbearable pain [10].

Section C: Comparison of postoperative pain level by patients and professionals

Present study showed that there was no significant difference between postoperative pain score of VRS among patients and professionals (p=0.16). Hence, the null hypothesis $H0_2$ was accepted and suggesting that there was no difference in the pain assessment by patients and professionals using NRS and VRS.

But in a study conducted to assess the postoperative pain and anxiety among patients v/s nurses during or nurses-controlled analgesia also showed that the difference between pain assessed by patients and by nurses, increased with level of pain and there was no significance difference in the discrepancies between patients and nurses pain estimates.(p=0.8). The highest percentage (48%) of the nurses assessments of patients pain were correct, while in 51% the nurses underestimated and in 1% overestimated patients pain [11].

Section D: Correlation of postoperative pain between patients and professionals on Numeric Rating Scale and Verbal Rating Scale

Findings of the present study showed that there was a highly significant correlation between the postoperative pain score of NRS and VRS among patients (r=0.802, p<0.001) and professional (r=0.735, p<0.001).

A study was designed to evaluate whether the nurses assessment of postoperative pain can be an alternative to patients self-reporting, showed that, there was an acceptable correlation between overall pain measurement assessed by patients and nurses using100-mm visual analogue scales (VAS) (r=0.72, p=0.0001) [12].

A supportive study conducted to assess postoperative pain and anxiety among patients and nurses during patients or nurses-controlled analgesia also showed that there was higher correlation between patients pain rating were higher than between nurses pain rating (median r=0.76 v/s 0.70) [13].

The present study also showed that there was a very high significant linear relationship between VRS and NRS. The present study also showed that there was a highly significant linear relationship among NRS and VRS, as the point showed similar distribution through the length of the line show linear relationship.

A supportive study conducted to assess a co-relation between NRS and VRS of pain in postoperative patients showed that there was a linear association between values for NRS and VRS. Linear regression model Pearson co-relation statistic of the two scale show stronger linear relationship between VAS and NRS. Thus the study findings evaluated that there was a stronger linear relationship between NRS and VRS [14].

A study conducted comparing quantification of pain severity by Verbal Rating Scale and Numerical Rating Scales showed that, patients VRS and NRS rating were correlated weakly (Spearman correlation, rho=0.38) [15].

In the present study, majority (77%) of the patient's experienced moderate pain, (20%) of the patients experienced severe pain and the least (3%) number of patients experienced mild pain using NRS.

Thus the study finding showed that there was a significance co-relation of postoperative pain assessment between NRS and VRS by the patients and professional.

Limitations

- Postoperative pain score was assessed when patient was at rest; hence pain score may differ at movement.
- The study was conducted only in the one hospital at Mangalore which imposed limitation in the generalization of findings.
- Small population limits the generalization of the study findings.
- The estimated sample size at the beginning of the study for the health professionals were 100. But as there were only 80 health professionals in surgical intensive care unit and operation theatre, 20 professionals were taken as repeated sample for the assessment of pain.

Recommendations

- A similar study can be replicated with large sample to validate and generalise the findings.
- Further research need to be done in the area of pain assessment and management.
- A similar study can be conducted using the different pain assessment tool.

CONCLUSION

This study was conducted to assess postoperative pain by Numeric rating scale and Verbal rating scale among surgical patients and professionals. The following conclusions were drawn on the basis of the findings of the present study: There was significant difference between postoperative pain score of NRS among patients and professionals. There was no significant difference between postoperative pain score of VRS among patients and professionals and also a highly significant correlation between the postoperative pain score of NRS and VRS among patients and professionals. Level of pain was found to be severe as per the assessment done by the patients.

CONFLICT OF INTEREST

There were no conflicts of interest reported.

REFERENCES

1. Jabusch, Lewthwaite JB, Wheeler KM, Schnell- Hoehn BJ, Mills KN, Estella J, Holder E, Fedorowic Z. (2011). Nurses knowledge and attitudes regarding pain management in hospitalized adult. *Continuing Education in Nursing,* 42, 1-7.
2. Black MJ, Hawks HJ. (2005). *Medical surgical nursing.* 7th ed. Philadelphia: Saunders Elsevier Publication, 442.
3. Hunter S. (2000). Determination of moral negligence in the context of the under medication of pain by nurses. *Nursing Ethics*, 7(5), 379-91.
4. Jennifer I, Nancy B, Patrician p, Valerie Z, Lorraine C. (2004). Patient satisfaction and pain management. An educational approach. *Journal of Nursing Care Quality*, 19(4), 322-7.
5. Van Dijk JF, Van Wijck AJ, Kappen TH, Peelen LM, Kalkman CJ, Schuurmans MJ. (2012). Postoperative pain assessment based on numeric rating is not the same for patient and professionals; A cross-sectional study. *International Journal of Nursing Studies*, 49, 65-71.
6. Apfelbaum JL, Chen C, Mehta SS, Gan TJ. (2003). Postoperative pain experience: results from a national survey suggest postoperative pain continues to be undermanaged. *Anesth Analg*, 97(2), 534-40.
7. Carr DB, Goudas LC. (1999). Acute pain. *The Lancet*, 353(9169), 2051-8.
8. Polit DF, Beck TC. (2011). *Nursing research, principles and methods.* 9th ed. Philadelphia: Lippincott Williams and Wilkins.
9. Dunwoody CJ, Krenzischek DA, Pasero C, Rathmell JP, Polomano PC. (2008). Assessment, physiological monitoring and consequences of inadequately treated acute pain. *Journal of Perianaesthesia Nursing*, 23(1), 15-27.
10. Breivik H, Borchgrevink PC, Allen SM, Rosseland LA, Romundstad L, Hals EK, Kvarstein G, Stubhau A. (2008). Assessment of pain. *British Journal of Anaesthesia*, 101(1), 17-24.
11. Rachelle V. (2010). A very comparing the visual analogue scale and verbally administered NRS in traumatic versus non-traumatic pain in a community hospital emergency centre. *BMC Public Health,* 8, 42.
12. Chung IS, *et al.* (2001). Nurse's assessment of postoperative pain: can it be an alternative to patients' self-reports. *J Korean Med Sci,* 16(6), 784-8.
13. Gagliese L, Nataly, Ellis W, Chan VWS. (2005). The measurement of postoperative pain: a comparison of intensity scales in younger older surgical patients. *Pain,* 117, 412-20.
14. Gajasinghe S, Wijayaratna M, Abayadura A. (2006). Correlation between NRS and visual analogue scale (VAS) in assessment of pain in operative patients. *Journal of Advanced Nursing,* 46(2), 124-33.
15. Pag GME, Katz J, Stinson J, Isaac L, Pichora ALM, Campbell F. (2001). Validation of the numerical raring scale for pain intensity and unpleasantness in paediatric acute postoperative pain sensitivity to change over time. *Pain,* 13(4), 359-69.