

Effectiveness of ICE Pack Application on Pain Reduction at Subcutaneous Heparin Injection Site Among Postoperative Patients in a Selected Hospital, Kanpur

MS. Neetika

College - LPS institute of cardiology, Kanpur, Uttar Pradesh. Assistant professor

ABSTRACT (Page 1)

Subcutaneous administration of heparin is a widely used clinical intervention for the prevention of thromboembolic disorders in postoperative patients. Despite its therapeutic importance, patients frequently report pain, discomfort, and bruising at the injection site, which may negatively impact treatment adherence and overall patient experience. This study aimed to assess the effectiveness of ice pack application in reducing pain at the site of subcutaneous heparin injection.

A quantitative, quasi-experimental one-group pre-test and post-test research design was adopted. A total of 60 postoperative patients receiving subcutaneous heparin injections were selected through purposive sampling. Pain was assessed using the Wong-Baker Faces Pain Rating Scale. The intervention involved applying an ice pack at the injection site for 30 seconds prior to administration, for four consecutive days.

The results revealed that there was no statistically significant reduction in pain on the first day ($t = 0.15$). However, from the second day onwards, a significant reduction in pain scores was observed (Day 2: $t = 3.36$; Day 3: $t = 4.80$; Day 4: $t = 9.23$), indicating the effectiveness of ice pack application.

The study concludes that ice pack application is a simple, cost-effective, and efficient non-pharmacological nursing intervention for reducing pain associated with subcutaneous heparin injections.

Keywords: Ice pack, Heparin injection, Pain management, Postoperative care, Nursing intervention

INTRODUCTION

Background of the Study

Pain management remains a cornerstone of quality nursing care, particularly in postoperative settings where patients undergo multiple invasive procedures. One such procedure is the administration of subcutaneous heparin, commonly used to prevent thromboembolic complications.

Heparin injections, although clinically essential, are frequently associated with adverse effects such as:

- Pain at injection site
- Bruising and hematoma formation
- Anxiety and discomfort

Studies indicate that nearly **50–90% of patients experience pain** during subcutaneous heparin administration .

Pain at the injection site can interfere with:

- Patient compliance
- Treatment adherence
- Overall recovery experience

Need for the Study

The need for effective pain management strategies is critical due to:

- High incidence of injection-related pain
- Limited use of non-pharmacological interventions
- Increased patient dissatisfaction

Cold application has been identified as a potential solution due to its:

- Vasoconstrictive effect
- Analgesic properties
- Ability to reduce inflammation

However, there is limited research in Indian clinical settings evaluating this intervention.

Statement of the Problem

“A study to assess the effectiveness of ice pack application on the site of subcutaneous heparin injection in prevention and reduction of pain among postoperative patients.”

Objectives

1. To assess the level of pain in patients receiving subcutaneous heparin injections
2. To evaluate the effectiveness of ice pack application
3. To determine association between pain and demographic variables

Hypotheses

- H1: Ice pack application significantly reduces pain
- H2: Significant association exists between pain and demographic variables

Studies on Ice Pack Application

- Cold application reduces nerve conduction velocity
- Decreases inflammation and tissue damage
- Reduces pain scores significantly

A systematic review showed:

- 40% reduction in bruising
- Significant decrease in pain intensity

Studies on Heparin Injection Pain

- Injection technique influences pain intensity

- Slower injection reduces discomfort
- Site of injection affects bruising

Research Gap

- Limited studies in Indian hospitals
- Lack of standardized protocols
- Need for practical nursing interventions

METHODS

Research Design

Quasi-experimental one-group pre-test and post-test design

Setting

LPS Institute of Cardiology and GSVM Medical College, Kanpur

Population

Postoperative patients receiving heparin injections

Sample

- Size: 60 patients
- Technique: Purposive sampling

Variables

- Independent: Ice pack application
- Dependent: Pain level
- Demographic: Age, gender, occupation, habits

Tool

Wong-Baker Faces Pain Rating Scale

Intervention

- Ice pack applied for 30 seconds
- Duration: 4 days

Data Collection Procedure

1. Pre-test pain assessment
2. Ice pack application
3. Heparin injection
4. Post-test pain assessment

Ethical Considerations

- Informed consent obtained

- Confidentiality maintained
- Ethical approval secured

Statistical Analysis

- Mean, SD
- Paired t-test
- Chi-square test

DATA ANALYSIS AND INTERPRETATION OF FINDINGS

The description of the data analysis is the heart of a research project. It is the communication of measurements, and observation gathered by the researcher. For achieving the results, the collection of data must be processed and analyzed in an orderly coherent fashion. Analysis is a process of organizing and synthesizing data in such a way that research questions can be answered and hypothesis can be tested.

The data collected through Wong – Baker Faces Pain Rating Scale and interpretation of data obtained from Wong – Baker Faces Pain Rating Scale. Then the findings were printed in different graphs and tables of percentage.

Analysis as the “categorizing” ordering manipulating & summarizing of data to obtain access to research questions. The purpose of analysis is to reduce data to an intelligible & interpretable form, so that the relation of research problem can be studied and tested.

This chapter presents the analysis and interpretation of the data collected for assess the effectiveness of Ice pack application on site of subcutaneous Heparin injection among post-operative clients.

The data analysis was based on the following objectives of the study:

- To assess the level of pain in patient receiving subcutaneous heparin injection.
- To evaluate the effectiveness of ice pack application on pain in patients receiving subcutaneous heparin injection.
- To find out association between pre interventional level of pain in patients receiving subcutaneous heparin with their selected demographic variables.

PRESENTATION OF DATA

The analyzed data has been organized and presented in the following sections: Section I: Description of demographic characteristics of the post- operative clients. Section II: Assess the level of pain in patients receiving subcutaneous heparin injection.

Section III: Evaluate the effectiveness of Ice pack application on site of subcutaneous heparin injection in prevention and reduction of pain.

Section IV: Association between level of pain in patients receiving subcutaneous heparin injection with their selected demographic variables.

SECTION I: DESCRIPTION OF DEMOGRAPHIC CHARACTERISTICS OF THE POST OPERATIVE PATIENTS

Table no. 4.1: Frequency and percentage distribution of post-operative patients

N=60

S. No.	Variables	Frequency	Percentage
1.	Age		
	Early adulthood (20 – 35 years)	10	16.66%
	Middle adulthood (36 – 64 years)	37	61.66%
	Late adulthood (65 years and above)	13	21.66%
2.	Gender		
	Male	38	63.33%
	Female	22	36.66%
	Transgender	00	00%
3.	Occupation		
	House wife	04	06.66%
	Govt. Services	28	46.66%
	Private services	18	30%
	Others....(Factory, Mines, Labor, etc)	10	16.66%
4.	Bad habits		
	Smoking	21	35%
	Tobacco	15	25%
	Alcohol	19	31.66%
	Substance abuse	05	08.33%
5.	Diet pattern		
	Vegetarian	11	18.33%
	Non vegetarian	22	36.66%
	Mixed vegetarian	27	45%
6.	Pre existing disease		
	Cardiac disease	27	45%
	Renal disease	05	08.33%
	Liver disease	07	11.66%
	Lungs disease	21	35%

The above table 4.1 present that : Majority 37 (61.66%) samples were from the 36 – 64 years of age followed by 13 (21.66%) were 65 years and above and remaining 10 (16.66%) samples were 20 – 35 years of age.

➤ The most of 38 (63.33%) samples were male and remaining 22 (36.66%) were female and there were no transgender.

- The most of 28 (46.66%) samples government services followed by 18 (30%) samples have private services some of them 10 (16.66%) samples have other occupation like factory worker, mines worker, labor etc. and remaining 04 (06.66%) samples were housewife.
- The most of 21 (35%) samples were have habit of smoking followed by 19 (31.66%) samples were alcoholic, some of them 15 (25%) samples were use tobacco and remaining 05 (08.33%) samples were substances abuser.
- The most of 27 (45%) samples were mixed vegetarian followed by 22 (36.66%) samples were non vegetarian and remaining 1 (18.33%) sample were vegetarian.
- The most of 27 (45%) samples were have cardiac problem, followed by 21 (35%) samples were have lungs disease some of them 07 (11.66%) samples were have liver disease and remaining 05 (08.33%) samples were have renal disease.

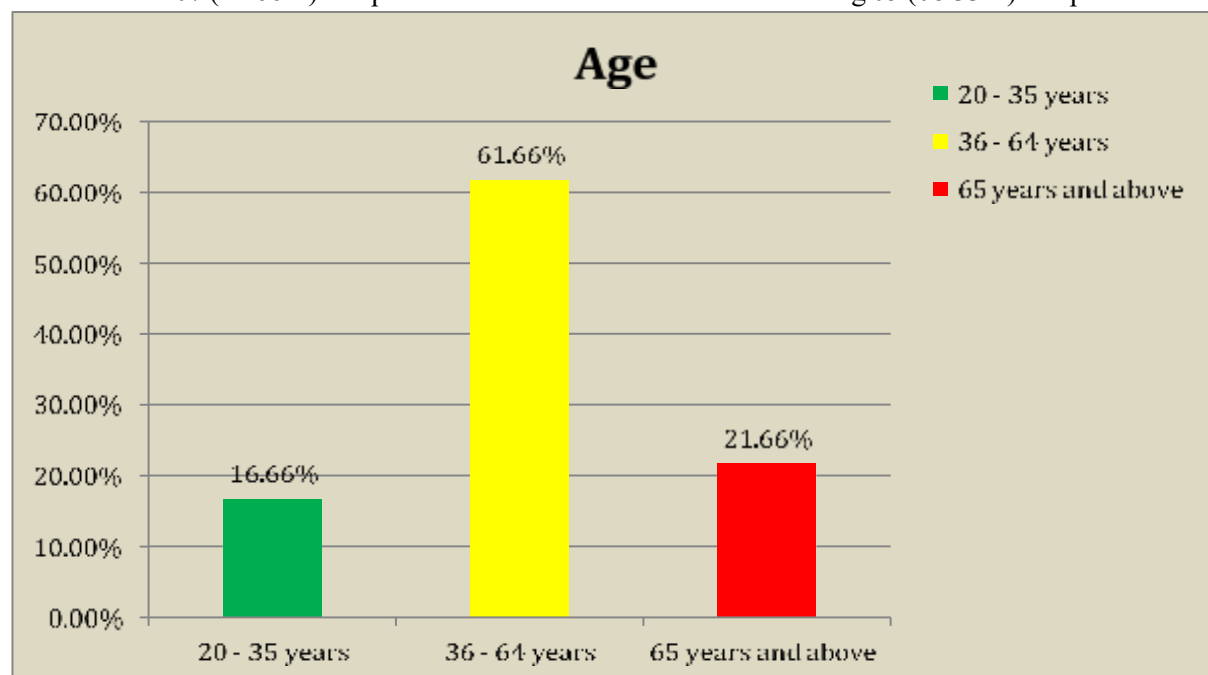


Fig. 4.1: Bar diagram showing percentage distribution of post-operative patients according to age

The above fig. no. 4.1 represent that majority 37 (61.66%) samples were from the 36 – 64 years of age followed by 13 (21.66%) were 65 years and above and remaining 10 (16.66%) samples were 20 – 35 years of age.

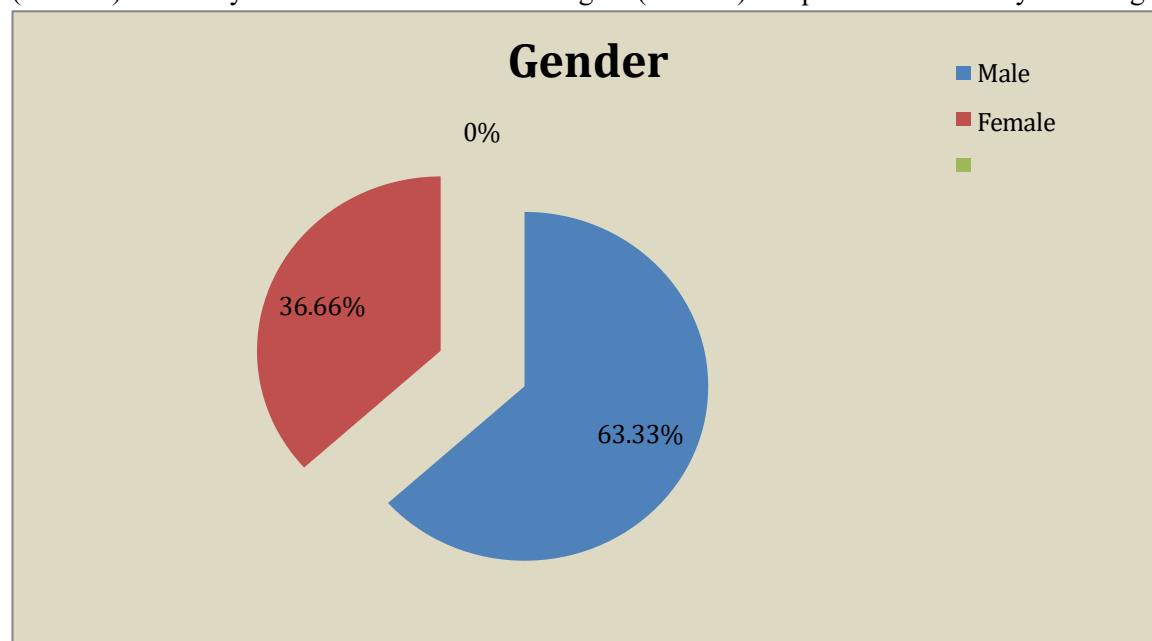


Fig. 4.2: Pie diagram showing percentage distribution of post-operative patients according to gender

The fig. no. 4.2 revealed that most of 38 (63.33%) samples were male and remaining 22 (36.66%) were female and there were no transgender.

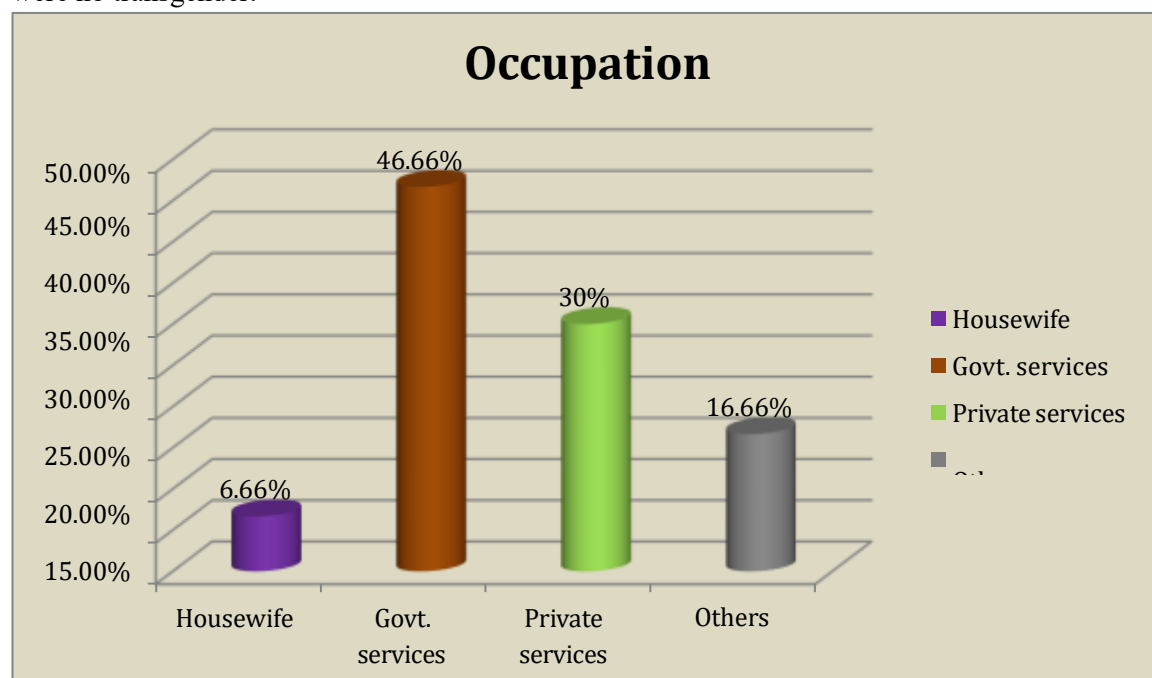


Fig. 4.3: Cylindrical diagram showing percentage distribution of post-operative patients according to occupation

The above fig. shows that most of 28 (46.66%) samples government services followed by 18 (30%) samples have private services some of them 10 (16.66%) samples have other occupation like factory worker, mines worker, labor etc. and remaining 04 (06.66%) samples were housewife.

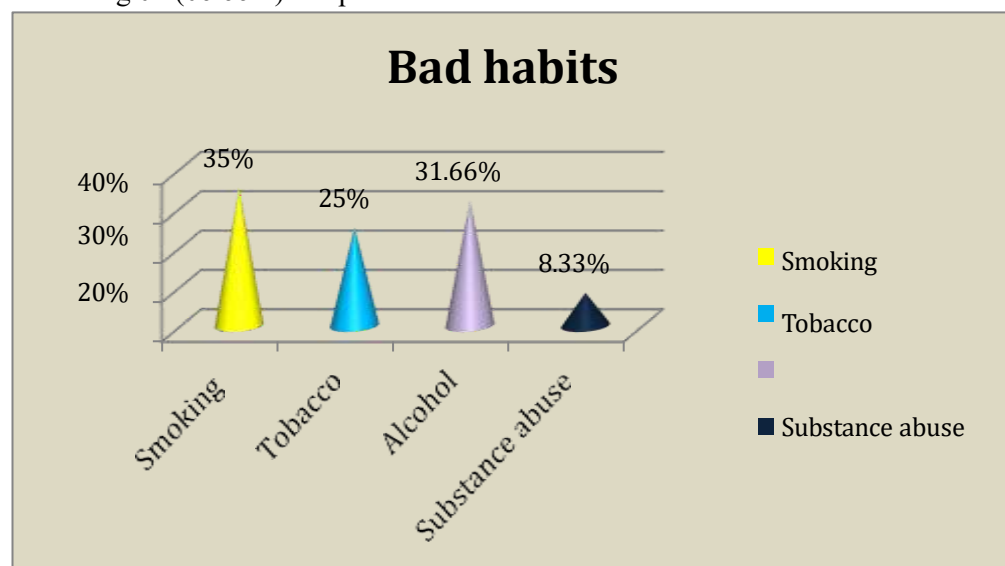


Fig.4.4: Cone diagram showing percentage distribution of post-operative patients according to bad habits

As per above most of 21 (35%) samples were have habit of smoking followed by 19 (31.66%) samples were alcoholic, some of them 15 (25%) samples were use tobacco and remaining 05 (08.33%) samples were substances abuser.

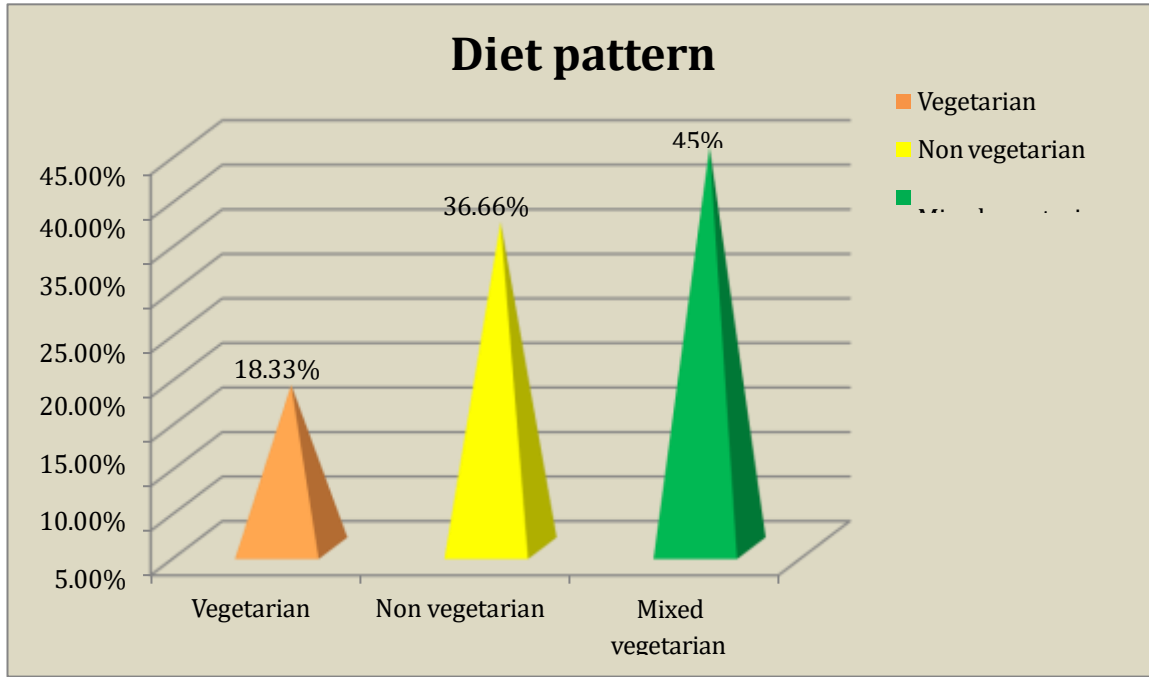


Fig. 4.5: Cone diagram showing percentage distribution of post-operative patients according to Diet Pattern.

The fig. no. 4.5 show that most of 27 (45%) samples were mixed vegetarian followed by 22 (36.66%) samples were non vegetarian and remaining 1 (18.33%) sample were vegetarian.

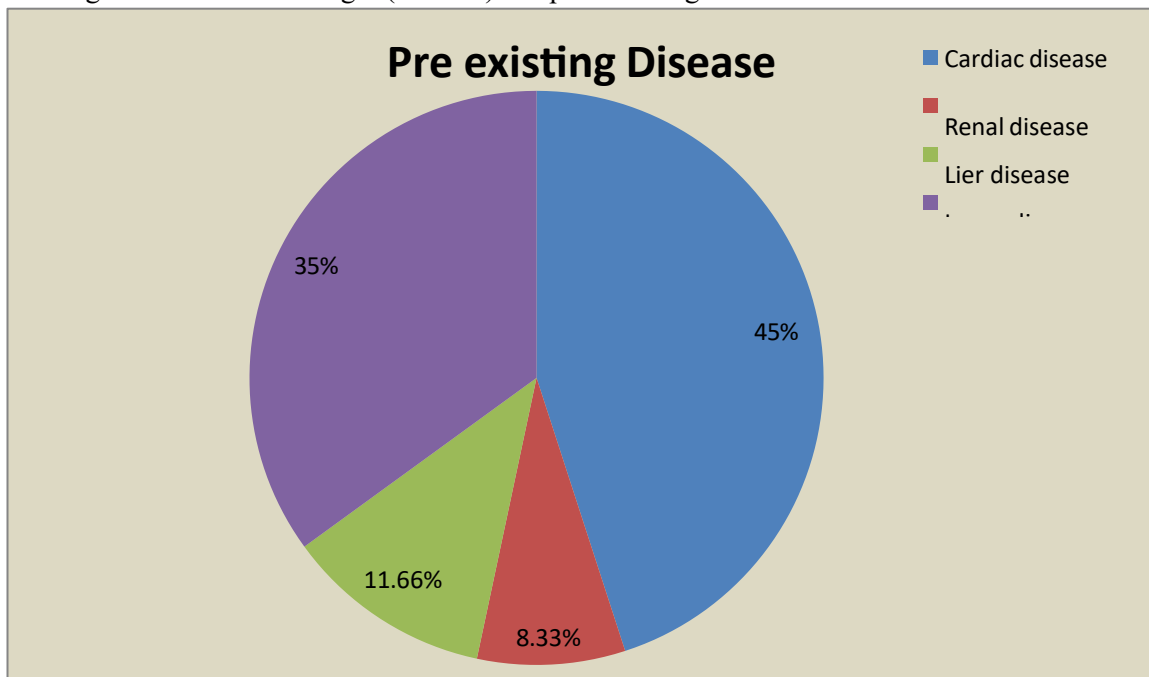


Fig. 4.6: Pie diagram showing percentage distribution of post-operative patients according to pre-existing disease

As per the above fig. most of 27 (45%) samples were have cardiac problem, followed by 21 (35%) samples were have lungs disease some of them 07 (11.66%) samples were have liver disease and remaining 05 (08.33%) samples were have renal disease.

SECTIONII: ASSESSTHE LEVEL OFPAIN IN PATIENTS RECEIVING SUBCUTANEOUS HEPARIN INJECTION

a. Level Of pain among patients receiving subcutaneous heparin injection

Table No. 4.2: Level Of pain among patients receiving subcutaneous heparin injection before and after implement ice pack

S. No.	Aspect	Before intervention		After intervention	
		Frequency	Percentage	Frequency	Percentage
1	No hurt	04	6.67%	39	65%
2	Hurts a little bit	03	5%	12	20%
3	Hurts a little more	15	25%	05	8.34%
4	Hurts even more	12	20%	02	3.33%
5	Hurts a whole lot	18	30%	02	3.33%
6	Hurts worst	8	13.33%	0	00%

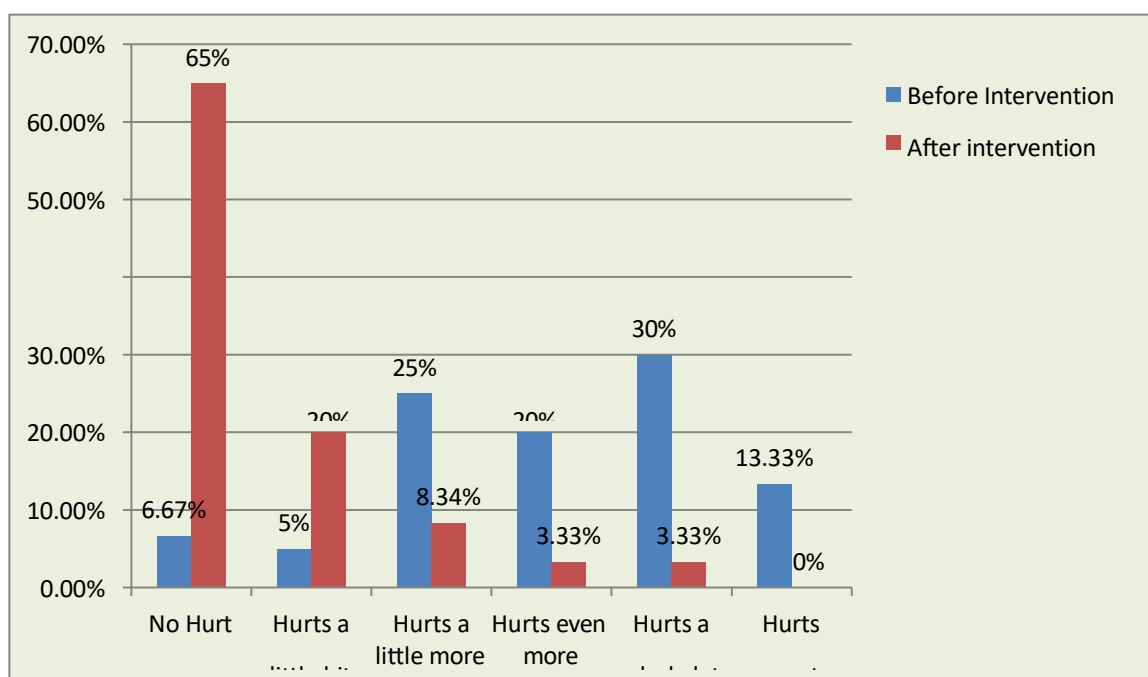


Fig. No. 4.7: Bar diagram showing the level of pain among patients receiving subcutaneous heparin injection before and after implement ice pack

The table no. 4.2 and fig. no. 4.7 showed the level of pain among patients receiving subcutaneous heparin injection before and after implement ice pack. With regard to pain scores, 04 (6.67%) patients had no hurt pain, 03 (05%) patients had hurts a little bit pain, 15 (25%) patients had hurts a little more pain, 12 (20%) patients had hurts even more pain, 18 (30%) patients had hurts a whole lot pain and 08 (13.33%) patients had hurts worst pain before implement, the ice pack on site of subcutaneous heparin injection whereas 39 (65%) patients had no hurt pain, 12 (20%) patients had hurts a little bit pain, 05 (08.34%) patients

had hurts a little more pain, 02 (03.33%) patients had hurts even more pain, 02 (03.33%) patients had hurts a whole lot pain and 00 (00%) patients had hurts worst pain after implement the ice pack on site of subcutaneous heparin injection.

b. Level Of pain score among patients receiving subcutaneous heparin injection before and after implement the ice pack

Table 4.3: Mean, mean percentage, median, SD of level of pain

S. No.	Aspect	Before pre intervention	Post Interventional assessment			
			Ist day	IInd day	IIIrd day	IVth day
1.	Mean	6.63	6.66	5.76	5.06	3.3
2.	Mean Percentage	66.33%	66.6%	57.66%	50.66%	33%
3	Median	6	6	6	4	2
4	SD	1.35	1.08	1.43	2.13	2.17

The above table no. 4.3 revealed the mean, mean percentage, median and SD of level of pain among patients receiving subcutaneous heparin injection before and day wise after implements the ice pack. With regards to pain score the mean of patients is 6.63 with 66.33% mean percentage. The median and SD are 6; 1.35 respectively in pre-intervention. While after intervention, the mean of Ist day is 6.66 with 66.6% mean percentage. The median and SD are 6; 1.08 respectively. The mean of IInd day is 5.76 with 57.66% mean percentage. The median and SD are 6; 1.43 respectively. The mean of IIIrd day is 5.06 with 50.66% mean percentage. The median and SD are 4; 2.13 respectively. The mean of IVth day is 3.3 with 33% mean percentage. The median and SD are 2; 2.17 respectively.

SECTION III: EVALUATE THE EFFECTIVENESS OF ICE PACK APPLICATION ON SITE OF SUBCUTANEOUS HEPARIN INJECTION IN PREVENTION AND REDUCTION OF PAIN

There were 60 patients those receiving subcutaneous heparin injection were taken for the study. Each of them had to give to response on pain rating scale as level of pain. To assess the level of pain Wong baker faces scale. After that mean, median, SD is calculated on the basis of responses and result or hypothesis can be calculated by ‘t’ test. Mean, median and standard deviation were obtained as below:

Table 4.4: Mean, median, SD and t value of intervention

N=60

S. No.	Intervention	Mean	Median	SD	Mean Difference	df	‘t’ calculated value	‘t’ tabulated value
1.	Before intervention	6.63	6	1.35	-0.03	59	0.15	
	Ist day after intervention	6.66	6	1.08				
2.	Before intervention	6.63	6	1.35				

	IInd day after intervention	5.76	6	1.43	0.87	59	3.36	1.96
3.	Before intervention	6.63	6	1.35	1.57	59	4.80	
	IIIrd day after intervention	5.06	4	2.13				
4.	Before intervention	6.63	6	1.35	3.33	59	9.23	
	IVth day after intervention	3.3	2	2.17				

The above table no. 4.4 revealed that the pre interventional mean score of patients receiving subcutaneous heparin injection is 6.63 while 6.66 for Ist day after intervention with -0.03 mean difference. The median is 6 for the pre intervention and also Ist day after intervention. The SD is 1.35 for pre interventional assessment and 1.08 after intervention.

The t value is 0.15. This value is obtained by paired t test. The calculated value of t (0.15) is less than the tabulated value (1.96) at 0.05 level of significance.

Here the calculated value i.e. 0.15 is less than the tabulated value i.e. 1.96; so we can say that the ice pack is not effective on site of subcutaneous heparin injection in prevention and reduction of pain among post operative patients of Ist day after intervention. The hypothesis H1 is rejected.

The pre interventional mean score of patients receiving subcutaneous heparin injection is 6.63 while 5.76 for IInd day after intervention with 0.87 mean difference. The median is 6 for the pre interventional assessment and also IInd day after intervention. The SD is 1.35 for pre intervention and 1.43 after intervention.

The t value is 3.36. This value is obtained by paired t test. The calculated value of t (3.36) is more than the tabulated value (1.96) at 0.05 level of significance.

Here the calculated value i.e. 3.36 is more than the tabulated value i.e. 1.96; so we can say that the ice pack application is effective on site of subcutaneous heparin injection in prevention and reduction of pain among post operative patients of IInd day after intervention. The hypothesis H1 is accepted. The pre interventional mean score of patients receiving subcutaneous heparin injection is 6.63 while 5.06 for IIIrd day after intervention with 1.57 mean difference. The median is 6 for the pre interventional assessment and 4 for IInd day after intervention. The SD is 1.35 for pre interventional assessment and 2.13 after intervention.

The t value is 4.80. This value is obtained by paired t test. The calculated value of t (4.80) is more than the tabulated value (1.96) at 0.05 level of significance.

Here the calculated value i.e. 4.80 is more than the tabulated value i.e. 1.96; so we can say that the ice pack is effective on site of subcutaneous heparin injection in prevention and reduction of pain among post operative patients of IIIrd day after intervention. The hypothesis H1 is accepted.

The pre interventional mean score of patients receiving subcutaneous heparin injection is 6.63 while 3.3 for IVth day after intervention with 3.33 mean difference. The median is 6 for the pre interventional assessment and 2 for IVth day after intervention. The SD is 1.35 for pre interventional assessment and 2.17 after intervention.

The t value is 9.23. This value is obtained by paired t test. The calculated value of t (9.23) is more than the tabulated value (1.96) at 0.05 level of significance.

Here the calculated value i.e. 9.23 is more than the tabulated value i.e. 1.96; so we can say that the ice pack is effective on site of subcutaneous heparin injection in prevention and reduction of pain among post operative patients of IVth day after intervention. The hypothesis H1 is accepted.

SECTION IV: ASSOCIATION BETWEEN LEVEL OF PAIN IN PATIENTS RECEIVING SUBCUTANEOUS HEPARIN INJECTION WITH THEIR SELECTED DEMOGRAPHIC VARIABLES

Table –4.5: Association between Levels Of pain With Selected Demographic Variables

N=60

S. No.	Variables	Condition of patients						Df	Table Value	X ² Value	Remarks		
		No Hurt	Hurts a little bit	Hurts a little more	Hurts even more	Hurts a whole lot	Hurts worst						
1.	Age							10	18.30	19.33	S		
	Early adulthood (20 – 35 years)	2	4	2	1	1	0						
	Middle adulthood (36 – 64 years)	1	4	5	12	14	1						
	Late adulthood (65 years and above)	1	7	2	2	1	0						
2.	Gender							5	11.07	4.76	NS		
	Male	6	13	11	5	2	1						
	Female	2	5	6	5	4	0						
	Transgender	0	0	0	0	0	0						
3.	Occupation							15	24.99	30.03	S		
	House wife	0	0	1	0	3	0						
	Govt. Services			1	7	5	11	3	1				
	Private services			2	6	4	4	2	0				
	Others....(Factory, Mines, Labor, etc)			5	1	1	1	2	0				
4.	Bad habits									15	24.99	28.23	S
	Smoking			1	8	8	2	2	0				
	Tobacco			2	7	2	3	1	0				
	Alcohol			1	1	3	2	11	1				
	Substance abuse			0	1	1	2	1	0				
5.	Dietary pattern									10	18.30	5.54	NS
	Vegetarian			1	3	3	1	2	1				
	Non vegetarian			2	5	4	3	7	1				
	Mixed Vegetarian			3	5	7	7	5	0				
	Pre existing disease												

6.	Cardiac disease	2	3	7	3	12	0	15	24.99	28.74	S
	Renal disease	1	0	1	3	0	0				
	Liver disease	1	3	1	0	2	0				
	Lungs disease	7	6	3	3	1	1				

The above table no. 4.5 represents that:

The tabulated value of chi square at 10 df was 18.30 which is less than calculate value that is 19.33. So there was significant association between the levels of pain with age of patients receiving subcutaneous heparin injection at 0.05 level of significance. The hypothesis H2 is accepted.

The tabulated value of chi square at 5 df was 11.07 which is more than calculate value that is 4.76. So there was no significant association between the level of pain with gender of patients receiving subcutaneous heparin injection at 0.05 level of significance. The hypothesis H2 is rejected.

The tabulated value of chi square at 15 df was 24.99 which is less than calculate value that is 30.03. So there was significant association between the level of pain with occupation of patients receiving subcutaneous heparin injection at 0.05 level of significance. The hypothesis H2 is accepted.

The tabulated value of chi square at 15 df was 24.99 which is less than calculate value that is 28.23. So there was significant association between the level of pain with bad habits of patients receiving subcutaneous heparin injection at 0.05 level of significance. The hypothesis H2 is accepted.

The tabulated value of chi square at 10 df was 18.30 which is more than calculate value that is 5.54. So there was no significant association between the level of pain with diet pattern of patients receiving subcutaneous heparin injection at 0.05 level of significance. The hypothesis H2 is rejected.

The tabulated value of chi square at 15 df was 24.99 which is less than calculate value that is 28.74. So there was significant association between the level of pain with pre existing disease of patients receiving subcutaneous heparin injection at 0.05 level of significance. The hypothesis H2 is accepted.

DISCUSSION

The results of the study clearly indicate that ice pack application is an effective intervention for reducing pain associated with subcutaneous heparin injections. The lack of significant effect on the first day can be attributed to the acute postoperative condition of patients, where pain sensitivity is generally higher due to surgical trauma and inflammation.

The significant reduction in pain observed from the second day onwards can be explained by the cumulative effect of repeated cold application. With continued use, the ice pack likely contributed to sustained vasoconstriction and reduced nerve sensitivity, leading to improved pain control. These findings are consistent with previous studies that have demonstrated the effectiveness of cold therapy in reducing procedural pain.

Furthermore, the study highlights the importance of non-pharmacological interventions in nursing practice. Unlike pharmacological methods, which may have side effects and additional costs, ice pack application is a safe, inexpensive, and easily accessible intervention that can be implemented in various clinical settings.

CONCLUSION

In conclusion, the study provides strong evidence that ice pack application is an effective non-pharmacological intervention for reducing pain associated with subcutaneous heparin injections. While the intervention did not show significant results on the first day, its effectiveness increased with repeated application, leading to a substantial reduction in pain from the second day onwards. Given its simplicity, cost-effectiveness, and ease of implementation, ice pack application should be incorporated into routine nursing practice to enhance patient comfort and improve the quality of care.