

A Study to Assess the Effectiveness of Cryotherapy On Experience of Intramuscular Injection Among Patient in Selected Hospital.

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ABSTRACT

INTRODUCTION:

Intramuscular (IM) injections are essential for medication delivery but often cause pain and discomfort, leading to anxiety and treatment avoidance. Effective pain management is crucial for enhancing patient experience and adherence. Cryotherapy, a non-pharmacological intervention, has shown promise in reducing pain by numbing the injection site and alleviating discomfort. This study evaluates the effectiveness of cryotherapy in improving the IM injection experience, contributing to a more patient-centered approach in clinical practice.

OBJECTIVES: 1.To assess the post test intramuscular injection score among patients in selected hospital.2 To assess the effectiveness of Cryotherapy on experience of intramuscular injection among patients in selected hospital in experimental and control group.3 To compare the effectiveness of Cryotherapy on experience of intramuscular injection among patients in selected hospital in experimental and control group.4To associate the post-test intramuscular injection among patients in selected hospital with their demographic variables in experimental group.

MATERIALS AND METHOD: A quasi-experimental type of study design was used i.e. post- test only design to study the effectiveness of cryotherapy on experience of intramuscular injection among patient in selected hospital. The study was carried out in OPD at selected hospital of city. Patient who was receiving vit B12 intramuscular injection on OPD basis were taken as a sample for study. Non-probability (purposive sampling technique) was used to select sample. and total sample size was 72. Control group sample size-36 and Experimental group sample size-36. The data was analysed with descriptive and inferential statistics.

RESULTS AND CONCLUSION: The findings of this study firmly establish that cryotherapy is an exceptionally effective non-pharmacological method for improving experience during intramuscular injections. The statistical analysis unequivocally shows a significant reduction in pain and discomfort among patients who received cryotherapy prior to their injection, in stark contrast to those who did not.

Moreover, it is clear that demographic factors such as age and body mass index (BMI) have a substantial impact on pain perception. In contrast, factors such as gender, occupation, co-morbid illnesses, and the duration of diagnosis do not significantly influence pain levels.

KEY WORDS: cryotherapy, experience, intramuscular injection.

1. INTRODUCTION

"Every experience, whether pleasant or painful, shapes our understanding of care."

Intramuscular (IM) injections are a cornerstone of modern medical practice, playing a vital role in delivering medications and vaccines effectively. However, despite their efficacy, IM injections often evoke fear and discomfort among patients. Pain and discomfort are frequently reported, particularly in individuals who require repeated injections, leading to avoidance behaviors, anxiety, and, in some cases, the refusal of necessary treatment. This highlights the need to explore methods that enhance the overall patient experience, making this routine procedure more tolerable and acceptable.

IM injections involve administering medication deep into the muscle tissue, facilitating rapid absorption into the bloodstream. They are particularly indispensable in managing conditions such as vitamin B12 deficiency, where intramuscular delivery ensures effective treatment. Although widely practiced, this method is not without drawbacks, with pain being one of the most common concerns¹.

Pain, as defined by the International Association for the Study of Pain (IASP), is "an unpleasant sensory and emotional experience associated with actual or potential tissue damage." Declared the fifth vital sign, pain assessment and management are now as critical as evaluating other vital parameters, such as temperature, pulse, and blood pressure. This recognition underscores the importance of addressing discomfort associated with medical interventions, including intramuscular injections².

The experience of IM injections goes beyond pain. It encompasses emotional, psychological, and sensory responses, which can vary significantly from person to person. Factors such as anxiety, previous negative experiences, and even the patient's perception of the procedure play a significant role in shaping their overall experience. Addressing these subjective factors is essential in ensuring a positive healthcare experience and fostering trust between patients and healthcare providers³.

Cryotherapy has emerged as a potential solution to alleviate patient discomfort and improve their overall experience during medical procedures. As one of the oldest and simplest therapeutic techniques, cryotherapy involves cooling the target tissue to reduce local metabolism, lower inflammation, and provide a soothing effect. Its application in physical rehabilitation is well established, and recent studies suggest its efficacy in minimizing discomfort during medical procedures⁴.

In addition to its physiological benefits, cryotherapy has been shown to influence patient psychology positively. The cooling effect can provide a sense of relief and comfort, which, in turn, reduces anxiety and fear associated with injections. By integrating such non-pharmacological interventions into clinical practice, healthcare providers can create a more holistic and patient-centered approach to care, particularly for those who may experience repeated injections or have heightened sensitivity to medical procedures⁵.

In this study, the term "experience" encompasses the subjective perception of feelings, discomfort, and pain reported by patients during intramuscular injection. By assessing the effectiveness of cryotherapy in improving this experience, the research aims to contribute to a more patient-centered approach to care in routine clinical practice.

2. SUBJECTS AND METHODS

In this study quasi-experimental type of study design was used i.e. post- test only design to study the effectiveness of cryotherapy on experience of intramuscular injection among patient in selected hospital. The study was carried out in OPD at selected hospital of city. Patient who was receiving vit B12 intramuscular injection on OPD basis were taken as a sample for study. Non-probability (purposive sampling technique) was used to select sample. and total sample size was 72. Control group sample size-36 and Experimental group sample size-36. A likert scale was used to assess the effectiveness of cryotherapy on experience of intramuscular injection. The data was analysed with descriptive and inferential statistics.

3. RESULTS AND DISCUSSION

The result of study finding are:

Finding related sociodemographic data:

- Age: Majority were between 31 to 40 years. About 24% of the experimental group and 22% of the control group were aged 20 to 30 years. Around 22% in both groups were 41 to 50 years old, while 22% in the experimental group and 24% in the control group were above 50 years.
- Gender: Males were slightly more in the control group (51%) than in the experimental group (46%), while females were higher in the experimental group (54%) than in the control group (49%).
- Occupation: Housemakers were more in the experimental group (35%) compared to the control group (17%). Private service employees (19%) and self-employed individuals (22%) were more in the control group.
- Co-Morbid Illness: Anemia was found in 24% of the experimental group and 30% of the control group. Hypertension was more frequent in the experimental group (24%) than in the control group (14%). A larger proportion of the control group (46%) had no illness compared to the experimental group (38%).
- Duration of Diagnosis: Most patients were diagnosed within one year, with 68% in the experimental group and 81% in the control group. A small percentage had a diagnosis for more than five years (5% in the experimental and 3% in the control group).
- BMI: More than half of the experimental group (57%) and nearly half of the control group (46%) had a healthy weight. Underweight cases were higher in the control group (16%). Obesity was observed in a small percentage of both groups (5% to 11%).

Assessment of experience of intramuscular injection score

- Day 1: All patients in the control group had a poor intramuscular injection score, while 5% of the experimental group had a good score, and 95% had an excellent score. The mean score was 34.56 in the experimental group and 12.45 in the control group.

- Day 2: The majority of the control group (97%) remained in the poor category, with 3% showing slight improvement. In the experimental group, 97% had an excellent score, and 3% had a good score. The mean score was 34.94 in the experimental group and 13.21 in the control group.
- Day 3: All patients in the experimental group achieved an excellent score, while 97% of the control group remained at a poor level. The mean score was 35.51 in the experimental group and 13.13 in the control group.
- The results indicate a significant improvement in the intramuscular injection score among patients in the experimental group, while the control group showed minimal progress.
- A significant difference in intramuscular injection scores was observed between the experimental and control groups on all three days.

Comparison of effectiveness of cryotherapy:

- The mean score in the experimental group was consistently higher (Day 1: 34.56, Day 2: 34.94, Day 3: 35.51) compared to the control group (Day 1: 12.45, Day 2: 13.21, Day 3: 13.13).
- The calculated t-values for all three days were much higher than the tabulated value at a 5% level of significance, confirming statistical significance ($p = 0.0001$ for all days).
- These results indicate that cryotherapy was highly effective in improving the experience of intramuscular injections among patients.

Association of post-test intramuscular injection score with demographic variables:

- **Age:** There is a statistically significant association between age and post-test intramuscular injection scores ($p = 0.045$).
- **Gender:** No significant association was found between gender and post-test scores ($p = 0.65$).
- **Occupation:** No statistical association was observed between occupation and post-test scores ($p = 0.82$).
- **Co-morbid Illness:** No significant association was found between co-morbid illnesses and post-test scores ($p = 0.92$).
- **Duration of Diagnosis:** No statistical association was observed between the duration of diagnosis and post-test scores ($p = 0.88$).
- **BMI:** A statistically significant association was found between BMI and post-test scores ($p = 0.0001$), indicating that BMI influences the effectiveness of cryotherapy.

Reliability Analysis

Pearson's correlation coefficient: **0.918**

Reliability score: **0.9572**

The tool is considered **highly reliable and valid** based on the parallel form method.

SECTION A: Percentage wise distribution of Patients according to their demographic characteristics.

This section deals with percentage wise distribution of patients with regards to their demographic characteristics. A convenient sample of 74 subjects was drawn from the study population, who were from selected hospital. The data obtained to describe the sample characteristics including age, gender, occupation, comorbid illness, duration of diagnosis, and BMI respectively.

Table : Percentage wise distribution of Patients according to their demographic characteristics.

n=74

Demographic Variables	Experimental Group(n=37)	Control Group(n=37)
Age(yrs)		
20-30 yrs	9(24.3%)	8(21.6%)
31-40 yrs	12(32.4%)	12(32.4%)
41-50 yrs	8(21.6%)	8(21.6%)
≥51 yrs	8(21.6%)	9(24.3%)
Gender		
Male	17(45.9%)	19(51.4%)
Female	20(54.1%)	18(48.6%)
Occupation		
Daily Wage Worker	6(16.2%)	5(13.5%)
Housemaker	13(35.1%)	6(16.5%)
Govt Service	5(13.5%)	5(13.5%)
Private Service	5(13.5%)	7(18.9%)
Self Employed	6(16.2%)	8(21.6%)
Other	2(5.4%)	6(16.2%)
Comorbid Illness		
Anemia	9(24.3%)	11(29.7%)
Diabetes Mellitus	4(10.8%)	4(10.9%)
Hypertension	9(24.3%)	5(13.5%)
Other	1(2.7%)	0(0%)
None of the above	14(37.8%)	17(45.9%)
Duration of diagnosis		
1 years	25(67.6%)	30(81.1%)
>2-2 yrs	5(13.5%)	2(5.4%)

>3-4 yrs	5(13.5%)	4(10.7%)
≥5 yrs	2(5.4%)	1(2.7%)
BMI(kg/m²)		
Underweight	2(5.4%)	6(16.2%)
Healthy Weight	21(56.8%)	17(45.9%)
Overweight	12(32.4%)	10(27%)
Obesity	2(5.4%)	4(10.7%)

SECTION B: ASSESSMENT OF LEVEL OF INTRAMUSCULAR INJECTION SCORE AMONG PATIENTS IN SELECTED HOSPITAL OF THE CITY

This section deals with the assessment of level of Intramuscular Injection Score among patients in selected hospital of the city. The level of intramuscular injection score is divided under following heading of poor, average, good and excellent.

Table 2: Assessment with level of Day 1 Intramuscular Injection Score

n=74

Level of intramuscular injection	Score Range	Level of Day 1 Intramuscular Injection Score	
		Experimental Group(n=37)	Control Group(n=37)
Poor	<19	0(0%)	37(100%)
Average	19-24	0(0%)	0(0%)
Good	25-30	2(5.41%)	0(0%)
Excellent	31-36	35(94.59%)	0(0%)
Minimum score		30	9
Maximum score		36	18
Mean intramuscular injection Score		34.56±1.77	12.45±3.21
Mean % Intramuscular Injection Score		96.02±4.92	34.60±8.94

The above table shows that all(100%) of patients in control group had poor level of intramuscular injection score, 5.41% in experimental group had good and 94.59% of patients in experimental group had excellent level of intramuscular injection score.

Minimum intramuscular injection score in experimental group was 30 and in control group it was 9 and maximum intramuscular injection score in experimental group was 36 and in control group it was 18. Mean intramuscular injection score in experimental group was 34.56 ± 1.77 and in control group it was 12.45 ± 3.21 and mean percentage of intramuscular injection score in experimental group was 96.02 ± 4.92 and in control group it was 34.60 ± 8.94 .

Table 3: Assessment with level of Day 2 Intramuscular Injection Score

n=74

Level of intramuscular injection	Score Range	Level of Day 1 Intramuscular Injection Score	
		Experimental Group(n=37)	Control Group(n=37)
Poor	<19	0(0%)	36(97.30%)
Average	19-24	0(0%)	1(2.70%)
Good	25-30	1(2.70%)	0(0%)
Excellent	31-36	36(97.30%)	0(0%)
Minimum score		29	9
Maximum score		36	20
Mean intramuscular injection Score		34.94 ± 1.63	13.21 ± 3.37
Mean % Intramuscular Injection Score		97.07 ± 4.53	36.71 ± 9.37

The above table shows that 97.30% of patients in control group had poor level of intramuscular injection score, 2.70% in experimental group had good and 97.30% of patients in experimental group had excellent level of intramuscular injection score.

Minimum intramuscular injection score in experimental group was 29 and in control group it was 9 and maximum intramuscular injection score in experimental group was 36 and in control group it was 20. Mean intramuscular injection score in experimental group was 34.94 ± 1.63 and in control group it was 13.21 ± 3.37 and mean percentage of intramuscular injection score in experimental group was 97.07 ± 4.53 and in control group it was 36.71 ± 9.37 .

Table 3: Assessment with level of Day 3 Intramuscular Injection Score

n=74

	Score Range	Level of Day 1 Intramuscular Injection Score

Level of intramuscular injection		Experimental Group(n=37)	Control Group(n=37)
Poor	<19	0(0%)	36(97.30%)
Average	19-24	0(0%)	1(2.70%)
Good	25-30	0(0%)	0(0%)
Excellent	31-36	37(100%)	0(0%)
Minimum score		32	9
Maximum score		36	20
Mean intramuscular injection Score		35.51±0.93	13.13±3.37
Mean % Intramuscular Injection Score		98.64±2.58	36.48±9.37

The above table shows that all (100%) of patients in control group had poor level of intramuscular injection score, 2.70% in experimental group had good and all (100%) of patients in experimental group had excellent level of intramuscular injection score.

Minimum intramuscular injection score in experimental group was 32 and in control group it was 9 and maximum intramuscular injection score in experimental group was 36 and in control group it was 20. Mean intramuscular injection score in experimental group was 35.51±0.93 and in control group it was 13.13±3.37 and mean percentage of intramuscular injection score in experimental group was 98.64±2.58 and in control group it was 36.48±9.37.

SECTION C: COMPARISON OF EFFECTIVENESS OF CRYOTHERAPY ON EXPERIENCE OF INTRAMUSCULAR INJECTION AMONG PATIENTS IN SELECTED HOSPITAL

This section deals with the comparison of effectiveness of Cryotherapy on experience of intramuscular injection among patients in selected hospital. The hypothesis is tested statistically with comparison of post test(day2 and day 3) intramuscular injection among patients in selected hospital in experimental and control group. Significance of difference at 5% level of significance is tested with student’s unpaired ‘t’ test and tabulated ‘t’ value is compared with calculated ‘t’ value. Also the calculated ‘p’ values are compared with acceptable ‘p’ value i.e. 0.05.

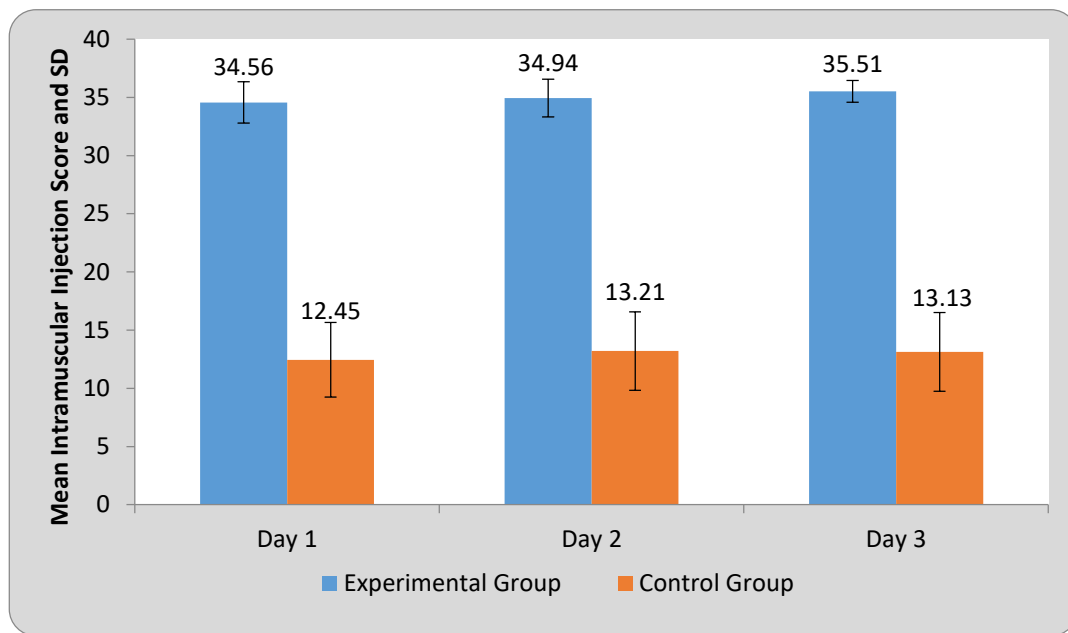
Table 4 : Comparison of difference intramuscular injection score at day 1, day 2 and day 3 among patients of selected hospital in two groups

n=37

Day	Experimental Group	Control Group	Mean Difference	t-value	p-value
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Day 1	34.56±1.77	12.45±3.21	22.10±0.60	36.56	0.0001,S
Day 2	34.94±1.63	13.21±3.37	21.72±0.61	35.25	0.0001,S
Day 3	35.51±0.93	13.13±3.37	22.37±0.57	38.86	0.0001,S

Graph 10: Comparison of difference intramuscular injection score at day 1, day 2 and day 3 among patients of selected hospital in two groups



SECTION D: ASSOCIATION OF LEVEL OF POST TEST INTRAMUSCULAR INJECTION SCORE AMONG PATIENTS FROM SELECTED HOSPITAL IN RELATION TO THEIR DEMOGRAPHIC VARIABLES

Experimental Group:

Table 5: Association of posttest Intramuscular Injection score among patients in relation to their age in years

n=37

Age in years	No. of patients	Mean posttest intramuscular injection score	F-value	p-value
20-30 yrs	9(24.3%)	35.11±1.36	2.99	0.045 S,p<0.05
31-40 yrs	12(32.4%)	35.16±0.93		
41-50 yrs	8(21.6%)	36±0		

≥51 yrs	8(21.6%)	36±0		
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This table shows the association of intramuscular injection score with age in years of patients from selected hospital. The tabulated ‘F’ values was 2.84(df=3,33) which is less than the calculated ‘F’ i.e. 2.99 at 5% level of significance. Also the calculated ‘p’=0.045 which was less than the acceptable level of significance i.e. ‘p’=0.05. Hence it is interpreted that age in years of patients is statistically associated with their post test intramuscular injection score.

Table 6: Association of post test Intramuscular Injection score among patients in relation to their gender

n=37

Gender	No. of patients	Mean posttest intramuscular injection score	t-value	p-value
Male	17(45.9%)	35.58±0.87	0.44	0.65
Female	20(54.1%)	35.45±0.99		NS,p>0.05

This table shows the association of intramuscular injection score with gender of patients from selected hospital. The tabulated ‘t’ values was 2.02(df=35) which is higher than the calculated ‘t’ i.e. 0.44 at 5% level of significance. Also the calculated ‘p’=0.65 which was higher than the acceptable level of significance i.e. ‘p’=0.05. Hence it is interpreted that gender of patients is statistically not associated with their post test intramuscular injection score.

Table 7: Association of post test Intramuscular Injection score among patients in relation to their Occupation. n=37

Occupation	No. of patients	Mean posttest intramuscular injection score	F-value	p-value
Daily Wage Worker	6(16.2%)	35.66±0.81	0.42	0.82 NS,p>0.05
Housemaker	13(35.1%)	35.38±1.19		
Govt Service	5(13.5%)	35.40±1.34		
Private Service	5(13.5%)	35.20±0.44		
Self Employed	6(16.2%)	35.83±0.40		
Other	2(5.4%)	36±0		

This table shows the association of intramuscular injection score with occupation of patients from selected hospital. The tabulated 'F' values was 2.45(df=5,31) which is higher than the calculated 'F' i.e. 0.42 at 5% level of significance. Also the calculated 'p'=0.82 which was higher than the acceptable level of significance i.e. 'p'=0.05. Hence it is interpreted that occupation of patients is statistically not associated with their post test intramuscular injection score.

Table 8: Association of post test Intramuscular Injection score among patients in relation to Co-morbid Illness

n=37

Co-morbid Illness	No. of patients	Mean posttest intramuscular injection score	F-value	p-value
Anemia	9(24.3%)	35.33±1.32	0.22	0.92 NS,p>0.05
Diabetes Mellitus	4(10.8%)	35.75±0.50		
Hypertension	9(24.3%)	35.44±0.88		
Other	1(2.7%)	36±0		
None of the above	14(37.8%)	35.57±0.85		

This table shows the association of intramuscular injection score with Co-morbid illness of patients from selected hospital. The tabulated 'F' values was 4.32(df=4,32) which is higher than the calculated 'F' i.e. 0.22 at 5% level of significance. Also the calculated 'p'=0.92 which was higher than the acceptable level of significance i.e. 'p'=0.05. Hence it is interpreted that Co-morbid illness of patients is statistically not associated with their post test intramuscular injection score.

Table 9: Association of post test Intramuscular Injection score among patients in relation to Duration of diagnosis

n=37

Duration of diagnosis	No. of patients	Mean posttest intramuscular injection score	F-value	p-value
1 years	25(67.6%)	35.48±1	0.21	0.88 NS,p>0.05
>2-2 yrs	5(13.5%)	35.40±0.89		
>3-4 yrs	5(13.5%)	35.60±0.89		

≥5 yrs	2(5.4%)	36±0		
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This table shows the association of intramuscular injection score with duration of diagnosis(yrs) of patients from selected hospital. The tabulated ‘F’ values was 2.84(df=3,33) which is higher than the calculated ‘F’ i.e. 0.21 at 5% level of significance. Also the calculated ‘p’=0.88 which was higher than the acceptable level of significance i.e. ‘p’=0.05. Hence it is interpreted that duration of diagnosis(years) of patients is statistically not associated with their post test intramuscular injection score.

Table 10: Association of post test Intramuscular Injection score among patients in relation to their BMI(kg/m2)

n=37

BMI(kg/m2)	No. of patients	Mean posttest intramuscular injection score	F-value	p-value
Underweight	2(5.4%)	33±1.41	11.69	0.0001 S,p<0.05
Healthy Weight	21(56.8%)	35.42±0.81		
Overweight	12(32.4%)	36±0		
Obesity	2(5.4%)	36±0		

This table shows the association of intramuscular injection score with BMI(kg/m2) of patients from selected hospital. The tabulated ‘F’ values was 2.84(df=3,33) which is less than the calculated ‘F’ i.e. 11.69 at 5% level of significance. Also the calculated ‘p’=0.0001 which was less than the acceptable level of significance i.e. ‘p’=0.05. Hence it is interpreted that BMI(kg/m2) of patients is statistically associated with their post test intramuscular injection score.

CONCLUSION:

The findings of this study firmly establish that cryotherapy is an exceptionally effective non-pharmacological method for improving experience during intramuscular injections. The statistical analysis unequivocally shows a significant reduction in pain and discomfort among patients who received cryotherapy prior to their injection, in stark contrast to those who did not. Moreover, it is clear that demographic factors such as age and body mass index (BMI) have a substantial impact on pain perception. In contrast, factors such as gender, occupation, co-morbid illnesses, and the duration of diagnosis do not significantly influence pain levels.

The study findings support the use of cryotherapy as an effective, safe, and non-invasive method for reducing discomfort during intramuscular injections. Given its simplicity and affordability, integrating cryotherapy into clinical practice can enhance patient comfort and improve overall healthcare experiences.

Future research can expand on these findings to explore broader applications of cryotherapy in pain management.

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