

A study to assess the severity of pain experienced by patients undergoing intramuscular injection in a tertiary care hospital in Jammu and Kashmir

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Abstract

Problem: The study was conducted to assess the severity of pain experienced by adult male subjects during intramuscular injection in a tertiary care hospital in Jammu and Kashmir. The objectives of the study were to assess the pain level perceived by the subjects and to examine the relationship between selected demographic variables and pain perception.

Materials and Methods: The approach used for the study was quantitative exploratory design. Thirty healthy male subjects receiving the first dose of prophylactic rabies injection were selected from in-patient wards and out-patient injection room through purposive sampling. The tools were a semi-structured questionnaire regarding demographic data and numerical pain scale to assess the pain level of the subjects during intramuscular injection, recorded immediately after the completion of the injection. The demographic profile selected was age, educational qualification, and economic status. The data was collected over a period of two months from the injection room and the wards from those patients who reported for rabies vaccination as part of post exposure prophylaxis.

Major findings: On analysis of the data, it was seen that all the subjects experienced moderate pain during the injection as per the standard technique without any of the non-pharmacological interventions. The average pain score and SD of the group were found to be 4.13 ± 0.21 . Selected demographic parameters were examined to identify relationship with pain scores. Age of the participants was found to have statistically significant association with severity of pain levels. The younger age group subjects were found to experience more pain (mean value 4.17 ± 0.14) as compared to the elder age group patients (mean value 4.04 ± 0.16) with a Z value of 1.99 and p-value of < 0.05 . No relationship could be established between pain perception and educational level or economic status.

Conclusion: The study found that all the subjects experienced moderate pain during intramuscular injection using the standard technique, and hence it is advisable to institute non-pharmacological measures for reducing procedural pain during needle procedures, so that patient experience less pain and will be more compliant to health care services.

Keywords: Intramuscular injection, procedural pain, needle procedures, rabies vaccination.

1. Introduction

Getting injections and experiencing pain is part of life, as all of us have received at least one injection in our life time. Injections are administered in various settings like hospitals, clinics, assisted living facilities, schools, camps, hospices, and in-home care services. Intramuscular injections are the commonest route for vaccination, and are also used for antibiotics, analgesics and other drugs, as the medicines administered through the intra-muscular route are absorbed quickly because of the good blood supply of the muscles and uniform distribution of medicine into the systemic circulation surpassing the effects of first pass metabolism.

Administration of medicines is a key element in nursing, and a complex psychomotor task that requires skill and knowledge of the nurse. Being prescribed by the doctor and dispensed by the pharmacist, the responsibility of correct administration of the medication rests with the registered nurse, and its unsafe administration leads to serious adverse effects for the patient^[1, 2]. While giving medications, the nurse should ensure that the right patient gets the right dose

of the medicine at the right time through the right route, and monitor its therapeutic response, identify and manage its side effects, and imparts education regarding the medicine. She should assess the patient before giving medicine, respect his rights to refuse the medicine, educate him about the drug, and document the procedure timely with relevant observations. The nurse is responsible and accountable for checking the correctness of the medication she administers. Successful and relative pain free administration of intramuscular injection depends on many factors like selection of site for injection, the route of administration, type of drug, intervening medical conditions of the patient, size of the muscle, degree of relaxation of the muscle, length of the needle, speed of the injection, age of the patient, pharmacological and non-pharmacological measures instituted with the procedure, understanding and cooperation of the patient etc.^[3-5]. The most widespread use of intramuscular injections is because of the fact that a variety of medications can be delivered safely by this route including sedatives, hormones, analgesics, antiemetics, vaccines, long-acting antipsychotics, tumour immune-

therapy, immune suppressants, vitamins, antibiotics, and many curative agents.

The World Health Organisation issued a number of evidence based recommendations to reduce number of injections and to support implementation of safe injection practices. The current WHO estimates reveal that approximately 16 billion injections are administered globally every year; of which 90% are intramuscular, intradermal, or subcutaneous injections for various therapeutic purposes, and recommends that many of these are either unnecessary or could be replaced by oral medication^[6].

India contributes to 25-30% of this global injection load. A WHO sponsored study conducted by Arora found that 3-6 billion injections are administered annually in India and that, one in every 3rd patient visiting an outpatient facility is prescribed with an injection^[7].

Any procedure which causes actual or potential tissue damage causes pain. As pain is a subjective experience with many dimensions, each person experiences and expresses pain uniquely and differently. Ironically, injections are identified to be the most frequently used painful medical procedure in any health care setting^[8].

Simini conducted a study on 46 subjects to compare the severity of pain among spinal, intramuscular and intravenous injections. During the pre-test, only about 4% subjects thought that the intramuscular and intravenous injections would hurt more than the spinal injections. After the three puncture procedures, almost 50% of the participants rated intramuscular injections to be the most painful^[9]. Another study conducted among medical and nursing staff to determine their evaluation of pain and distress experienced by children during common procedures in the emergency department identified intramuscular injection as one among the most painful procedures among children^[8].

Keen identified that, as most of the analgesics are given intramuscularly, patients with various types of pain reject them because of the expected procedural pain^[10]. Studies found that about 10% of people avoid vaccination and needle procedures because of needle phobia, about 25% of adults and 75% of children have needle fear^[11], and even 27% of health care workers avoided preventive vaccination because of needle fear^[12].

There are many patient specific factors that affect the adequacy of procedural pain management. Among them, the American Academy of Pediatrics and the American Pain Society lists the patient's age, diagnosis, gender, race, ethnicity, cognitive level, literacy level, mental condition, history of chemical dependency, socioeconomic background, and his ability to communicate as the common factors. They also highlight the importance of acknowledgement of pain by the health care professionals in order to identify pain and to ensure adequate pain management^[13]. The World Health Organisation also urges for safe injection practices; and professional training among nurses for better procedural pain management^[6].

1.2 Review of Literature

Many studies have been conducted to analyse severity of pain experienced by the patients during intramuscular injection and also to examine the effect of non-pharmacological methods in providing relief from pain. The

studies have found contrasting evidences on the effects of these interventions in pain relief. Taddio *et al.* conducted a meta-analysis of six studies representing 853 adult patients to examine the effect of local anaesthetic cream, skin cooling measures, manual pressure application, jet injectors, frozen injection needle, and warm vaccine to reduce pain during intramuscular injection. The studies found beneficial effects of some non-pharmacological interventions on pain relief, but recommended further investigations as the data were insufficient and contradictory^[14].

Magfret found locally applied EMLA cream to be ineffective in reducing pain after intramuscular injection^[15]. Basaranoglu found valsalva procedure^[16], Jancy found beneficial effect of cold needle^[17], Romano found multiple pin pricks^[18], Alavi found acupressure^[19], Farhadi found cryotherapy^[20], and Barnhill found simple manual pressure^[21] to be effective in reducing needle puncture pain. Sukanandan *et al.* Also conducted similar studies on 102 samples and found that blunt pressure was effective in reducing intramuscular injection pain. The study also found that young age and unemployment were significantly associated with pain perception. Young adults experienced more pain (mean 4.12±1.12) than older adults (mean 3.50±1.31), and unemployed people also experienced more pain (mean 4.15±1.26) than employed people (mean 2.58±1.31). The study could not find any association between pain perception and variables like level of education, previous history of injections, body mass index, type of drug used, and site of injection^[22].

Studies conducted by Ozdemir found that faster rate of injection are associated with longer duration of pain and recommended slower injection speeds to reduce pain perception of intramuscular injection. However, both faster and slower speed conditions were noticed to result in acute severe pain^[23]. Another study conducted to identify the difference in pain perception of intramuscular injections given in dorsolateral and ventrogluteal sites found statistically significant association of pain with the site of injection and suggested the use of ventrogluteal site for intramuscular injection^[24]. Nasiry found that manual thumb pressure reduced puncture pain, but noticed no effect of age and gender on pain perception^[25]. Kubsch found significant reduction in pain, improvement in heart rate and blood pressure with application of cryotherapy, but found no significance of age, gender and educational levels on the severity of pain perception after intramuscular injection (Kubsch, 2001)^[26].

2. Materials and Methods

The approach for this study was quantitative exploratory design, conducted at a tertiary care centre in Jammu & Kashmir. The reference population was all the serving personnel of the defense forces, and the accessible population was those patients who either attended the injection room or were admitted to the wards for intramuscular injection of rabies vaccine as prophylaxis of dog bite. Thirty male subjects were selected through non-probability purposive sampling. Patients with category III dog bite, bleeding disorders and skin disorders at the deltoid injection site were excluded. A semi-structured questionnaire was used for collecting demographic data and the numerical rating scale was used for evaluating pain perception. An informed written consent was obtained, the

procedure was explained and the pain scale was described. After completing demographic data, the injection was given in the deltoid muscle using the standard technique. The subject indicated his level of pain on the numeric rating scale immediately after the injection, and was monitored for 30 minutes post procedure. The collected data was analysed by descriptive and inferential statistics, and represented by frequency, percentages and tests of significance.

3. Results

The data and findings are presented in two headings assessment of severity of pain level and association of pain score with selected demographic variables.

1. Severity of pain level among subjects

The pain score obtained using the numeric rating scale (NRS) immediately after the injection were classified as no pain, mild pain, moderate pain, severe pain and worst pain. The frequency and percentage distribution of pain level of the subjects are given in table 1 as follows:

Table 1: Assessment of pain level among patients in study group

Pain score	No of cases	Percentage
0 (No pain)	0	0
1-3 (Mild pain)	0	0
4-6 (Moderate pain)	30	100
7-9 (Severe pain)	0	0
10 (Worst pain)	0	0
Total	30	100

From Table 1, it can be seen that all subjects (100%) reported moderate pain with a mean pain score calculated to be 4.13 and SD of 0.21. None of the subjects reported either mild pain or severe pain.

2. Association of pain score with demographic variables

All the subjects were medically fit adult males with no comorbidities. Other variables analysed were age, education level and average monthly income.

Table 2: Comparison of pain score with selected demographic variables in study group, N=30

Parameter	N (%)	Pain score		Test Statistic	P-Value
		Mean	SD		
Age (years)					
21-40 (young adult)	20(66%)	4.17	0.14	MW test Z value=1.99	*0.047
41-60 (middle age adult)	10(34%)	4.04	0.16		
Education level					
Below graduate	23(77%)	4.12	0.15	MW test Z value=0.05	0.96
Graduate	7(23%)	4.14	0.19		
Monthly income (Rs)					
≤60000	9(30%)	4.17	0.21	Fischer's test F value=0.97	0.39
60001-80000	12(40%)	4.15	0.12		
80001 & above	9(30%)	4.07	0.15		

* Statistically significant at DF (2,27) = 3.35

Table 2 explains the relationship between pain score and selected demographic data of the subjects. About 66.6% (N=20) subjects were young adults and 33.3% (N=10) were middle age adults. The mean pain score of the young adult age group was 4.17±0.14 and the mean pain score of middle age group was 4.04±0.16. Further analysis with Mann Whitney U test showed a z-value of 1.99 and p-value of

0.04 which is statistically significant and was established that young age adults showed a positive correlation with pain score at 0.05 level of significance and 95% confidence interval.

The subjects were divided into two groups as graduates and below graduates. All the subjects had basic education at least up to 12th standard. From the table, it can be seen that out of 30 subjects, 76.66% subjects (N=23) had basic education, and 23.34% subjects (N=7) had graduation. On analysis, the mean and SD of pain score of below graduates were 4.12± 0.15 and the mean and SD of graduates were 4.14± 0.19. The Mann Whitney U test score was 0.05 with p-value of 0.96 showing no relationship of educational qualification with pain levels.

All the subjects belonged to upper middle class as their cumulative score as per the modified Kuppuswamy scale was found to be 16-25. For the ease of comparison, this was further divided into three sections. From the table, it can be inferred that, 40% subjects (N=12) had monthly income between Rs. 60,001 to Rs. 80,000, 30% subjects (N=9) has income of more than Rs. 80,001, and again, 30% subjects (N=9) had income less than 60,000per month. It is also clear that the mean and SD of the first group was 4.17±0.21, the second group was 4.15±0.12, and the third group was 4.07± 0.15. The Fisher's exact test F value for analysis of variance was found to be 0.97 and the p-value was 0.39 showing no relationship of pain level with economic status.

4. Discussion

This study found that all the patients experienced moderate pain during intramuscular injections given under the standard technique, and among the selected demographic variables of age, educational qualification, and family income, only age was found to be positively associated with severity of pain perception.

This study found significant association of age of participants with pain level, which contradicts the findings obtained by Barnhill in which he found no correlation between pain intensity and selected demographic variables including age. This study found that all the subjects experienced moderate pain (Mean Value 4.13±0.21) while Barnhill recorded mild pain (Mean 2.13±1.93) among subjects under standard technique of intramuscular injection.

The findings of this study validate the findings of Sukanandan's study which found significant relationship between pain experience and young age group. His study showed that young adults experienced more pain (score 4.12±1.12) compared to elders (score 3.12±1.29), and this study also found that young adults perceived more pain (Score 4.17±0.14) than elders (score 4.04±0.16).

Except for the parameter of age, the findings of this study is also in line with studies conducted by Kubsch where she found no significant effect of age, gender and educational levels on the severity of pain perception. This study validates the findings of Nasiry in which she found moderate pain (mean 5.47±1.18), and no relationship of age and gender with pain perception of the subjects. But this study found positive correlation of age with pain levels, where young age adults experienced slightly more pain than middle aged adults.

The findings of this study also goes well with the results of

Jancy's study (mean 5.3), Alavi's study (mean 5.0) and Romano's study (mean 5.16), where the researchers found moderate pain and this study also found moderate pain (mean 4.13±0.4) perceived by the subjects after the injection.

This study recorded moderate pain, which is not in congruity to Maryem's study (mean 2.78±1.61), and Basaroglu's study (mean 3.1±2.2) where the researchers recorded mild pain. This study also contradicted findings by Frontan (mean score 8.67±1.06), Farhadi (mean 7.39+/-1.55), and Zahra (mean 7.3±1.08) where the researchers noticed severe pain.

5. Conclusion

The study was conducted among 30 healthy male subjects to analyse the pain level experienced after intramuscular injection using the standard technique. The demographic data was obtained with a semi-structured questionnaire and pain severity was rated by numerical pain scale. The association between the variables was examined by Mann Whitney U test and Fischer's exact test. The results showed that all subjects had perceived moderate pain with a mean score of 4.13±0.21, and young aged adults experienced more pain than the middle aged adults (mean 4.17±0.14 and 4.04±0.16 respectively). Other selected demographic variables like educational level and family income had no effect on perception of pain severity.

6. Implications and Recommendations

The study revealed that even healthy adult males experience moderate pain during intramuscular injections. Studies have found that subjects perceive moderate to severe pain during standard intramuscular injection technique and reports very mild pain after instituting non-pharmacological measures. These interventions are independent nursing actions which can be easily instituted. Many studies have recommended the use of these interventions to reduce procedural pain, and this study has emphasized the need to do so.

The further recommendations of this small study are that, it may be replicated on a larger scale, with each non-pharmacological intervention as the control group, relating with extensive demographic & physiologic variables, and in a well-controlled setting.

The implications are that, as these findings are evidence based, they may be made as a standard operating procedure to be followed in hospitals, and taught in the curriculum for the nursing students and the young nursing trainees. Also, the nurse administrators should encourage more such evidence based action research in their own hospitals among the young enthusiastic and experienced nursing staff.

Conflict of Interest: Not available

Financial Support: Not available

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