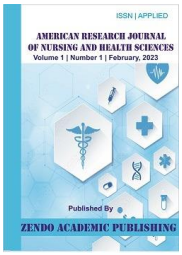

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EFFICACY OF EUTECTIC MIXTURE OF LOCAL ANESTHETICS VS LIDOCAINE SPRAY ON PAIN DURING ARTERIOVENOUS FISTULA CANNULATION IN HEMODIALYSIS PATIENTS

Shelly Masih, Kapil Sharma and Sunita Rani
(Nurse Practitioner in Critical Care), DMC, CON, Ludhiana, Punjab, India

Abstract: Arteriovenous fistula cannulation is a painful procedure in Hemodialysis patients. The study aimed to compare the efficacy of eutectic mixture of local anesthetics and Lidocaine spray on pain during arteriovenous fistula (AVF) cannulation in 30 patients visiting the dialysis unit of DMC & Hospital, Ludhiana, Punjab. Pain was assessed using a Numerical Pain Rating scale. Descriptive and inferential statistics were used to analyze the data. The study found that the eutectic mixture of local anesthetics was more effective than Lidocaine spray in reducing pain during AVF cannulation. The results can help improve the dialysis acceptance and life quality of Hemodialysis patients.

Keywords: Eutectic Mixture of Local Anesthetics, Lidocaine spray, Pain, Arteriovenous Fistula Cannulation, Hemodialysis patients

Introduction

Kidneys are essential organs of the human body, responsible for flushing out harmful and toxic waste products and maintaining a balance of water, fluids, minerals, and electrolytes. Chronic kidney disease (CKD) is a gradual loss of kidney function over a period of many years, leading to various complications and ultimately, end-stage renal disease (ESRD). CKD is classified into five stages based on severity, with stage 5 being a severe illness with poor life expectancy if untreated. ESRD is a major problem for public health and causes complex implications for social and economic structures of every nation worldwide.

Approximately 220,000 patients are diagnosed with ESRD every year, requiring an additional demand for 34 million dialysis sessions in India alone. It is estimated that over 1.1 million patients with ESRD currently require maintenance dialysis, and the number is increasing at a rate of 7% per year. Hemodialysis is the most common treatment for ESRD, which involves removing blood from the body, filtering it through a machine, and then returning it to the body. The arteriovenous fistula (AVF) is considered the gold standard for vascular access in hemodialysis patients.

AVF cannulation is one of the painful procedures in hemodialysis patients, affecting their dialysis acceptance and life quality. Pain may induce disability, fear, and anxiety in most patients, making it one of the most common reasons for seeking healthcare and treatment. Therefore, reducing this pain improves their dialysis acceptance and life quality. Among the complaints expressed by 50% of these patients is some sort of pain experience.

The aim of this study is to assess the efficacy of eutectic mixture of local anesthetics vs. Lidocaine spray on pain during AVF cannulation among patients visiting dialysis units. A quantitative approach and

quasi-experimental (post-test only) research design will be used for the study. The purposive sampling technique will be used to draw the sample from the target population. The study will be conducted on 30 patients in the dialysis unit of DMC & Hospital, Ludhiana, Punjab. The pain assessment sheet, as per the Numerical Pain Rating scale, will be used for data collection. The data will be analyzed using descriptive and inferential statistics. The conclusion and discussion will be made according to the findings of the study and comparing the results of the present study with the previous literature.

Patients with chronic renal failure need treatments such as kidney transplantation, hemodialysis, or peritoneal dialysis. However, the most common treatment for the disease is hemodialysis, which is the most frequently used renal replacement therapy. Vascular access remains as the lifeline for patients with ESRD who need chronic intermittent hemodialysis (HD) therapy. The ideal HD access should have long length of a suitable superficial vein for cannulation in two places more than 5 cm apart with sufficient blood flow for effective dialysis, usually in excess of 400 ml/min. A vascular access should have good primary patency, have a low risk of complications and side effects, and leave opportunities for further procedures in the event of failure. Ideally, a first access should be an arteriovenous (AV) fistula placed peripherally at the wrist.
Hemodialysis through AVF necessitates one arterial and one venous puncture using two large-diameter needles. These punctures can be very painful, which can cause fear, anxiety, and even needle phobia among patients. These psychological problems, in turn, can affect the patient's quality of life and adherence to treatment. Therefore, reducing pain during AVF cannulation is essential for improving patients' acceptance of dialysis treatment and quality of life.

Pain is a complex sensation that is experienced differently by everyone. It is a subjective experience that can be influenced by various factors such as genetics, age, gender, and past experiences. There are various types of pain, and they can be classified into two broad categories: acute pain and chronic pain. Acute pain is a sharp and sudden pain that is usually a result of injury or illness and lasts for a short period of time. On the other hand, chronic pain is persistent pain that lasts for weeks, months, or even years and can have a significant impact on a person's quality of life. Examples of chronic pain include arthritis, neuropathic pain, and fibromyalgia. Understanding the different types of pain is crucial in developing effective treatment strategies and improving the quality of life for those who suffer from pain.

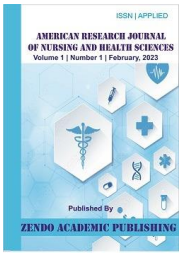
Material and Methods

With quantitative approach, quasi experimental (posttest only) design was used for this study conducted on 30 patients in dialysis unit of DMC & H, Ludhiana, Punjab. Purposive sampling technique was used to draw the sample from the target population based on inclusion and exclusion criteria. Pain assessment sheet as per Numerical Pain Rating Scale was used for data collection. Pain severity was assessed at AVF cannulation in one group with three methods: conventional method without pain management in control arm, application of EMLA cream in experimental arm I & use of Lidocaine Spray in experimental arm II. Each patient was observed for three times for each method, i.e, a total of 9 assessments for each patient, while the order of the methods was determined alternatively for each patient.

Inclusion criteria

Patients who were

- between the age group 18-65 years



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- willing to participate in the study
- visiting twice or thrice a week for hemodialysis
- capable to provide adequate response to pain intensity experienced

Ethical consideration

Following things were considered to ensure ethical consideration of study

- Written permission for conducting study was undertaken from Institutional ethical committee of DMC & Hospital, Ludhiana.
- Written permission was taken from the Principal, College of Nursing and from the HOD of Dialysis unit.
- The study was approved by Baba Farid University of Health Sciences, Faridkot.
- The patients /attendants were explained about the study and its objectives in their language and written consent was taken from them.
- Anonymity and confidentiality of subjects was maintained.
- It was ensured that intervention was cost effective and patient did not have to pay any charges.
- It was ensured that study did not affect the participants in any way.

Results

Majority of patients i.e. 17 (56.7%) were falling in age group 46-60 years. 16 (53.3%) were female & 25 (83.3%) were married. Most of the subjects 16(53.3%) living in urban areas & 14 (46.7%) were Hindu and Sikh. Only 10(33%) were educated upto primary and secondary level. As per dietary pattern were 16(53.3%) were non-vegetarian. As per occupational status, majority of the patients 24(80 %) were not working. As per socio-economic status (Kuppuswami's Socioeconomic Status Scale 2019) half of the patients i.e. 15 (50%) belonged to upper middle class (II) . As per clinical profile of the patients, majority of the patients diagnosed with CKD 21(70%). Majority of the subjects based on mode of admission were OPD 30(100%).

Majority of the patients were having the co morbidity disease and most of them were with diabetes mellitus and hypertension. 46.7% had dialysis vintage. The findings of the present study reveals that statistically significant results were found in pain intensity within the groups as well as between the groups of experimental arm I (EMLA) (p=0.001) and in experimental arm II (Lidocaine Spray) (p= 0.004) . However, nothing significant results were found in control arm i.e. (p=0.273.

Table 2 illustrates the comparison of pain intensity of patients on maintenance hemodialysis among control arm (no intervention), experimental arm I (EMLA) and experimental arm II (Lidocaine Spray) in O_1, O_2 & O_3 within the groups and between the groups. In control arm (no intervention) on O_1, O_2 , O_3 mean±SD was 4.90±1.322, 4.83±1.769, 4.13±1.059 respectively with mean% 49%, 48% & 41.3% of respective observations. In experimental arm I (EMLA) on O_1, O_2 , O_3 mean±SD was 2.13±1.105, 2.16±0.912, 0.76±0.067 respectively with mean% 21.3%, 21.6% & 7.6% of respective observations. In experimental arm II (Lidocaine Spray)) on O_1, O_2 , O_3 mean±SD was 4.83±1.205, 4.53±1.0743, 3.93±0.827 respectively with mean% 48.3%, 45.3% & 39.3% of respective observations. Hence, H_o null hypothesis is rejected as statistically significant results were found in pain intensity within the groups as well as between the groups of experimental arm I (EMLA) (p=0.001) and in experimental arm II (Lidocaine Spray) (p= 0.004) . However, nothing significant results were found in control arm i.e. (p=0.273).

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Table 1: Frequency and percentage distribution of post interventional pain during AVF cannulation in control arm, experimental arm I (EMLA), experimental arm II (Lidocaine Spray) according to pain intensity in O1, O2, O3.

Pain intensity	**Control arm**			**Experimental arm I (EMLA)**			**Experimental arm II (Lidocaine Spray)**		
	O1 (f %)	**O2 (f %)**	**O3 (f %)**	**O1 (f %)**	**O2 (f %)**	**O3 (f %)**	**O1 (f %)**	**O2 (f %)**	**O3 (f %)**
No pain	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	**11 (36.6)**	0 (0)	0 (0)	0 (0)
Mild pain	5 (16.6)	5 (16.6)	9 (30)	28 (93.3)	28 (93.3)	19 (63.3)	5 (16.6)	5 (16.6)	8 (26.6)
Moderate	23 (76.6)	23 (76.6)	20 (66.6)	2 (6.66)	2 (6.66)	0 (0)	24 (80)	24 (80)	22 (73.3)
Severe	2 (6.6)	2 (6.6)	1 (3.3)	0 (0)	0 (0)	0 (0)	1 (3.3)	1 (3.3)	0 (0)

Maximum score=10
Minimum score =0

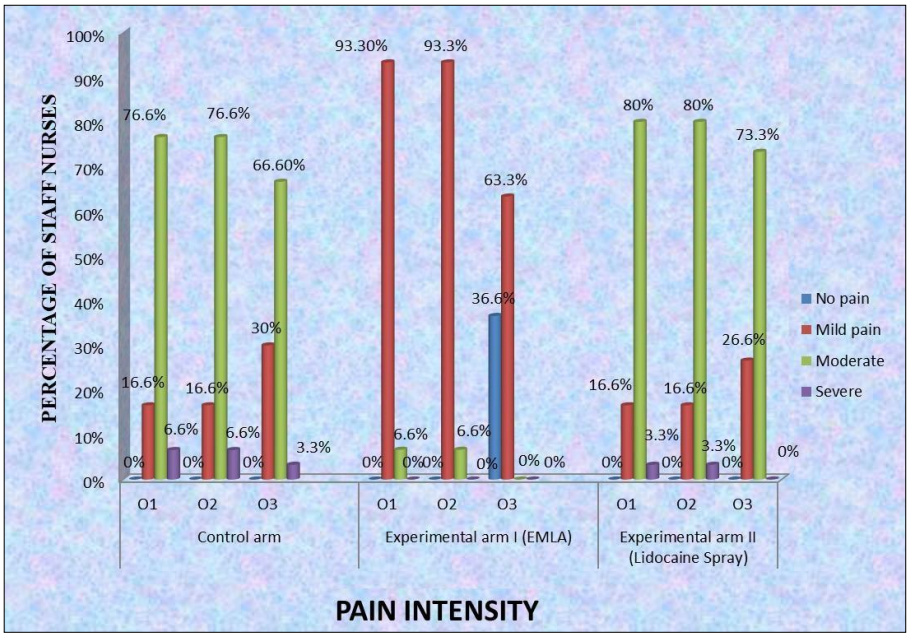

Fig 1: Percentage distribution of post interventional pain during AVF cannulation in control arm, experimental arm I (EMLA) , experimental arm II (Lidocaine Spray) according to pain intensity in O1 , O2 , O3.

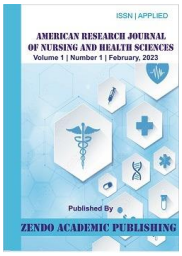

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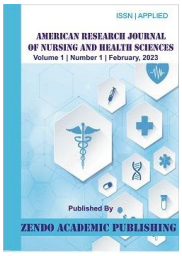
Table 2: Comparison of mean scores of post interventional pain during AVF cannulation in the same group of patients by using three methods i.e. control arm (no intervention), experimental arm I (EMLA), experimental arm II (Lidocaine Spray) among patients visiting dialysis unit in $O_{1,}$ O_2 & $O_{3..}$

Pain Intensity	**Control arm (No intervention)**		**Experimental Arm I (EMLA)**		**Experimental Arm II (Lidocaine Spray)**		**ANOVA f/p value between the groups**
	Mean ± SD	**Mean %**	**Mean± SD**	**Mean %**	**Mean ± SD**	**Mean%**	
O1	4.90 ± 1.322	49%	2.13 ± 1.105	21.3%	4.83 ± 1.205	48.3%	F=50.6709 df=89 p=0.001*
O2	4.83±1.769	48.3%	2.16±0.912	21.6%	4.53±1.074	45.3%	F=56.9424 df=89 p=0.001*
O3	4.13±1.059	41.3%	0.76±0.67	7.6%	3.93±0.827	39.3%	F=135.516 df=89 p=0.001*
ANOVA f/p value Within the group	F=3.7264 df=89 p=0.0273 NS		F=22.8160 df=89 p=0.001*		F=5.7393 df=89 p=0.004*		



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Discussion

The findings of the study had been discussed in accordance with the objectives of the study and previously reviewed studies. Review of literature enlighten that there are vast number of studies conducted on patients undergoing dialysis and various pain minimizing strategies used to reduce the pain experienced by the patients during arteriovenous fistula puncture. Evidence based practice is the integration of best research evidence with clinical expertise and patient values which when applied by practitioners will lead to improve outcome. It is an ongoing and continuous process. In nursing care services also, we continuously strive for improving standards of care. With the help of comparison by using two pain reducing measures, we will able to find the better one for reducing pain during AVF cannulation. By using pain relieving measures during AVF cannulation, there will be increased compliance in patients with arteriovenous fistula undergoing Hemodialysis. This chapter deals with the discussion for the findings of study titled "A study to assess the efficacy of eutectic mixture of local anesthetics cream vs Lidocaine spray on pain during Arteriovenous fistula (AVF) cannulation among patients visiting dialysis unit in a tertiary care hospital, Ludhiana, Punjab.' The research was conducted on one group by using the three methods: conventional method without pain management, Lidocaine Spray & EMLA analgesic cream.This study concluded that application of both EMLA and Lidocaine Spray were effective in pain reduction during AVF cannulation. The findings of the present study showed that the mean pain scores of the three method. In control arm (no intervention) on O1, O2 , O3 mean±SD was 4.90±1.322, 4.83±1.769, 4.13±1.059 respectively with mean% 49%, 48% & 41.3% of respective observations. In experimental arm I (EMLA) on O1, O2 , O3 mean±SD was 2.13±1.105, 2.16±0.912, 0.76±0.067 respectively with mean% 21.3%, 21.6% & 7.6% of respective observations. In experimental arm II (Lidocaine Spray) on O1, O2 , O3 mean±SD was 4.83±1.205, 4.53±1.0743, 3.93±0.827 respectively with mean% 48.3%, 45.3% & 39.3% of respective observations But, eutectic mixture of local anaesthetics cream showed better outcome compared to lidocaine spray in reducing the pain during AVF cannulation among patients visiting dialysis unit. The findings of the present study reveals that statistically significant results were found in pain intensity within the groups as well as between the groups of experimental arm I (EMLA) (p=0.001) and in experimental arm II (Lidocaine Spray) (p= 0.004). However, nothing significant results were found in control arm i.e. (p=0.273).

Conclusion

This study concluded that application of both EMLA and Lidocaine Spray were effective in pain reduction during AVF cannulation. But, eutectic mixture of local anaesthetics cream showed better outcome compared to lidocaine spray in reducing the pain during AVF cannulation among patients visiting dialysis unit

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