

**“A quasi-experimental study to assess the effectiveness of ice massage at hegu point on arteriovenous fistula puncture-related pain among hemodialysis patients in a selected hospital, Navi Mumbai.”**

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**ABSTRACT**

**Introduction**

In India, chronic kidney disease (CKD) is presently the third most prevalent non-communicable disease. Kidney function is reduced progressively and irreversibly as a result of CKD. The most popular treatment for chronic renal disease is hemodialysis (HD). An arteriovenous fistula (AVF) is the most typical vascular access point for those who need to undergo hemodialysis. However, HD patients always have severe concerns about the pain that is associated with AVF cannulation. The researcher aims to assess the effectiveness of ice massage at the Hegu point on AVF puncture-related pain among hemodialysis. The main objective of the study is to evaluate the AVF puncture-related pain scores in HD patients with and without Hegu point ice massage and to correlate the AVF puncture-related pain scores with selected biographical variables.

**Method:** The study was conducted as a Quasi-experimental study, the research approach is a posttest design. Non-probability purposive sampling technique was used. 40 respondents were selected. For the present study, the same 40 respondents are used both as experimental and control groups at two different points of time. At first, the respondents were selected as the control group during their first contact with the researcher, and later, when they came for the next cycle of dialysis they were selected

to be a part of the experimental group. In this study, interview techniques (demographic variables, clinical variables, opinionnaire on ice massage at the hegu point) and observational techniques (Numerical Pain scale) were used for data collection.

**Results** The study's findings of the AVF puncture-related pain show that in the control group, out of 100% (N=40) of the respondents, 92.5% (n=37) respondents had severe puncture-related pain, 7.5% (n=3) respondents had moderate AVF puncture-related pain, and none of them had mild AVF puncture-related pain, the mean score of the AVF puncture-related pain was  $7.4 \pm 0.6$ . After receiving an ice massage at the hegu point, the experimental group, data showed 85.0% (n=34) respondents had moderate AVF puncture-related pain, 15% (n=6) respondents had severe AVF puncture-related pain, the mean score of the AVF puncture-related pain was  $6 \pm 0.7$ . Chi-square tests with a 0.1% level  $P < 0.001$  are statistically significant for both the experimental and control groups. In both groups, there was no correlation between pain scores and demographic or clinical variables; except, a significant association was found between pain scores and gender among the control group respondents.

### **Conclusion**

This study evaluates the efficiency of ice massage at Hegu point on Arteriovenous fistula puncture-related pain in hemodialysis patients, and the study shows that ice massage at Hegu point is effective at lowering AVF puncture pain.

**Keywords:** Ice massage, Hegu point, hemodialysis, arteriovenous Fistula, pain management

## INTRODUCTION

In India, chronic kidney disease (CKD) is currently the third most prevalent non-communicable illness. CKD is a significant public health issue due to its high prevalence, morbidity, and death rates.<sup>1</sup> In India, it is a grave medical, social, and financial issue that affects patients and their families alike.<sup>1</sup> Kidney function is reduced progressively and irreversibly as a result of CKD. The most frequent treatment for CKD is hemodialysis (HD).

The most used form of renal replacement therapy is HD, with over 90.0% of patients receiving it.<sup>1</sup> All patients undergoing HD must have vascular access (Kumbar, 2012). An AVF is the most typical vascular access method for people receiving maintenance hemodialysis (Srivastava & Sharma, 2011). However, HD patients still have severe concerns about the pain that comes with AVF cannulation. Approximately 320 times each year, patients receiving HD endure anxiety and agony as a result of the insertion of HD needles. Until a successful kidney transplant, patients will continue to suffer from this agony for the rest of their lives. Regular AVF puncturing may have adverse effects like worry, fear, extreme pain, discomfort, distress, and tension (Azimian et al., 2015; Figueiredo et al., 2008). Both children and adult patients are gravely concerned about the pain that results from the insertion of a big cannula into the AVF during routine HD. Variable prevalence rates for AVF puncture-related

pain among patients receiving HD have been documented in the literature. For instance, this percentage was recorded as 57.5% by Celik et al. (2011) and 60.9% by Béfa Noto Kadou (2014).

The field of complementary and alternative medicine is expanding, and its applications are continually changing. Complications and the requirement for synthetic analgesics are minimized by the use of complementary therapies and natural alternatives. According to other studies (Sabitha et al., 2008;<sup>5</sup> Aghajanloo et al., 2016,<sup>10</sup> Celik et al., 2011) prilocaine cream, lidocaine spray, cryotherapy, and transcutaneous electrical nerve stimulation are a few of the effective methods used to reduce discomfort after needle insertion into a fistula.

Acupressure is an ancient Chinese practice in which fine pressure is given along the pain channels. It is probably one of the most expensive modalities in complementary and alternative medicine, showing benefits in pain management. According to research, cold inhibits nerve impulses and communication in the sensory fibres, effectively slowing the rate of nerve conduction.<sup>13</sup>

As advocates for people, nurses are dedicated to reducing the psychological and physical effects of unpleasant procedures. According to research, cutaneous stimulation is a stand-alone nursing intervention that is recommended for reducing pain in patients. Studies have shown that cryotherapy is just as effective

as cutaneous stimulation in relieving pain. The gate control theory best explains the effect of cutaneous stimulation.

Fariba Soltanpuor,<sup>12</sup> Fariba Nasiriziba (2011), and Kapil and Jaspreet (2020) have done studies to know the effect of ice massage on pain during AVF puncture in selected patients; the impact of ice massage on pain during AVF puncture in selected patients, and it was discovered in both studies that hegu point ice massage reduces pain levels during AVF puncture in HD patients in a safe and effective way.

Vajihi, Masoumeh,<sup>11</sup> and Zahra (June 2016) and Elham Davtalab, Seyed Ali Najji, and Shahrzad Shahidi (2015) have conducted comparison studies on the effects of 2% Lidocaine Gel and Hegu Point Ice Massage, as well as the combined effects of the Valsalva maneuver and Hegu Point Ice Massage on AV Fistula Puncture-Related Pain in HD Patients. During the study, they divided the selected patients into two groups to see the effect on pain; the results show that ice massage has given higher effectiveness on hegu point.

Thus, the researcher aims to study the effectiveness of ice massage at hegu point on arteriovenous fistula puncture-related pain among hemodialysis patients. As the patients' caretakers, nurses have a responsibility to lessen the psychological and physical side effects of unpleasant interventions. By minimizing discomfort at the site of the fistula, particularly by applying cold massage to pain during AVF vein puncture, the nurses in hospitals can significantly improve the patient's quality of life.

#### **Problem statement:**

“A Quasi-experimental study to assess the effectiveness of ice massage at

Hegu point on Arteriovenous fistula puncture-related pain among hemodialysis patients in a selected hospital, Navi Mumbai.”

#### **Objectives:**

1. To evaluate the AVF puncture-related pain scores in HD patients with and without Hegu point ice massage.
2. To correlate the AVF puncture-related pain scores with selected biographical variables.

#### **Hypothesis:**

H<sub>0</sub>: Application of Ice massage at Hegu point will have no significant effect in reducing AVF puncture-related pain in HD patients.

H<sub>1</sub>: Application of Ice massage at Hegu point will have a significant effect in reducing AVF puncture-related pain in HD patients.

H<sub>2</sub>: There will be no significant association between AVF puncture-related pain scores among HD patients in the experimental and control group with their selected baseline variable.

#### **Research Approach**

The approach for the research chosen for the study is a quantitative approach as it will gather and analyse numerical data using statistics and provide findings that will be represented in the form of graphs and tables.

#### **Research Design**

For this study quasi-experimental, only post-test design was adopted to assess the effectiveness of ice massage at Hegu point

on AVF puncture-related pain among hemodialysis patients.

### Variables of the Study

**Independent variable:** Ice massage at Hegu point

**Dependent variable:** AVF puncture-related pain scores among HD patients.

### Research Setting

The study research setting is the dialysis unit of D Y Patil Hospital, Navi Mumbai.

### Population

CKD patients having AVF and undergoing hemodialysis in the dialysis unit of D Y Patil Hospital, Nerul Navi Mumbai.

### Target Population

The target population of this study is Hemodialysis patients in the dialysis unit, D Y Patil Hospital, Navi Mumbai.

### Sample and Sample size

40 respondents are planned to be recruited undergoing hemodialysis and have AVF. For the present study, the same 40 respondents are used both as experimental and control groups at two different points of time. At first, the respondents were selected as the control group during their first contact with the researcher, and later, when they came for the next cycle of dialysis they were selected to be a part of the experimental group.

### Sampling Criteria

In this study, respondents were selected as follows:

#### Inclusion criteria

- Patient who are conscious and oriented.

- Patient who are diagnosed with CKD and completed 6 consecutive cycles of HD

#### Exclusion criteria

- Patients who have neurological disorders may have altered pain perception.
- Patient with femoral and jugular dialysis.

### Technique And Tool

In this study, interview schedules were used for data collection to collect demographic and clinical variables. The observation technique is used in this study to observe and access the AVF puncture-related pain.

#### Tools Used For The Study

Based on the study objectives the tool designated for the study were

TOOL 1 – interview schedule

Section I: includes baseline variables such as age, gender, and marital status

Section II: includes the duration of diagnosis of CKD, duration of hemodialysis, duration of present AV fistula, Comorbidities, numbers of hemodialysis cycles per week

Section III: an Opinionnaire (to know the experience on the use of ice massage at hegu point).

TOOL 2: Observational tool used to access the AVF puncture-related pain

Section I: consists of a Numerical Pain Scale to assess the level of AVF puncture-related pain.

### Content Validity

To determine the content and construct validity, the tool was given to experts from the Nursing and medical field. After receiving their valuable inputs, the researcher in consultation with the research guide made needed modifications.

### Reliability

The Numerical Rating Scale (NPRS-11) is an 11-point scale for self-report of pain. The numeric pain scale has a reliability score of 0.96.

### Ethical Aspects

The main study was conducted after the approval of the Internal Ethical Committee; D.Y.Patil University School of Nursing (file no: EC/NEW/IND/2021/1547). Respondent Confidentiality and anonymity were maintained.

### Data Gathering Process

The data was collected on November 16th to December 10th, 2021. A non-probability purposive sampling strategy was used to choose forty respondents.

Patients getting hemodialysis through an arterio-venous fistula were given a Patient Information Sheet. They were informed about the protocol of the research by the researcher. The respondent's demographic and clinical variables were collected. The Researcher informed the dialysis staff to perform the AVF puncture as the patient was included first in the control group. The pain was assessed using a numerical pain scale of the control group respondents after the AVF puncture. For the next Dialysis cycle, the same patient were enrolled in the experimental group. It was informed to the dialysis staff to be ready for the AVF puncture; the research protocol was implemented. The researcher performed hand disinfection; prepared the waterproof fabric pouch of the ice cube ready for the ice massage and the timer. The researcher started the massage for 3 minutes on the hegu point in a 2 cm circular motion; at the end of 3 minutes, the dialysis staff performed the AVF puncture. The researcher continued the ice massage

during the puncture and post puncture for a total of 3-minute duration. The researcher gave a break of 15 seconds, every 2 minutes while icing to observe the site for any side effects. At the end of 6 minutes, the researcher assessed for pain using a numerical pain scale. The respondents' opinion questionnaire was implemented immediately after assessing pain.

### Data Analysis Plan

#### Descriptive statistics:

Frequency and percentage were used to analyze the baseline variables of hemodialysis respondents

Mean and standard deviation was used to assess the pain scores of the patients undergoing hemodialysis through AVF puncture

#### Inferential statistics:

A Chi-square test was used to assess the association between pain scores following ice massage at Hegu point during AVF puncture among hemodialysis patients with their selected baseline variables.

Analyzed data was presented in the form of tables and graphs. The level of significance was determined at a 5% level.

## DATA ANALYSIS

**SECTION 1:** Frequency percentage distribution of demographic variables of the hemodialysis respondents

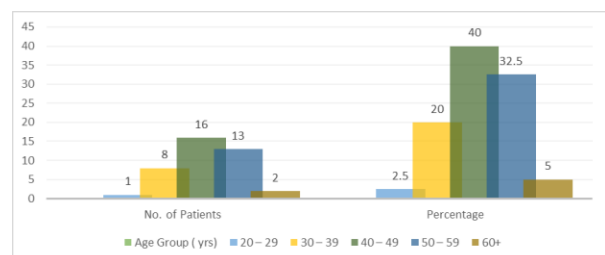


Figure 1: Bar graph showing percentage-wise distribution according to the age of the hemodialysis respondents.

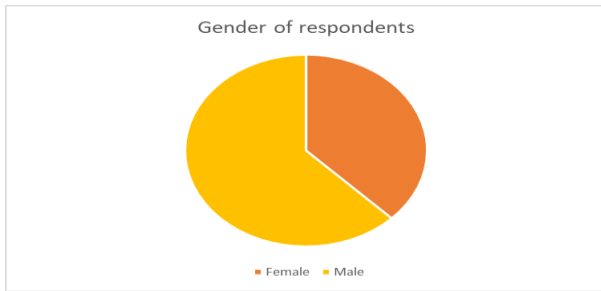


Figure 2: Pie diagram showing percentage-wise distribution according to the gender of the hemodialysis respondents.

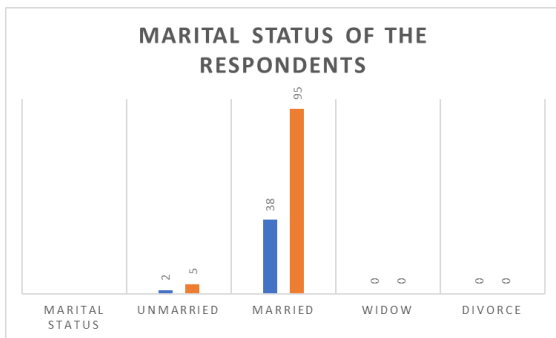


Figure 3: Bar graph showing percentage-wise distribution according to the marital status of the hemodialysis respondents.

**SECTION 2:** Frequency percentage distribution Clinical variables of the hemodialysis respondents.

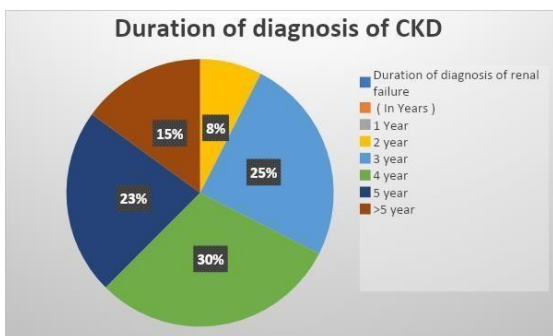


Figure 4: Bar graph showing percentage-wise distribution according to the duration of diagnosis of CKD of the hemodialysis respondents.

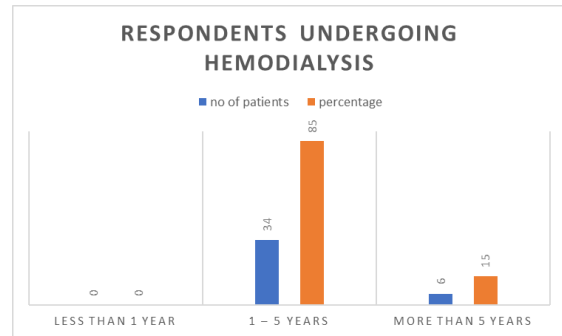


Figure 5: Bar graph showing percentage-wise distribution according to the duration of the respondents undergoing hemodialysis.

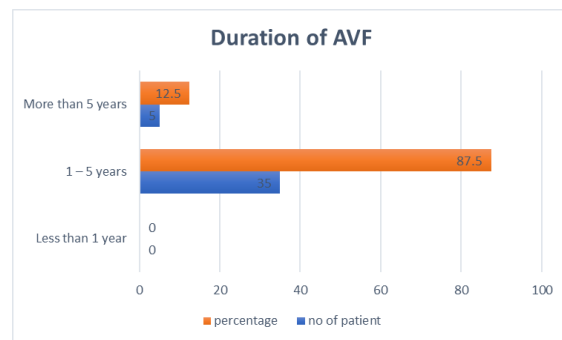


Figure 6: Bar graph showing percentage-wise distribution according to the duration of AVF created in the respondents undergoing hemodialysis

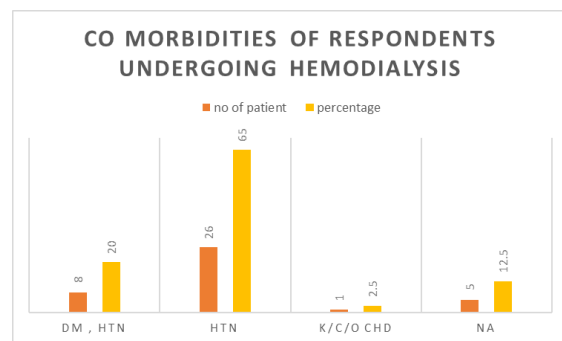


Figure 7: Bar graph showing percentage-wise distribution according to Comorbidities of respondents undergoing hemodialysis along with CKD.

Table I :Assessment of AVF puncture-related pain score of control and experimental group

N=40

| Level of Pain      | Normal (0) | Mild (1-3) | Moderate (4-6) | Severe (7-10) | Total     | Chi-square test | P-Value | Sig. at 5% level |
|--------------------|------------|------------|----------------|---------------|-----------|-----------------|---------|------------------|
| control group      | 0(0.0)     | 0(0.0)     | 3(7.5)         | 37(92.5)      | 40        | 48.322*         | 0.000   | Yes              |
| experimental group | 0(0.0)     | 0(0.0)     | 34(85.0)       | 6(15.0)       | 40        |                 |         |                  |
| <b>Total</b>       | <b>0</b>   | <b>0</b>   | <b>37</b>      | <b>43</b>     | <b>80</b> |                 |         |                  |

\*\*Statistically highly significant at the 0.1% level, i.e. P<0.001.

The above table reveals that:

In the control group, after the AVF puncture, the pain assessment on a Numerical pain scale reveals that 92.5% (n=37) of the respondents had severe pain, 7.5% (n=3) respondents had moderate pain, and none of them had mild pain. The mean pain score of the control group is  $7.4 \pm 0.6325$ .

In the experimental group, after the ice massage at the hegu point, AVF puncture related pain; assessment on a numerical pain scale, shows that 85.0% (n=34) respondents had moderate pain levels, 15% (n=6) respondents had severe pain, The mean pain score of the respondents in the experimental group is  $6.00 \pm 0.7161$ .

Chi-square tests for both experimental and control groups are statistically significant at a 0.1% level P<0.001. Thus, the application of Ice massage at the Hegu point has a significant effect in reducing AVF puncture-related pain in HD patients. Therefore the null hypothesis (H0) is rejected and the alternative hypothesis is accepted.

**SECTION 3:** Association between AVF puncture-related pain scores among hemodialysis patients in the control and experimental group with their selected baseline variables.

Table II: Association of AVF puncture-related Pain Scores with demographic variables in Control Group

N=40

| Level of Pain (Control Group) | Normal (0) | Mild (1-3) | Moderate (4-6) | Severe (7-10) | Total     | Chi-square test | P-Value | Sig. at 5% level |
|-------------------------------|------------|------------|----------------|---------------|-----------|-----------------|---------|------------------|
| <b>Age Group</b>              |            |            |                |               |           |                 |         |                  |
| 20 – 29                       | 0          | 0          | 0              | 1             | 1         | 0.568           | 0.967   | Not              |
| 30 – 39                       | 0          | 0          | 1              | 7             | 8         |                 |         |                  |
| 40 – 49                       | 0          | 0          | 1              | 15            | 16        |                 |         |                  |
| 50 – 59                       | 0          | 0          | 1              | 12            | 13        |                 |         |                  |
| 60+                           | 0          | 0          | 0              | 2             | 2         |                 |         |                  |
| <b>Total</b>                  | <b>0</b>   | <b>0</b>   | <b>3</b>       | <b>37</b>     | <b>40</b> |                 |         |                  |
| <b>Gender</b>                 |            |            |                |               |           |                 |         |                  |
| Female                        | 0          | 0          | 3              | 12            | 15        | 5.405*          | 0.020   | Yes              |
| Male                          | 0          | 0          | 0              | 25            | 25        |                 |         |                  |
| <b>Marital Status</b>         |            |            |                |               |           |                 |         |                  |
| Unmarried                     | 0          | 0          | 0              | 2             | 2         | 0.171           | 0.679   | Not              |
| Married                       | 0          | 0          | 3              | 35            | 38        |                 |         |                  |

\*Statistically Significant at 5% level i.e. P<0.05.

Table II reveals there is no significant association between the AVF puncture-related pain scores and the demographic variables among the respondents of the control group, except an association is found between AVF puncture-related pain and gender, thus from the above results the H<sub>2</sub> that, there is no significant association between AVF puncture-related post-test pain scores among HD patients in the experimental and control group with their selected baseline variables is rejected.

AVF puncture-related Pain Scores are associated with demographic and clinical variables in the experimental group. According to the data, there is no association between the respondents in the experimental group's AVF puncture-related pain levels and the respondents' demographic and clinical variables.

AVF puncture-related Pain Scores are associated with clinical variables in the control group. According to the findings, there is no association between the clinical variables and the AVF puncture-related pain scores among the respondents in the control group.

## 5.6 Discussion



Hemodialysis patients typically experience pain from AVF punctures, and relieving this pain can enhance their acceptance of the treatment and, as a result, their quality of life. This study aimed to assess the effectiveness of ice massage at hegu point on arteriovenous fistula puncture-related pain among hemodialysis respondents. In the current study, it was revealed that applying ice massage to the hegu point significantly ( $P < 0.001$ ) lowered the pain scores within the experimental group. Thus, ice massage was found to be effective as a nonpharmacological pain management technique to reduce puncture-related pain of AVF in hemodialysis respondents

In the present study, the data depicts that the majority of the respondents were in the middle age group, between 40-49 years (mean age  $45.7 \pm 9.1$ ). The majority of the respondents were undergoing hemodialysis for 1–5 years, with the frequency of cycle per week being three. Figueiredo et al. (2008),<sup>3</sup> Jose L et al, (2015) reported in their study that the mean age of their subjects was from 40 to  $57.3 \pm 14$  years of age, and 62% of them belonged to female gender.<sup>10</sup> and other researcher shows the majority of the subjects were males.<sup>2</sup>

In the present study, the most common comorbidities among the CKD respondents is hypertension (65%) and diabetes mellitus with hypertension (20%). Ghorbani et al., (2015) in their study have also reported hypertension (34.2%) and diabetes (26.9%) as the two most common causes of chronic renal failure,<sup>4</sup> which is in line with the present study. Snouber et al., found that the most common causes of ESRD was diabetes (22.5%) followed by hypertension (11.1%), and both these comorbidities were also present in the subjects (10.6%), thus,

the results of the current study are in consistent with the literature.

The results of this study indicated that applying ice massage at the Hegu point can reduce puncture-related pain of AVF. Sabita et al (2008),<sup>5</sup> Davtalab et al. (2016),<sup>6</sup> Naimeh Porramezani et al. (2019)<sup>7</sup> aimed to study the effects of Hegu point cryotherapy on fistula puncture-related pain in hemodialysis patients, the researchers concluded that Hegu point massage alone is ineffective in the pain rather than ice massage on the Hegu point which has been confirmed to be effective and the results were similar to the present study. There are studies which report contrary to the findings of this study but in applied areas; such as, Hafize Ozturk Can et al, (2015) reported that ice massage applied to LL<sub>4</sub> during the active phase of labor did not lead to any statistical differences in mothers in the first 24 hours postpartum in terms of the characteristics of the pain with MPQ and VAS.<sup>8</sup>

The correlation between pain scores and demographic and clinical variables of the control and experimental group revealed that there is no significant association; except an association was found between AVF puncture-related pain scores and gender in the control group. There are contradictory research findings to this, such as, Ghods et al., found the duration of hemodialysis to be significantly associated with the intensity of pain.<sup>9</sup> Furthermore, Sabitha et al. (2008) found no significant relationship between the pain score with the duration of AVF and age.<sup>5</sup>

## 5.6 Conclusion

The goal of this study is to evaluate the impact of cold massage at Hegu point on hemodialysis patients' pain after an

arteriovenous fistula puncture. After receiving ice massage at Hegu Point, hemodialysis patients' pain scores related to AVF punctures were shown to have significantly decreased. There is statistically no significant association found between selected baseline variables (age, gender, marital status, duration of illness, present diagnosis, number of hemodialysis per week, total number of hemodialysis the patient underwent) and the AVF puncture pain scores; except for an association is found between AVF puncture related pain intensity score and gender among the control group respondents.

### **Nursing Implication**

#### **Nursing Practice**

As clinical mentors, they should be strengthening evidence-based nursing practices among nurse clinicians. One such example is the outcome of this study where ice massage is used in reducing AVF puncture-related pain.

#### **Nursing Education**

Nursing teaching should include information regarding ice massage at hegu point for AVF puncture-related pain for patients undergoing hemodialysis.

#### **Nursing Administration**

The Nurse administrator should formulate protocols of care based on the outcome of the study and organize a training program on the specified alternative therapy of this study while handling the patients undergoing hemodialysis through AVF.

#### **Nursing Research:**

The effect of ice massage at the Hegu point technique with varying time durations could also be researched further to reduce pain. It can be further researched in extended areas such as, post-operative pain, labour pain, migraine headache, etc.

### **Recommendations**

- For generalisation, the current study can be repeated with more participants.
- The study can be done using varying time duration to reduce puncture-related pain.

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