



Comparison of the Effects of Cold Compress and Xyla-P Cream on Stress Caused by Venipuncture among Hemodialysis Patients

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Abstract

Background: Stress caused by the insertion of the needle into the arteriovenous fistula is one of the main concerns of hemodialysis patients. Reducing the stress of patients during venipuncture is one of the main goals of nursing care. This study aimed to investigate and compare the effects of Xyla-P cream and cold compress on the severity of stress caused by venipuncture in hemodialysis patients.

Methods: This clinical trial was conducted in 50 patients undergoing hemodialysis who were enrolled in the study using simple random sampling. The severity of stress was measured during two successive hemodialysis sessions in three stages including after the application of a placebo, Xyla-P cream, and cold compress. The visual analog scale was used to measure the severity of stress. The data collector and data analyzer were blinded. The collected data were analyzed using analysis of variance with repeated measures.

Results: The stress scores were significantly different between the placebo group (6.69 ± 1.66) and Xyla-P cream group (5.43 ± 1.42) ($P=0.000$) and cold compress group (5.05 ± 1.40) ($P=0.000$), and between Xyla-P cream group and cold compress group ($P=0.026$).

Conclusions: Cold compress is more effective than Xyla-P cream in reducing the stress. Therefore, nurses are recommended to use this method, instead of medications, for reducing the stress.

Keywords: Arteriovenous fistula, Cold compress, Hemodialysis, Lidocaine and Prilocaine, Stress.

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for HD.⁵ People who undergo long-term HD suffer from psychological and physiological stressors and experience personality and lifestyle changes.⁶ The results of some studies have shown that 5.3% of the adult patients suffer from a severe fear of needles and 22% from a moderate fear. Stress caused by the insertion of needles and catheter into a blood vessel becomes problematic when it is reiterative and requires their constant use.⁷ Stress leads to irritability, increases the basal metabolism, releases catecholamines, and causes changes in the vital signs such as increased blood pressure and tachycardia which in turn increases the myocardial oxygen demand. These stress-induced changes are particularly dangerous in people whose life is endangered due to age, illness, or injuries threatening their health.⁸ Given the fact that HD patients usually undergo this process two to three times a week, each time for 3–4 hours,⁹ they are repeatedly exposed to stress and pain caused by about 300 times of arteriovenous fistula cannulation per year; such repeated stress can cause depression and reduced quality of life in the patients. A reduction in pain and stress can improve their quality of life and help them to accept HD more easily.¹⁰⁻¹² There is no standard and unique procedure to reduce stress. Previous studies have investigated the use of non-pharmacological methods such as massage therapy,¹³ use of essential oil of lavender,¹⁴ and music therapy¹⁵ to reduce stress. Despite the advances which have been made in the treatment of stress in patients with kidney disease, they still experience high levels of stress. Therefore, proper use of stress reduction strategies can play an important role in improving the general health of the patients.¹⁶ Since the pain caused by needle insertion is one of the most important factors causing anxiety and stress in HD patients,¹⁷ the use of analgesic methods is assumed to reduce stress in these patients.

Cryotherapy is an old and cheap non-pharmacological method. Ice is a well-known refrigerant which is recognized as an anesthetic and is frequently used in emergencies for patients with fractures, sprains, and other inflammatory conditions.¹⁸ One of the local anesthetic formulations is a mixture of lidocaine and prilocaine which penetrates several millimeters of the superficial layers of the healthy skin and act as an analgesic.¹⁹ Considering the abovementioned facts, since we found no study investigating and comparing the effects of cryotherapy and localized analgesics on stress caused by venipuncture, this study aimed to compare the effects of cold compress and Xyla-P cream on the stress caused by the insertion of needles into the arteriovenous fistula in HD patients.

Introduction

Chronic renal disease is a pathologic process with numerous causes which result in an irreversible reduction in the number and functioning of nephrons and, in many cases, leads to end-stage renal disease (ESRD).¹ Based on the available statistics, the prevalence of kidney failure worldwide is 260 cases per million people per year and increases by almost 6% annually. It is estimated that by 2020, more than three-quarters of a million people in the United States will develop kidney failure.² In Iran, the incidence of kidney failure is very high, i.e., about 22.6% per year; approximately 4,000 new cases are added annually.¹

Hemodialysis (HD) is the most common functional model of renal replacement therapy around the world and in Iran.³ Almost 92% of the total population of dialysis patients undergo HD.⁴ A safe, durable, and reliable vascular access is required

Materials and Methods

This study aimed to determine and compare the effects of Xyla-P cream and cold compress on the severity of stress caused by venipuncture in HD patients. This clinical trial with the registration number: IRCT2016050427744N1 was conducted in 50 patients who were referred to the dialysis center of Shohada Hospital (the only referral center for HD patients in Quchan city) in 2016.

The inclusion criteria were as follows: being over 18 years old, being conscious of time, place, and persons at the time of data collection, undergoing HD at least twice a week, having a fistula for at least three months, not using alcohol or drugs as confirmed by a physician, not having a known allergy to local anesthetics, having a minimum level of literacy, and lack of a history of mental illness as confirmed by a physician. The exclusion criteria were as follows: use of anesthetics in the past 24 hours, refusal to continue participation in the research, and death of patients.

Among the 80 patients treated with HD, 30 were excluded (27 patients did not meet the inclusion criteria, and 3 patients declined to participate). After obtaining consent from the patients, the 50 eligible patients were enrolled in the study.

All the stages of the insertion of the needle into the fistula for each patient were performed by a nurse to control for the confounders. All the needles used were similar in size, shape, and the manufacturing company.

A demographic questionnaire [including age, dialysis duration (months), duration of the fistula (months), gender, level of education, marital status, job, and etiology of CKD] and a visual pain scale ruler were used as the data collection tools. The visual pain scale ruler was graded from zero to ten, where zero indicated no pain, and ten indicated the most intense level of pain. The validity and reliability of this standard tool have already been confirmed by various studies. Given that various studies have used the visual analog scale to measure stress, the same was used in this study as well.²⁰⁻²³

After explaining the objectives of the study to the patients and obtaining informed consent, they completed a demographic questionnaire. First, the patients in the placebo group were evaluated. The patients were trained how to use the stress ruler, and then, the severity of stress was measured before the needle insertion during the two successive HD sessions without performing any intervention; for this group, only an ice bag (at body temperature) was used (as the placebo) 10 minutes before the venipuncture. After a week, 10 minutes before inserting the needle, Xyla-P cream (purchased from Tehran Shimi Company) was applied and rubbed over an area of 5 cm around the site of the fistula, and again, an ice bag at body temperature was placed on the site of the fistula. Then, using water, the cream was removed from the patient's skin, and the skin was disinfected for venipuncture. The severity of stress before injection was assessed and recorded. After a week of wash out to eliminate the effect of the previous intervention (intervention with Xyla-P cream), the cold compress (ice bag) was applied 10 minutes before the needle insertion, and the severity of stress in the patients was measured and recorded before the intervention (Figure 1).

The patients were selected using the simple random sampling method according to the study inclusion and

exclusion criteria and were enrolled in the study. Then, the order of the treatments was determined randomly by drawing lots, and consequently, all patients received placebo, Xyla-P cream, and cold compress intervention, respectively. In this study, the first author enrolled the participants, generated the allocation sequence (by drawing lots), and assigned the participants to their groups. The data collector and data analyzer were blinded. The collected data were entered into SPSS version 18 statistical software and analyzed using descriptive statistics and analysis of variance with repeated measures and Bonferroni post hoc test.

After explaining the objectives of the study to the patients, they signed the informed consent form. This study was approved by the ethics committee of Shahroud University of Medical Sciences with the registration number: IR.shmu.rec.1395.19.

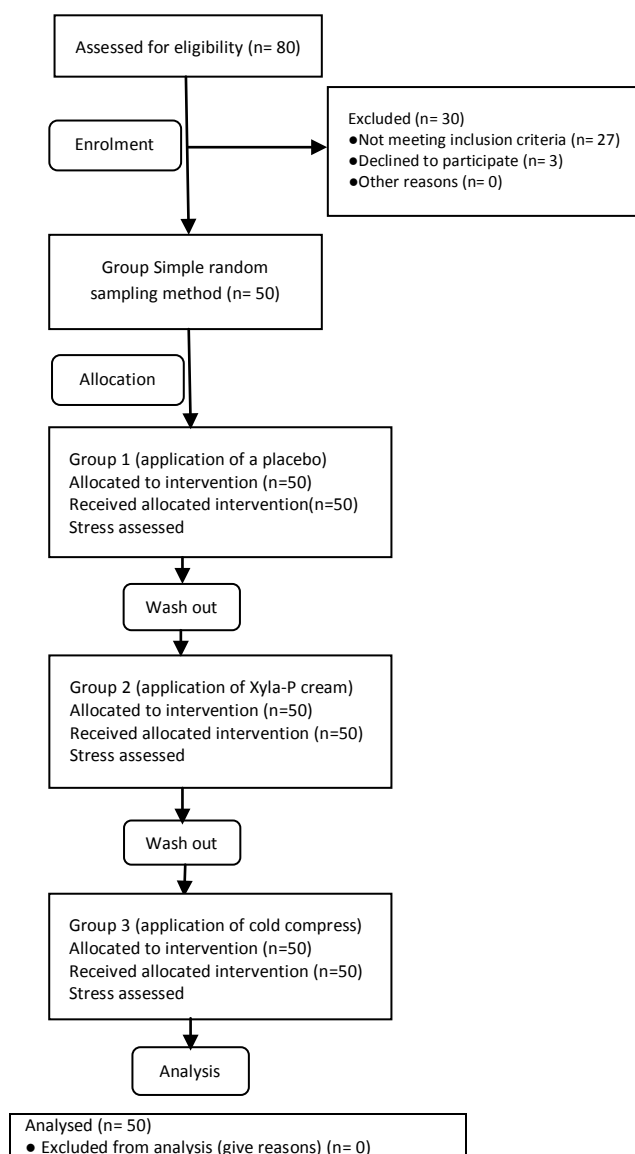


Figure 1. A flow diagram of the study process

Results

A total of 50 HD patients participated in this study. The mean age of the patients was 50.16 ± 14.74 years, and most of them (54%) were males. Hypertension alone or in combination with diabetes (90%) was the most common cause of the disease.

Table 1 presents the results of the comparison between the studied groups regarding the severity of stress during the insertion of needles into the arteriovenous fistula. The mean stress scores at the time of application of placebo, Xyla-P cream, and cold compress were 6.69 ± 1.66 , 5.43 ± 1.42 , and 5.05 ± 1.40 , respectively. Based on the results of the analysis of variance with repeated measures, there were significant differences between the three groups regarding the severity of stress ($F = 58.74$, $df = 2, 48$, $P = 0.000$); the lowest severity of stress was observed in patients who received cold compress. Also, there was a statistically significant difference between the placebo group and Xyla-P cream group ($P = 0.000$), between the placebo group and cold compress group ($P = 0.000$), and between the Xyla-P cream group and cold compress group ($P = 0.026$).

Table 1. Bonferroni test results to compare the mean difference of the stress scores between the three groups after needle insertion

Group 1	Group 2	The mean difference ¹	Standard Error	P.V
Placebo	Xyla-P	1.260	0.184	<0.001**
Placebo	Ice compresses	1.640	0.149	<0.001**
Xyla-P Cream	Ice compresses	0.380	0.139	0.026 [†]

¹mean score of stress score in group 1 – mean score of stress score in group 2
[†]significant at $\alpha < 0.05$; **significant at $\alpha < 0.01$

Discussion

The results of this study showed that the lowest severity of stress was observed in patients who received cold compress. Cold compress and Xyla-P cream were effective in reducing the stress caused by venipuncture compared with the placebo group.

The mean age of the subjects in this study was 50.16 ± 14.74 years. In a study by Celik (2011) which aimed to compare the effects of vapocoolant spray and lidocaine/prilocaine cream on the reduction of the pain caused by venipuncture in HD patients, the mean age of the patients was 57 ± 13.3 years, which is in line with the present study data.¹⁰ Diabetes and hypertension are the most common causes of ESRD, and with aging, the prevalence of diabetes and hypertension increases too;²⁴⁻²⁶ hence, the prevalence of chronic renal failure increases with aging. In other words, a majority of the patients with chronic renal failure are older.

Hypertension alone or in combination with diabetes (90%) was the most common factor leading to HD in the studied patients. In a study by Bagheri-Nesami et al. in 2013, hypertension alone or in combination with diabetes was the most common cause of chronic renal failure²⁷ which is in line with the results of this study.

In this study, after the application of cold compress and Xyla-P cream, the stress was significantly reduced in the patients. We did not find any studies which have specifically studied the stress caused by venipuncture in HD patients;

however, we found some studies which have investigated the reduction of stress in HD patients. For instance, Hmwe (2014) conducted a study entitled “Effects of acupressure on depression, anxiety, and stress in HD patients,” and the results were indicative of stress reduction in the intervention group ($P < 0.001$).²⁸ Jahromy’s study (2016) showed that telenursing reduced stress in HD patients, and this proved the effectiveness of the interventions.²⁹ Gurkan in 2015 showed that the use of stress reduction strategies in HD patients helps them to experience less stress.³⁰ Tak conducted a study entitled “Interventions to reduce pain and distress caused by venipuncture in children,” and the results showed a greater reduction of stress in the intervention group receiving the EMLA cream as compared with the placebo group ($P < 0.001$);³¹ this result is in line with the that of the current study. Di Gioia et al. (2011) conducted a study entitled “Relieving pain and stress in preterm infants” and used different interventions, including the use of lidocaine/prilocaine cream, to reduce pain and stress in newborns; the results showed that stress was reduced more in infants in the intervention group than those in the control group, which is consistent with the results of our study.³² Moreover, Tey et al. (2012) conducted a study entitled “Reducing the level of anxiety in preschool children under cryotherapy for skin warts.” The study showed that the level of anxiety in the intervention group was reduced from 58.4 to 37.7, which represented the effectiveness of cryotherapy in anxiety reduction;³³ it is consistent with our study results.

Rymaszevska in 2007 conducted a study entitled “Whole body cryotherapy as an adjunctive therapy for depression and anxiety.” A reduction by at least 50% in the Hamilton Depression Rating Scale (HDRS) and Hamilton Anxiety Rating Scale (HARS) was seen in the studied group.³⁴

The psychological and emotional status of the patients during data collection at different times may vary. These limitations were out of the researchers’ control. Also, a crossover design may provide more accurate results, which was not used in this study.

Based on the results of this study, cold compress and Xyla-P cream both are effective in reducing the stress caused by venipuncture; however, cold compress is more effective than Xyla-P cream in reducing the stress. Therefore, the use cold compress is recommended as an easy, self-administrable method for the patients to reduce stress during HD fistula cannulation.

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Conflict of Interest

The authors declare that they have no conflict of interest.

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