

## Original Article

## Pain Following Needle Insertion into a Hemodialysis Fistula and Influencing Factors

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### Abstract

**Aim.** The aim of this study was to determine the intensity of the pain experienced during vascular needle insertion and fistula care in hemodialysis patients.

**Methods.** This descriptive study, 102 individuals who a fistula on hemodialysis treatment and agreed to participate were included. Data were collected with a questionnaire of 15 questions developed by the researcher after reviewing the literature and the visual pain scale. Descriptive statistics, student t test, mann-whitney u, one-way anova were used for data analysis.

**Results.** It was found out that mean age of the participant individuals  $50.6 \pm 14.7$ , mean duration of hemodialysis was  $5.8 \pm 4.1$  years and mean duration of fistula  $38.4 \pm 25.6$  months. We found that 70.6% of the patients washed the fistula area with water and soap, 88.2% checked the thrill sound daily. Individuals were found to experience of the moderate ( $4.8 \pm 2.6$ ) level pain following needle insertion into a fistula. Age, sex, education, duration of hemodialysis and fistula has been found to be a no statistically significant relationship between the pain experienced of individuals ( $p > 0.05$ ). Subjects who slept on the extremity had a higher pain value than those that did not and the difference was statistically significant ( $p < 0.05$ ).

**Conclusion.** It was determined that hemodialysis patients experienced pain following needle insertion into a fistula. Based on these results, hemodialysis nurses must offer education, care and support for patients who moderate pain during arteriovenous fistula needle insertion to assist them in making a successful cope with pain.

**Keywords.** Pain, hemodialysis, fistula, needle insertion, nursing

### Introduction

Chronic renal failure is a long-term progressive and irreversible deterioration of renal function that leads to uremia and can be treated by hemodialysis (Akoglu, & Suleymanlar, 2005; Suleymanlar, 2009). Although hemodialysis is a recent treatment option for those suffering from renal failure, it can cause physical, psychological, social and economic problems due to its chronic nature (Ozgur, Kursat, & Aydemir, 2003; Kaba *et al.*, 2007; Kammerer, Garry, Hartigan, Carter, & Erlich, 2007).

Pain is one of these problems and can decrease patients' quality of life (Kafka, Vehvilainen-

Julkunen, Zyga & Sapountzi-Krepia, 2018). Pain is a condition that threatens the organism, informs about possible dangers (Davinson, 2003). An effective haemodialysis treatment is dependent on a well-functioning vascular access without pain which has good blood flow, excellent patency, and allows easy and repetitive cannulation with two needles (KHA-CARI, 2017).

The pain experienced is usually caused by needle insertion into a hemodialysis (Bagheri-Nesami, Espahbodi, Nikkiah, Shorofi, & Charati, 2014). Pain during vascular needle insertion is commonly observed in patients on hemodialysis

treatment. The patients suffer frequent pain due to at least 300 needle insertions per year. One fifth of the patients define this pain as suffering and 47% of the patients have been reported to fear the pain caused by vascular needle insertion (Figueiredo, Viegas, Monteiro, & Figueiredo, 2008; Montero, Arellano, Abad, Gomez, & Galan, 2004; McLaughlin, Manns, Mortis, Hons, & Taub, 2003).

When the pain is well managed, the patients increase their quality of life (Celik *et al.*, 2011, Kafka, Vehvilainen-Julkunen & Sapountzi-Krepia, 2017). There is a decrease in pain in the fistula region in 3 months, but this pain reduction is not significant (Verhallen, Kooistra, & Van Jaarsveld, 2007).

It is important to provide a multidisciplinary health service to control pain in patients undergoing hemodialysis. The nurse, a member of multidisciplinary team, has a key function in ensuring this control that can be provided by many methods.

However, it is critical to define the pain clearly first. Nurses should follow a complementary approach and determine the patients' needs, previous experiences, factors affecting pain perception, and the methods used in the control of pain. Fistula care decreased pain in patients undergoing hemodialysis. (Tel, 2010; Subramanian, Ramasamy, Hoong, Chinna, & Rosli, 2016; Inal, & Kelleci, 2012).

Fistula care of the patients should include wearing clothes which compression extremity, checking the everyday thrill sound, carry heavy objects from three kilos, measuring blood pressure on the extremity, drawing blood on the extremity, overling on the extremity and doing strengthening exercise the fistula area (Pessoa, & Linhares, 2015).

### **Aim of the study**

This study has been conducted to determine the intensity of pain in hemodialysis patients during vascular needle insertion and the influencing factors .

### **Methods**

#### **Study Design and Sample**

The study population consisted of 132 hemodialysis patients in Yozgat center hospital. No sample was chosen and all subjects that accepted participation and met study inclusion

criteria were included in the sample. Inclusion criteria were (1) to be aged 18-65 years, (2) to have undergone HD treatment, (3) to be able to respond to the survey questions, (4) undergoing hemodialysis via an arteriovenous fistula. The study was completed with 102 individuals after obtaining consent. The data were collected by the investigator by using the face-to-face interview method. The interviews lasted approximately 15-20 minutes.

### **Study instruments**

Data were collected with a questionnaire form and the visual pain scale.

#### **Questionnaire Form**

Questionnaire form developed by the researcher after reviewing the literature (Tel, 2010; Davinson, 2003). The questionnaire consisted of 15 questions divided into 2 parts: (1) socio-demographic characteristics such as age, educational level, gender etc. (5 questions); (2) Fistula care such as checking the everyday thrill sound, washing the area before hemodialysis fistula, carry heavy objects from three kilos etc. (10 questions).

#### **Visual Analog Scale (VAS)**

The VAS was used to measure the perceived pain intensity. The VAS consisted mainly of a 10 cm-long horizontal or vertical line, the left end marked 'no pain' and the right end 'excruciating pain'. The pain intensity of patients was assessed immediately after vascular needle insertion. Subjects were divided into four subgroups: none (0), mild (1-3), moderate (4-6) and severe (7-10) pain intensity (Asgari, Motlagh, Soleimani, & Ghorbani, 2012; de Beer, Petruccioli, D., Adili, A., Piccirillo, L., Wismer, D., & Winemaker, 2012; Kocoglu, & Ozdemir, 2008).

### **Data analysis**

The statistical analyses were conducted using the SPSS version 22 (Statistical Package for Social Sciences).

The socio-demographic characteristics, checking the everyday thrill sound, carry heavy objects from one kilos, measuring blood pressure on the extremity, overling on the extremity were considered as independent variables and the VAS as dependent variables in the study.

To test whether the data were normally distributed, the Kolmogorov-Smirnov Test and Shapiro-Wilk test was used. It was used

descriptive statistics (percentage, mean, standard deviation), the Mann-Whitney U test, Student t test and one-way Anova. The  $p < 0.05$  was accepted as statistically significant.

### Ethics

The ethical rules described in the Helsinki Declaration were used and personal information was kept confidential.

Written permission was obtained from the research center after declaring the study aims and

objectives. The study was conducted on volunteers after obtaining verbal consent.

### Results

#### Participants' characteristics

Table 1 shows the socio-demographic attributes and the symptoms of the hemodialysis patients. Males made up 61.8% of the group, 70.6% of the subjects were married, and 63.7% were educated at the primary school level. The mean hemodialysis duration was  $5.8 \pm 4.1$  years.

**Table 1** Socio-demographic characteristics of hemodialysis patients

Socio-demographic characteristics	n	%
<b>Gender</b>		
Female	39	38.2
Male	63	61.8
<b>Marital status</b>		
Married	72	70.6
Single	30	29.4
<b>Educational status</b>		
Illiterate	21	20.6
Primary school	65	63.7
High school and over	16	14.7
<b>Hemodialysis period (Mean years)</b>	5.8±4.1	
<b>Mean age</b>	50.6±14.7 year	

SD, standard deviation

**Table 2** Fistula usage characteristics of hemodialysis patients

<b>Fistula Usage Characteristics</b>	<b>n</b>	<b>%</b>
<b>Fistule usage period (Mean month)</b>		38.4±25.6
<b>Washing the area before hemodialysis fistula</b>		
Washing	72	70.6
Not Washing	30	29.4
<b>Checking the everyday thrill sound</b>		
Controlling	90	88.2
Not Controlling	12	11.8
<b>Carry heavy objects from three kilos</b>		
Transport	22	21.6
Not transport	80	78.4
<b>Wearing clothes which compression extremity</b>		
Wearing	11	10.8
Not wearing	91	89.2
<b>Measuring blood pressure on the extremity</b>		
Measuring	11	10.8
Not Measuring	91	89.2
<b>Drawing blood on the extremity</b>		
Drawing	9	8.8
Not drawing	93	91.2
<b>Overling on the extremity</b>		
Overling	12	11.8
Not overling	90	88.2
<b>Doing strengthening exercise the fistula area</b>		
Doing	50	49.0
Not doing	52	51.0

SD, standard deviation

**Table 3** Pain characteristics at fistula area in hemodialysis patients

Pain Characteristics	n	%
<b>Average of pain fistula area (Mean)</b>	4.8±2.6 (min 0 - max 10)	
<b>Intensity of pain fistula area</b>		
Mild pain	29	28.4
Moderate pain	47	46.1
Severe pain	26	25.5

SD, standard deviation

**Table 4** Pain scale distribution of hemodialysis patients in fistula area based on their socio-demographic characteristics

Socio-demographic characteristics	Average of pain fistula area		
	$\bar{X} \pm SD$	Statistical tests	p
<b>Gender</b>			
Female	6.38±2.26	1.717*	0.089
Male	5.49±2.71		
<b>Age groups</b>			
23-43 age group	6.50±2.58	2.178**	0.119
44-64 age group	5.33±2.62		
65 age and over	5.63±2.32		
<b>Marital status</b>			
Married	5.80±2.66	0.168*	0.867
Single	5.90±2.38		
<b>Educational status</b>			
Illiterate	6.09±2.48	1.017**	0.365
Primary school	5.95±2.61		
High school and over	5.00±2.50		

\*Studen t test

\*\*One-way anova test

**Table 5** Pain scale distribution of hemodialysis patients in fistula area based on taking care of the area

Fistula Usage Characteristics	Average of pain fistula area		
	$\bar{X} \pm SD$	Statistical tests	p
<b>Washing fistula area before hemodialysis</b>			
Washing	4.84±2.51	0.025**	0.980
Not Washing	4.83±2.71		
<b>Checking the everyday thrill sound</b>			
Controlling	4.83±2.58	532.000*	0.933
Not Controlling	4.82±2.51		
<b>Carry heavy objects from one kilo</b>			
Transport	4.98±2.55	754.500*	0.300
Not transport	4.31±2.58		
<b>Wearing clothes which compression extremity</b>			
Wearing	4.97±2.51	377.500*	0.181
Not wearing	3.72±2.80		
<b>Measuring blood pressure on the extremity</b>			
Measuring	4.93±2.56	420.00*	0.381
Not Measuring	4.09±2.59		
<b>Drawing blood on the extremity</b>			
Drawing	4.95±2.53	300.000*	0.158
Not drawing	3.66±2.69		
<b>Overling on the extremity in sleep</b>			
Overling	5.07±2.47	309.500*	<b>0.016</b>
Not overling	3.08±2.68		
<b>Doing strengthening exercise the fistula area</b>			
Doing	4.96±2.66	0.450**	0.654
Not doing	4.73±2.48		

\*Mann-Whitney U test \*\*Studen t test

### Participants' fistule Care Characteristics

Table 2 shows the fistula care situation of the hemodialysis patients is shown. The mean fistula duration was  $38.4 \pm 25.6$  months. We found that 70.6% of the patients washed the fistula area with water and soap before coming to the dialysis session, 88.2% checked the thrill sound daily, 78.4% did not carry anything heavier than three kilograms. 89.2% of patients did not wear clothes that felt tight on the fistula arm. Moreover 89.2% of patients did not use their fistula arm to measure blood pressure, 88.2% of them did not sleep on that arms and 49.0% exercised to strengthen the fistula arm.

### Pain experience outcome

Table 3 shows specifications of fistula area pain in the hemodialysis patients. The mean pain intensity at the fistula area was  $4.8 \pm 2.6$  (min 0 - max 10). The pain was moderate pain in 46.1% of the patients.

Table 4 shows the pain scale distribution of hemodialysis patients in the fistula area based on the socio-demographic attributes. Although there was no statistically significant difference in mean pain scale values in the fistula area based on gender, age, marital status, and education level ( $p > 0.05$ ), we found that women, subjects aged 23-43 years and illiterate people felt more pain.

Table 5 shows the pain scale distribution in the fistula area of hemodialysis patients based on taking care of the area. Subjects who slept on the extremity had a higher pain value than those that did not and the difference was statistically significant ( $p < 0.05$ ). There was no statistically significant the pain values based on fistula care including washing the area, daily thrill sound control, carrying things heavier than one kilogram with the fistula arm, wearing clothes that are tight for the extremity, blood pressure measurement, drawing blood from the extremity and performing exercises for the fistula arm ( $p > 0.05$ ).

### Discussion

Pain is considered an important problem and is one of the reasons people apply to health centers. Pain becomes a part of life in hemodialysis patients. It has been shown that 75.7% of hemodialysis patients experience pain (Yesil, Karsli, Kayacan, Suleymanlar, & Ersoy, 2015). Pain has various effects on hemodialysis patients. Sabitha *et al.* (2008) have reported that

arteriovenous fistula cannulation is an important cause of pain in these patients. In our study, we found that 92.2% of patients had pain during arteriovenous fistula insertion with 28.4% of them having minor pain, 46.1% mild pain and 25.5% severe pain. Aitken *et al.* have reported 24.4% of their patients suffering severe pain. Vergnee *et al.* (2002) have found 57.5% their patients suffering pain that 79% of their patients had mild pain while 13% of them had moderate and 8% had severe pain during arteriovenous fistula needle insertion. The difference among these findings could be due to previous pain experiences, tiredness and anxiety due to HD treatment, the duration of treatment, coping methods, and family and social support (Tel, 2010; Afsar, & Pinar, 2003). We also found no statistically significant difference in the pain experienced during vascular insertion according to age, gender, and hemodialysis and fistula duration ( $p > 0.05$ ). The life quality of the patients has been reported to decrease during arteriovenous fistula needle insertion (Davinson, 2003). A complementary approach should therefore be used to evaluate and monitor these patients (Çöçeli, Bacaksı, & Ovayolu, 2008).

Arterial and venous needles need to be used continuously for hemodialysis treatment. Fistula care is important for an effective treatment and less pain. Blood pressure measurements and blood tests should be done using the arm without a fistula. Clothes with tight arms and carrying things weighing more than one kilo should be avoided. The fistula area should be protected from too hot and cold conditions. One should not use a watch on the fistula arm or sleep on this arm. The fistula arm should be protected from physical trauma. The fistula flow should be checked daily and the physician should be informed if there is a problem with the flow. Moreover, the fistula arm should be washed with warm soap-water and then moisturized before each dialysis (Tel, 2010; Ozen *et al.*, 2017). In our study, we found that 29.4% of the patients did not wash the fistula area with soap and water, 21.6% of them carried things heavier than one kilo and 51% of them did not do exercise the fistula area. Patients, who slept on their arms or put their arms under the pillow felt more pain ( $p < 0.05$ ). Although there was no statistically significant difference, patients who measured blood pressure on that arm, used clothes with tight arms and carried things heavier than one kg experienced more pain. We can therefore

conclude that regular training is needed to educate patients about fistula care and its importance.

### Limitations of the study

This study was conducted at a single hemodialysis center. More multicentre studies including hemodialysis center and with larger samples should be applied. Also, sample size was small, so our research findings cannot be generalized.

### Conclusion

We found that hemodialysis patients had moderate pain during arteriovenous fistula needle insertion. It was observed that fistula care was important in decreasing the level of pain. Based on these results, hemodialysis nurses must offer education, care and support for patients who moderate pain during arteriovenous fistula needle insertion to assist them in making a successful cope with pain. This study showed that there is need for further research.

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