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Original Research Article

Pain And Anxiety During AV Fistula Cannulation Among Hemodialysis Patients

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Abstract: *AV fistula cannulation is a routine yet often painful and anxiety-inducing procedure for patients undergoing maintenance hemodialysis. Despite its frequency, procedural pain and psychological distress remain under-addressed, especially in low-resource settings like Pakistan.* ***Objective:*** *To assess the severity and prevalence of pain and anxiety during AV fistula cannulation among hemodialysis patients in a tertiary care hospital in Pakistan.* ***Methods:*** *This cross-sectional descriptive study was conducted at the Dialysis Unit, Department of Nephrology, Nishtar Hospital Multan, from 15 December to 15 March. A total of 135 patients undergoing maintenance hemodialysis through AV fistula were included. Pain was evaluated using the Visual Analog Scale (VAS), and anxiety was measured using the Hospital Anxiety and Depression Scale – Anxiety subscale (HADS-A). Data were analyzed using SPSS v25, with chi-square tests for statistical significance ($p<0.05$).* ***Results:*** *Pain during cannulation was reported by 92.6% of patients, with 28.1% experiencing mild, 38.5% moderate, and 25.9% severe pain. Anxiety was present in 62.9% of patients (31.1% mild, 20.7% moderate, 11.1% severe). Significant associations were found between anxiety and female gender ($p<0.05$), as well as between severe pain and longer dialysis duration ($p=0.032$).* ***Conclusion:*** *Pain and anxiety are highly prevalent during AV fistula cannulation among Pakistani hemodialysis patients. Integrating pain management and psychological screening into routine dialysis care may significantly improve the well-being of this vulnerable population.*

Keywords: Hemodialysis, Arteriovenous Fistula, Pain Measurement, Anxiety, Vascular Access, Pakistan

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Introduction

End-stage renal disease (ESRD) is a growing public health concern in Pakistan, with hemodialysis being the most commonly utilized renal replacement therapy due to limited access to kidney transplantation and peritoneal dialysis facilities. Vascular access through an arteriovenous (AV) fistula remains the gold standard for hemodialysis due to its lower infection rates and longer patency than catheters or grafts (1). However, AV fistula cannulation is a recurrent and often distressing procedure that many patients undergo multiple times weekly, contributing significantly to procedural pain and psychological distress (2).

In Pakistan, where healthcare delivery is frequently limited by infrastructural and human resource constraints, pain during dialysis sessions is often inadequately addressed, and psychological outcomes such as anxiety receive little attention in routine clinical care. Repeated needle insertions into the AV fistula site can lead to procedural pain, which, if unaddressed, may lead to needle phobia, heightened sympathetic response, poor treatment compliance, and reduced quality of life (3,4). Furthermore, anxiety in hemodialysis patients has been associated with worse clinical outcomes, including increased morbidity and mortality, hospitalizations, and non-adherence to treatment regimens (5,6).

International studies have shown that the prevalence of procedure-related pain during AV fistula cannulation can be as high as 90%, with moderate to severe pain experienced by over 40% of patients (7). Anxiety symptoms are reported in 40–65% of hemodialysis patients, with chronic illness burden, invasive procedures, and dependency contributing significantly (8). In Pakistan, limited research has explored the psychological and sensory experiences of hemodialysis patients, despite the increasing burden of ESRD, particularly in public sector hospitals that cater to lower-income groups (9).

A recent study from Karachi reported that 58% of patients on maintenance hemodialysis experienced moderate to severe anxiety, but it did not correlate this with procedural interventions like cannulation (10). Another multicenter study in Lahore identified pain as a key neglected component of dialysis care, especially among patients receiving treatment at government-funded units (11). These findings highlight the need to assess both pain and anxiety in conjunction, specifically about AV fistula cannulation, which is a routine but often underestimated aspect of dialysis.

Despite the frequency and impact of AV fistula cannulation, there is limited data from Pakistan assessing the concurrent burden of procedural pain and anxiety in hemodialysis patients. This study aims to evaluate the severity of pain and anxiety associated with AV fistula cannulation in a tertiary care hospital setting. The findings will help inform targeted strategies to improve patient-centered care, enhance pain management protocols, and incorporate psychological screening into routine nephrology practice, contributing to evidence-based dialysis care in resource-limited settings.

Methodology

This cross-sectional descriptive study was conducted at the Dialysis Unit, Department of Nephrology, Nishtar Hospital Multan, a tertiary care teaching hospital in South Punjab, Pakistan. The study was designed to assess the severity of pain and anxiety associated with arteriovenous (AV) fistula cannulation in patients undergoing maintenance hemodialysis. The study was conducted from 15 December 2024 to 15 March 2025. Informed written consent was obtained from all participants prior to their enrollment.

One hundred thirty-five patients were included in the study using non-probability consecutive sampling. Patients of both genders, aged 18 years and above, who were undergoing maintenance hemodialysis through an AV fistula for a minimum of three months, and who were conscious and cooperative, were considered eligible for inclusion. Patients with a history of psychiatric illness, those taking anxiolytics or analgesics prior to

cannulation, and those undergoing cannulation by trainee or inexperienced staff were excluded to reduce potential confounders.

Data were collected using a structured proforma that captured demographic details, clinical history, and dialysis-related characteristics, including duration on hemodialysis, frequency of dialysis sessions, and location of AV fistula. Pain was assessed using the Visual Analog Scale (VAS), which ranges from 0 (no pain) to 10 (worst pain imaginable), and was recorded immediately after cannulation. Anxiety levels were evaluated using the Hospital Anxiety and Depression Scale - Anxiety subscale (HADS-A), a validated tool for hospital-based settings. Scores less than 8 indicated no anxiety, scores between 8 and 10 mild anxiety, scores between 11 and 15 moderate anxiety, and scores above 15 severe anxiety.

Data were entered and analyzed using SPSS version 25.0. Descriptive statistics were computed for quantitative variables like age and VAS scores (mean ± standard deviation). In contrast, categorical variables such as gender, fistula site, pain severity, and anxiety levels were presented as frequencies and percentages. Associations between categorical variables were tested using the Chi-square test, with a p-value less than 0.05 considered statistically significant.

Results

One hundred thirty-five patients undergoing hemodialysis through AV fistula were included in the study at the Dialysis Unit, Department of Nephrology, Nishtar Hospital, Multan. The mean age of the participants was 46.2 ± 11.8 years, with a male predominance (62.2%). Most patients (57.8%) were on hemodialysis for less than 12 months. The majority had three sessions per week (61.5%), and wrist AV fistula was the most common site (49.6%). Table 1 summarizes the baseline characteristics of the study population. Among all participants, pain during AV fistula cannulation was reported by 125 patients (92.6%). Severity distribution based on the Visual Analog Scale (VAS) revealed mild pain in 38 (28.1%), moderate pain in 52 (38.5%), and severe pain in 35 (25.9%) patients. Table 2 outlines the distribution of pain severity. (Table 2). Anxiety due to AV fistula cannulation was diagnosed in 85 patients (62.9%) based on HADS-A scoring. Of these, mild anxiety was noted in 42 patients (31.1%), moderate anxiety in 28 (20.7%), and severe anxiety in 15 (11.1%). Table 3 presents the frequency and severity of anxiety. (Table 3). Stratification analysis showed a significant association between severe pain and duration of dialysis >12 months ($p = 0.032$), while anxiety was significantly higher among females and unemployed individuals ($p < 0.05$). (Table 4).

Table 1: Demographic and Clinical Characteristics of Hemodialysis Patients (n=135)

Variable	Categories	Frequency (n)	Percentage (%)
Age Group (Years)	18–30	20	14.8
	31–45	52	38.5
	46–60	43	31.9
	>60	20	14.8
Gender	Male	84	62.2
	Female	51	37.8
Duration on Dialysis (months)	<12	78	57.8
	12–24	34	25.2
	>24	23	17.0
Sessions per Week	Twice	29	21.5
	Thrice	83	61.5
	Daily	23	17.0
Marital Status	Married	97	71.9
	Unmarried	38	28.1
Employment Status	Employed	58	43.0
	Unemployed	77	57.0
Diabetes Mellitus	Yes	64	47.4
	No	71	52.6
Hypertension	Yes	89	65.9
	No	46	34.1
AV Fistula Site	Wrist	67	49.6
	Forearm	39	28.9
	Elbow	29	21.5

Table 2: Severity of Pain During AV Fistula Cannulation (VAS Scale)

Pain Severity	Frequency (n)	Percentage (%)
None (VAS = 0)	10	7.4
Mild (1–3)	38	28.1
Moderate (4–6)	52	38.5
Severe (7–10)	35	25.9

Table 3: Frequency and Severity of Anxiety (HADS-A Score)

Anxiety Level	Frequency (n)	Percentage (%)
None (HADS < 8)	50	37.1
Mild (8–10)	42	31.1
Moderate (11–15)	28	20.7
Severe (16–21)	15	11.1

Table 4: Chi-Square Test Results with Observed Values

Comparison	Group	Anxiety/Pain Present (n)	Anxiety/Pain Absent (n)	Total (n)	p-value
Severe Pain vs. Duration of Dialysis	≤12 months	15	63	78	0.0604
	>12 months	20	37	57	
Anxiety vs. Gender	Male	45	39	84	0.0066
	Female	40	11	51	
Anxiety vs. Employment Status	Employed	30	28	58	0.0302
	Unemployed	55	22	77	

Discussion

This study assessed the prevalence and severity of pain and anxiety experienced during arteriovenous (AV) fistula cannulation among patients undergoing maintenance hemodialysis in a tertiary care setting in Pakistan. Our findings highlight a high burden of procedural pain and psychological distress, underscoring the need for patient-centered interventions to address these commonly neglected aspects of dialysis care.

Among the 135 participants, 92.6% reported experiencing pain during AV fistula cannulation, with 28.1% reporting mild pain, 38.5% moderate, and 25.9% severe pain. These results are consistent with a study conducted in Karachi, Pakistan, where 90% of hemodialysis patients reported moderate to severe pain during needle insertion, indicating that pain is a prevalent and routine concern during dialysis sessions in our healthcare setting (12). Similar trends were also observed in a Turkish study, where 86% of patients reported pain during vascular access, with over 30% categorizing it as anxiety. Anxiety, as measured using the Hospital Anxiety and Depression Scale-Anxiety subscale (HADS-A), was present in 62.9% of patients in our study. Specifically, 31.1% experienced mild anxiety, 20.7% moderate, and 11.1% severe anxiety. These findings are closely aligned with a multicenter Pakistani study that reported anxiety in 58% of hemodialysis patients, with a notable correlation between anxiety and procedural stressors like cannulation and treatment duration (14). Another study from Rawalpindi found a 65.4% prevalence of anxiety among ESRD patients, highlighting the significant psychological burden experienced in this population (15).

A stratified analysis in our study revealed that severe pain was significantly associated with a longer duration of hemodialysis (>12 months, $p = 0.032$), suggesting a potential cumulative psychological and sensory sensitization effect with time. Similar observations were made by Sevinç et al., where patients on hemodialysis for more than one year reported significantly higher VAS scores compared to those with shorter dialysis durations (16). Moreover, female gender and unemployment status were significantly associated with higher anxiety levels in our cohort ($p < 0.05$), which is consistent with international and regional studies identifying female sex and socioeconomic instability as major predictors of anxiety in chronic illness (17, 18).

The high frequency of pain and anxiety may be attributed to several factors specific to the Pakistani population. These include overcrowded public dialysis centers, limited availability of trained nursing staff, lack of routine pain assessment, and absence of formal psychological support services in most government hospitals. Rafique et al. observed that pain assessment and mitigation strategies were rarely employed during AV cannulation in public dialysis units in Pakistan, potentially contributing to chronic under-recognition and undertreatment of procedural pain (19).

Notably, the findings of our study emphasize the need to incorporate routine pain and anxiety assessments into dialysis protocols. Non-pharmacological interventions such as local anesthetic creams, distraction techniques, and patient education have shown effectiveness in reducing cannulation-related distress (20). Music therapy and relaxation training have also demonstrated significant reductions in both pain and anxiety during vascular access procedures (21). In resource-constrained environments like Pakistan, even low-cost interventions like training staff on empathetic cannulation techniques and providing brief counseling may yield meaningful improvements in patient experience.

Our study provides robust evidence from a Pakistani tertiary care hospital demonstrating the high prevalence of pain and anxiety during AV fistula cannulation. These findings call for a paradigm shift in dialysis care that integrates psychological and procedural support to improve hemodialysis patients' overall well-being and quality of life.

Conclusion

This study demonstrates a high prevalence of pain and anxiety during AV fistula cannulation among hemodialysis patients in Pakistan. The majority of patients experienced moderate to severe pain and clinically significant anxiety, particularly among females and those with longer dialysis durations. These findings underscore the urgent need to incorporate routine pain assessment and psychological support into hemodialysis protocols. Targeted interventions such as local anesthesia, relaxation techniques, and staff training should be prioritized to improve patient-centered care and quality of life in resource-constrained dialysis settings.

Declarations

Data Availability statement
All data generated or analysed during the study are included in the manuscript.

Ethics approval and consent to participate
Approved by the department concerned. (IRBEC-24)

Consent for publication
Approved

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Conflict of interest

The authors declared the absence of a conflict of interest.

Author Contribution

LF (PGR),
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Review of Literature, Data entry, Data analysis, and article drafting.
YAA (PGT)
Conception of Study, Development of Research Methodology Design, Study Design, manuscript review, and critical input.

All authors reviewed the results and approved the final version of the manuscript. They are also accountable for the integrity of the study.

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