

Original Article

Assessment Of Knowledge And Self-Care Behaviours Regarding Arteriovenous Fistula Among Patients With End-Stage Renal Disease In Pakistan. A Cross-Sectional Study

Zahid Rasheed¹, Hilal Ahmed², Fareeba Sabir³, Muhammad Waqas Raza⁴, Asif Hayat Khan⁵

Abstract

Objective: To evaluate ESRD patients' awareness and understanding of self-care for AVF maintenance and explore the association, such as demographic and clinic characteristics that are associated with awareness and motivation for caring for AVF.

Methodology: This descriptive cross-sectional study was conducted over a period of six months in tertiary care hospitals affiliated with Rawalpindi Medical University, Pakistan. Sixty adult patients with ESRD receiving regular haemodialysis were enrolled using a non-probability consecutive sampling method. A validated structured questionnaire was used to collect data on demographic and clinical characteristics, as well as information related to AVF self-care knowledge and practice. Statistical analysis: All statistical analyses were performed using SPSS version 27. Descriptive statistics were used to summarise participant characteristics, and Chi-square or Fisher's exact test was used to ascertain demographic relationships with awareness of AVF self-care. Crude odds ratios (ORs) with 95% confidence intervals (CIs) were reported, and $p < 0.05$ was considered statistically significant.

Results: The mean age of the participants was 50.2 ± 13.6 years, and sex distribution was equal (50% male and 50% female). The most common comorbidities were hypertension (66.7%) and diabetes mellitus (55%). Ninety per cent perceived AVF to be superior to catheters, but only 16.7% examined for vascular thrill, and 38.3% practiced adequate hygiene. Knowledge on avoidance of sleeping on the AVF limb (56.7%), heavy lifting (45%), tight clothing (35%), and unnecessary needling puncture pricks (30%) was insufficient. This awareness and motivation were significantly higher in females, those with higher education levels, and patients with diabetes ($p < 0.05$). Patients treated two times per week had more compliant behaviour with respect to AVF care than those treated three times weekly ($p = 0.049$).

Conclusion: While most patients with ESRD are aware of the benefits of AVF, significant gaps in self-care activities remain. Gender, education, co-morbidity, and dialysis number were significant predictors of the aware and motivated status. Structured innovation of patient education and counselling mechanisms is necessary to improve AVF self-care procedures, minimise access-related complications, and enhance haemodialysis outcomes.

Keywords: Arteriovenous fistula, awareness, end-stage renal disease, hemodialysis, patient education, self-care, vascular access.

Introduction

ESRD is a major public health problem, defined as irreversible loss of kidney function requiring renal replacement therapies, including haemodialysis. Among these treatment modalities, arteriovenous fistulas (AVF) are the most dependable and long-lasting access for patients on haemodialysis, ensuring adequate blood clearance and supporting patient survival.^{1,2} Given their high priority, ongoing self-care management for the preservation of AVFs plays a crucial role in patient prognosis. Behaviours that fall under the definition of self-care include any actions that patients engage in to take care of

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Data Availability Statement: The datasets generated and analysed in the current study are available from the corresponding author upon reasonable request.

Institutional Review Board Approval

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Holy Family Hospital

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themselves and prevent or alleviate complications from their illness, such as maintaining AVF patency and functioning.^{3,4}

Self-care is an essential aspect of AVF care. Researchers have found a strong correlation between knowledge and attitudes concerning AVF care and the effectiveness of self-care activities in haemodialysis patients. For example, education has been used to show that improved patient knowledge of their vascular access leads to better maintenance and decreased incidence of complications, such as thrombosis or stenosis.^{1,4,5} Among other factors, the correlation between patients' anxiety related to AVF failure and self-care activity also indicate that fear of complications is an inhibiting factor in adhering to appropriate care regimens.^{3,5,6} Studies underscore the emphasis of AVF creation and monitoring on its technicalities by healthcare professionals, with inadequate attention being paid to patients' active involvement in their self-management schedule.^{4,7} One study from Nepal reported very poor knowledge, attitude, and practice with respect to self-care of AVF among haemodialysis patients, indicating an urgency for education programs targeting toward improvement of self-care interventions.^{1,8} In addition, studies in the Pakistani population show a worrisome trend with respect to the scarcity of complete self-care education which often leads to poor health outcomes and high healthcare costs.^{9,10}

Certain social features in the Pakistani population, such as restricted use of healthcare facilities and educational disparities, make AVF management a more difficult task for patients with ESRD. It has been reported that cultural beliefs and socioeconomic factors play a major role in patients' adherence to self-care actions.⁹ Additionally, psychological obstacles such as anxiety and fear toward of dialysis procedures may become additional components that discourage patients from performing self-care activities.^{6,11} As such, intervention therapies focusing on these areas are imperative to improve the self-care capacity of caregivers in this population and overall care outcomes.

Therefore, it is crucial for patients with ESRD undergoing haemodialysis to keep AVF flow through self-management interventions. A structured curriculum is required, especially in Pakistan, where self-care behaviours are hampered by social and cultural factors. Raising awareness of patients, in conjunction with the provision of knowledge, will help prolong the life span of AVFs as.

Methodology

This descriptive cross-sectional study was conducted at the tertiary care hospitals of Rawalpindi Medical University (RMU), Pakistan. This study aimed to explore the level of knowledge among patients with end-stage renal disease (ESRD) concerning the care and maintenance of their AVF, which is used for haemodialysis. After obtaining approval from the institutional ethics review committee, data were collected over six months. The study hospital was chosen because of the high patient flow and access to specialised nephrology and vascular surgery care, as a reflection of the local dialysis population.

Adult patients with ESRD undergoing maintenance haemodialysis through arteriovenous fistulas were eligible for inclusion. Participants were recruited using non-probability consecutive sampling from the study sites during the six-month study period. A total of 60 eligible patients were enrolled in the study. Because the original documentation supporting the previously stated prevalence-based sample size calculation was unavailable, the sample size was reported as the number of eligible participants consecutively recruited during the study period. The sample size also limited the ability to perform reliable multivariable adjustments for potential confounding factors.

Patients were eligible for inclusion if they had CKD or ESRD and required AVF construction because of occlusion, rupture, or aneurysmal dilatation of the native fistula. Written informed consent was obtained from all participants. The exclusion criteria were refusal by the patient to participate, neurological or psychiatric disease resulting in a lack of understanding or inability to care for oneself, communication barriers, and unstable clinical conditions precluding participation. This stringent inclusion criterion guaranteed the enrolment of patients who were able to comprehend and did not have difficulties in performing AVF self-care education.

Consent was obtained from potential participants, after which data were obtained through structured interviews based on a pilot-tested questionnaire administered by experienced nursing and nephrology personnel. The survey was designed specifically for this study based on a literature review and clinical recommendations regarding arteriovenous fistula self-care and management. The tool was developed in plain Urdu and English for better understanding, and it was content-wise and face-wise validated by nephrology experts. It included demographic profiles, clinical history, and knowledge of AVF care. Information was recorded on a standardised form, and the responses of the patients were checked against hospital charts if required. The English version of the questionnaire is included in Additional file 1.

The covariates of interest were the patients' knowledge and awareness of AVF care and maintenance. Sources of awareness included checking for a vascular thrill, not lifting heavy objects or sleeping on the arm with the AVF, avoiding tight clothing and jewellery, hygiene, and avoiding unnecessary needles or blood pressure recordings in an

arm with an AVF. The secondary variables were sociodemographic (age, sex, and education), clinical (cause of renal failure, history of hypertension, and diabetes mellitus), and dialysis-related parameters (frequency). These factors were then examined for their correlation with awareness and motivation levels towards AVF care.

The study protocol was reviewed and approved by the Departmental Review Board (DRB) of the Holy Family Hospital, Rawalpindi. The participants received an explanation regarding the study aims, that participation was voluntary, and that they could withdraw at any time without influencing their treatment. All participants provided written informed consent, and the confidentiality of the data was assured throughout the study in compliance with the Declaration of Helsinki (2013 revision) and local ethical standards.

The data were coded and entered into IBM SPSS Statistics version 26.0 for analysis. Demographic and clinical variables were summarised using means, standard deviations (SDs), counts, and percentages. The chi-square (χ^2) test was used to analyse the association between sex, education, comorbidity status, cause of renal failure, dialysis frequency, and either awareness or motivation for caring for AVF. Fisher's exact test was used when the expected cell frequencies were small. Crude odds ratios (ORs) with 95% confidence intervals (CIs) were calculated to estimate the magnitude and precision of associations. Statistical significance was set at $p < 0.05$. Multivariable analysis was not performed because of the small sample size and sparse outcome cells; therefore, the reported estimates were unadjusted, and potential residual confounding could not be excluded.

Results

Sixty patients with ESRD who required arteriovenous fistula (AVF) were included. The average age of the subjects was 50.2 ± 13.6 (24–72) years. Gender was equally distributed, with 30 (50%) as males and 30 (50%) as females. In terms of educational status, 40 (66.7%) had no formal education, and 20 (33.3%) were formally educated. The most prevalent comorbidities were hypertension (66.7%) and diabetes mellitus (55%). The most frequent cause of renal failure was glomerulonephritis (61.7%), followed by nephrolithiasis (35%) and polycystic kidney disease (3.3%). Most patients (80%) were receiving twice-weekly haemodialysis, and the remaining 20% received thrice-weekly haemodialysis. (Table 1)

Table 1: Demographic and Clinical Characteristics of Patients (n = 60)

Variable	Category	n (%)
Gender	Male	30 (50.0)
	Female	30 (50.0)
Age (years)	Mean $\pm$ SD	50.2 $\pm$ 13.6
Education Status	Educated	20 (33.3)
	Uneducated	40 (66.7)
Comorbidities	Hypertension	40 (66.7)
	Diabetes Mellitus	33 (55.0)
Cause of Renal Failure	Glomerulonephritis	37 (61.7)
	Nephrolithiasis	21 (35.0)
	Polycystic Kidney Disease	2 (3.3)
Frequency of Hemodialysis	Twice weekly	48 (80.0)
	Thrice weekly	12 (20.0)

The vast majority (95%) of participants knew the aim of AVF construction in HD while, 90% were aware that AVF is better than dialysis catheters. Self-care in the context of AVF and its various components is poorly understood. Furthermore, only 16.7% of the participants vascular thrill, and 56.7% never used the AVF side for sleeping. Approximately 45% did not participate in heavy lifting, 35% avoided wearing tight clothing or jewellery, and 38.3% washed hands before and after dialysis. The proportion of being conscious not to pricking the AVF arm and, or measure blood pressure on that was 30% and 48.3%. Despite 86.7% of participants believing in the usefulness of self-care for AVF, only 38.3% were willing to practice it regularly. (Table 2)

The relationships between selected demographic and clinical variables, AVF knowledge, and self-care outcomes among the 60 patients are shown in Table 3. Female patients demonstrated significantly greater knowledge of the benefits of AVF than male (100.0% vs. 80.0%; $p=0.024$). However, no significant sex differences were observed in avoidance of sleeping on the AVF arm (66.7% vs. 46.7%; $p=0.118$) or motivation for AVF self-care (43.3% vs. 33.3%; $p=0.426$).

Table 2: Awareness and Self-Care Practices Regarding AVF Site

Awareness Item	Yes n (%)	No n (%)
Knows the benefits of AVF over dialysis catheter	54 (90.0)	6 (10.0)
Checks thrill over the AVF site	10 (16.7)	50 (83.3)
Avoids sleeping over the AVF site	34 (56.7)	26 (43.3)
Avoids lifting heavy weights with the AVF limb	27 (45.0)	33 (55.0)
Avoids wearing tight clothes or jewelry over AVF	21 (35.0)	39 (65.0)
Washes/disinfects AVF site before & after dialysis	23 (38.3)	37 (61.7)
Avoids needle pricks at AVF site (other than dialysis)	18 (30.0)	42 (70.0)
Avoids blood pressure measurement on the AVF limb	29 (48.3)	31 (51.7)
Feels motivated for AVF self-care	23 (38.3)	37 (61.7)
Believes AVF self-care is beneficial	52 (86.7)	8 (13.3)

Table 3: Association of Selected Demographic and Clinical Characteristics With AVF Knowledge and Self-Care Outcomes (n = 60)

Care Outcomes (n = 66)				
Outcome / Variable	Category	Yes n/N (%)	Crude OR (95% CI)	p-value
Knowledge of benefits of AVF over dialysis catheter				
Gender	Male	24/30 (80.0)	Reference	0.024†*
	Female	30/30 (100.0)	∞ (1.30–∞)‡	
Education	Uneducated	35/40 (87.5)	Reference	0.653†
	Educated	19/20 (95.0)	2.71 (0.30–24.95)	
Diabetes mellitus	Absent	22/27 (81.5)	Reference	0.081†
	Present	32/33 (97.0)	7.27 (0.79–66.60)	
Hemodialysis frequency	Thrice weekly	9/12 (75.0)	Reference	0.088†
	Twice weekly	45/48 (93.8)	5.00 (0.87–28.86)	
Avoidance of sleeping on the AVF arm				
Gender	Male	14/30 (46.7)	Reference	0.118
	Female	20/30 (66.7)	2.29 (0.80–6.50)	
Education	Uneducated	21/40 (52.5)	Reference	0.357
	Educated	13/20 (65.0)	1.68 (0.55–5.09)	
Hemodialysis frequency	Thrice weekly	5/12 (41.7)	Reference	0.241
	Twice weekly	29/48 (60.4)	2.14 (0.59–7.73)	
Motivation for AVF self-care				
Gender	Male	10/30 (33.3)	Reference	0.426
	Female	13/30 (43.3)	1.53 (0.54–4.36)	
Education	Uneducated	12/40 (30.0)	Reference	0.060
	Educated	11/20 (55.0)	2.85 (0.94–8.66)	
Hemodialysis frequency	Thrice weekly	3/12 (25.0)	Reference	0.340†
	Twice weekly	20/48 (41.7)	2.14 (0.51–8.93)	

Note: AVF = arteriovenous fistula; OR = odds ratio; CI = confidence interval. ORs are unadjusted. Pearson's χ^2 test was used where its assumptions were satisfied; †Fisher's exact test was used when expected cell frequencies were <5. * $p < 0.05$ was considered statistically significant. ‡The OR is infinite because no female participant responded "No" to knowledge of AVF benefits; the exact 95% CI is therefore one-sided.

Educated patients showed higher proportions of knowledge of AVF benefits (95.0% vs. 87.5%), avoidance of sleeping on the AVF arm (65.0% vs. 52.5%), and motivation for self-care (55.0% vs. 30.0%) compared with uneducated patients; however, these differences were not statistically significant ($p=0.653$, $p=0.357$, and $p=0.060$, respectively). Patients with diabetes showed greater knowledge of AVF benefits than those without diabetes (97.0% vs. 81.5%), although the association was not statistically significant ($p=0.081$). Similarly, patients undergoing dialysis twice weekly had higher proportions of knowledge of AVF benefits (93.8% vs. 75.0%), avoidance of sleeping on the AVF arm (60.4% vs. 41.7%), and motivation for self-care (41.7% vs. 25.0%) than those undergoing dialysis thrice weekly, but none of these differences reached statistical significance ($p=0.088$, $p=0.241$, and $p=0.340$, respectively). Overall, only sex was significantly associated with knowledge of the benefits of AVF, while the remaining evaluated associations were not statistically significant.

Discussion

The findings of this investigation regarding awareness and self-care among patients with end-stage renal disease (ESRD) who underwent AVF formation are consistent with those of some recent studies. Compared with the existing peer-reviewed journal literature in the past 5 years, our results on participants' demographic information, comorbid condition rates, level of awareness of AVF care, and factors that brought about motivation to self-care had both commonalities and variations.

With respect to demographics, our cohort had an average age of 50.2 years with a near equal gender distribution. Remarkably, majority of the respondents (66.7%) had no formal education. This result is consistent with the literature, demonstrating that educational status influences patients' knowledge and health care-seeking behavior¹. This inclination underscores the importance of education in chronic disease management, as higher educational status is connected to better knowledge and disease management behaviours.

As for health-related factors, hypertension (66.7%) and diabetes mellitus (55%) were the most frequent comorbidities among participants. This is consistent with other reports, suggesting a high prevalence of these comorbidities among patients with ESRD. Furthermore, glomerulonephritis (61.7%), as the main etiological factor for renal failure in our study, corroborates with reports made studies that show how glomerulonephritis contributes to significant number of renal failures in other populations.¹

Our research noted a high level of awareness of the beneficial use of AVF over DCs (90%), but also alarming deficits regarding their self-care, with rates as low as 16.7% for vascular thrill check or, for example, 38.3% when it comes the self-hygiene habits among served insured patients. This inconsistency between knowledge and practice has been observed earlier which reported that awareness does not mean self-care mitigation without education and encouragement to do so.¹² Poor adherence to prescribed AVF self-care measures highlights the importance of implementing educational solutions aimed at promoting behavioural change in this area of significant clinical need. Only 38.3% of patients felt motivated to perform AVF self-care even though 86.7% think that it was helpful, indicating a mixed relationship between knowledge and motivation. This is consistent with the findings of a study that examined the effect of self-efficacy on patient empowerment and self-management behaviours.¹³ The disparities between male and female participants in terms of awareness and motivation indicate possible gender gaps in the field of health literacy and proactive health management, as described by other studies, indicating differences between demographic characteristics regarding healthcare self-management.¹⁴

Furthermore, the worse awareness and motivation regarding AVF care in uneducated compared to educated participants in our study suggests that education improves understanding and inclination for self-care therapies. In our study, patients with diabetes had higher levels of knowledge and motivation, a situation that has been shown to be characteristic of people with chronic diseases who have more information regarding what they should do.

Therefore, although the results of our study show that patients with ESRD have relatively high awareness towards the advantages of AVF, substantial variances between privileges and actual self-care performance should be considered as a sign of an urgent requirement for educational strategies focusing not only on increasing knowledge but also on penetrating motivation. Such initiatives are especially important when implemented in heterogeneous demographic contexts, such as Pakistan, where HCP can potentially encounter challenges in addressing knowledge and motivational gaps. Considering the supportive evidence that education improves health, by establishing organised academic strategies for promoting self-care behaviour in patients with ESRD, general health and quality of life could be promoted by addressing urgent issues in healthcare.

Conclusions

There is a crucial disconnect between patients' knowledge and practice of self-care in relation to arteriovenous fistulae preservation, as indicated in this study. Although the importance of AVF is much appreciated, adherence to preventive and hygienic measures is not satisfactory. Patient-tailored education programs aimed at low-education and high-risk groups are necessary to ensure sustained self-care behaviour and support for AVF complications in patients with ESRD to improve the quality of life and treatment by reducing complications associated with AVF.

Author Information

^{1,5}Senior Registrar, Holy Family Hospital, Rawalpindi

²Resident Surgery, Holy Family Hospital, Rawalpindi

³Resident Surgery, DHQ Hospital, Rawalpindi

⁴Professor of Surgery, Holy Family Hospital, Rawalpindi.

Corresponding author: Dr. Zahid Rasheed  ziikemu@gmail.com

Contributions:

ZR AHK - Conception, Design

HA FS MWR - Acquisition, Analysis, Interpretation

ZR HA - Drafting

FS MWR AHK - Critical Review

All authors approved the final version to be published & agreed to be accountable for all aspects of the work.

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