

Impact of Type of Hemodialysis Access on HRQOL on Patients Undergoing Hemodialysis

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ABSTRACT

Objective: to measure the relationship between the type of vascular access and HRQOL in patients undergoing dialysis in a tertiary care hospital.

Study Design: Cross-sectional study.

Place and Duration of Study: Department of Vascular Surgery and Nephrology, Combined Military Hospital, Lahore Pakistan, from Jan to Jun 2021.

Methodology: Data was collected by dialysis centre nurses and duty doctors on patients meeting the inclusion criteria. It was a short-form 36(SF-36) questionnaire which included health-related quality of life in terms of physical symptoms, social functions and access-related complications in the last four weeks on a score of 0 to 3. Higher scores showed poorer quality of life.

Results: A total of 80 patients were recruited in our study. A total of 80 patients participated in the study. Male predominance was observed 59(73.8%). The mean age of the patients was 53 ± 13.9 years. Mean HRQOL score in AVF was 3.8 ± 4.8 , which was the lowest; followed by tunnelled dialysis catheter (TDC) 9.7 ± 4.5 and non-tunnelled double lumen catheter (NTDC) 11.8 ± 9.1 .

Conclusion: The HRQOL assessment in ESRD patients can inform medical professionals of the efficacy of treatment interventions. It also plays a significant role in improving patient care, evaluating patients' needs, setting treatment goals, and tracking disease progression.

Keywords: Arteriovenous fistula, Non-tunnelled catheter, Quality of life, Tunnelled catheter.

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INTRODUCTION

Chronic kidney disease (CKD) is a major health concern growing worldwide. Gradual deterioration inevitably results in end-stage renal disease (ESRD), which warrants treatment with hemodialysis.¹ Due to growing numbers of elderly patients and betterment in dialysis techniques, the number of dialysis patients is expected to rise annually by approximately 6%.² In 2010, an estimated 1.9 million ESRD patients were on RRT globally.³ The significance of measuring HRQOL in ESRD patients has been highlighted by studies that show a relationship between numerous health-related quality of life (HRQOL) measures and mortality and hospitalization rates in dialysis patients.⁴

Patients undergoing hemodialysis are proven to have lower HRQOL and are at risk of several complications, such as depression, malnutrition, inflammation, impaired cognition and memory loss. Improving HRQOL will decrease these complications of CKD and make the condition more tolerable for patients.⁵ The vascular access type used for dialysis is a factor that can be modified for HRQOL in patients with ESRD.⁶ The main types of vascular access are

arteriovenous fistula (AVF), arteriovenous graft (AVG) and central venous catheter (CVC). Access to AVF is associated with a lower mortality rate and hospitalizations.⁶ AVF is generally preferred over AVG as they have better secondary patency and a lower risk of infection. However, they have a greater primary failure rate than AVGs of about 20%.⁷ CVCs are less preferred as they are not long-lasting and have a high risk of infection, making patients susceptible to more hospitalizations. Patients using a CVC for hemodialysis have a greater mortality risk than with AVF or AVG. It can negatively impact HRQOL in patients.⁸⁻¹⁰

Since all access has pros and cons, the best dialysis access in terms of effective dialysis may not provide the optimum quality of life in terms of pain, visibility of a dilated vein, bathing and hygiene. This infers that a patient's perspective of good dialysis access may be different from an access surgeon. The study aimed to measure the association between the type of vascular access and HRQOL in patients undergoing dialysis in a tertiary care hospital in Lahore, Pakistan.

METHODOLOGY

This cross-sectional study was conducted at the Vascular Surgery and Nephrology Department,

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Combined Military Hospital, Lahore Pakistan, from January 2021 to June 2021 after approval from the Ethical Review Committee (ERB#302/2021). The consecutive sampling technique was used.

Inclusion Criteria: Patients of either gender, aged between 20 to 70 years and on maintenance haemodialysis due to chronic kidney disease after taking informed consent were included in the study.

Exclusion Criteria: Patients who had difficulty understanding the questionnaire refused to participate in the study; pregnant females with CKD and those undergoing emergency haemodialysis due to acute kidney injury were not part of the study.

Data collection was done by dialysis centre nurses and doctors after a brief explanation and understanding of the questionnaire. The first part of the questionnaire was based on patients' demographics, aetiology and CKD duration, frequency of haemodialysis, and type of dialysis access. The second part of the questionnaire comprised of short-form survey 36 (SF-36) the questionnaire defines the health-related quality of life in terms of physical symptoms, social functions and access-related complications on a score of 0 to 3, where 0=not at all, 1=sometimes, 2=most of the time, and 3=always. In the end, an open-ended question was incorporated so patients could tell their concerns during the last four weeks. The SF-36 questionnaire was translated into Urdu for patients' understanding. Low HRQOL scores were superior in terms of quality of life to high HRQOL scores.

Data was entered in Statistical Package for the social sciences (SPSS) version 22:00. Mean and SD was calculated for the qualitative variable by independent t-test. Frequency and percentage for the quantitative variable by chi-square test. The *p*-value of ≤ 0.05 was considered statistically significant.

RESULTS

A total of 80 patients participated in the study. Male predominance was observed, with 59(73.8 %) male patients. The mean age of the patients was 53 ± 13.9 , most of which fall in the age group between 50 and 60 years 25(31.3%). When patients were interviewed regarding the cause of their chronic kidney disease, 45(56.3%) believed it was due to hypertension, whereas 15(18.8%) believed long standing diabetes mellitus was its cause.

Thirty-six (45%) were on haemodialysis for less than one year, and 51(63.8%) were on three weekly haemodialysis sessions. The current haemodialysis

access of patients was shown in Figure-1, which depicts that the most common access was arteriovenous fistula (AVF) IN 68% of patients. A non-tunnelled double-lumen dialysis catheter was passed twice in 28(35%) of the patient and even six times in 2(2.5%) patients, as shown in Figure-2. The mean HRQOL score of patients with AVF was 3.8 ± 4.68 , tunnelled dialysis catheter (TDC) 9.7 ± 4.5 and non-tunnelled double lumen catheter(NTDC) 11.8 ± 9.1 . As there was just one patient with AVG, his mean HRQOL could not be calculated.

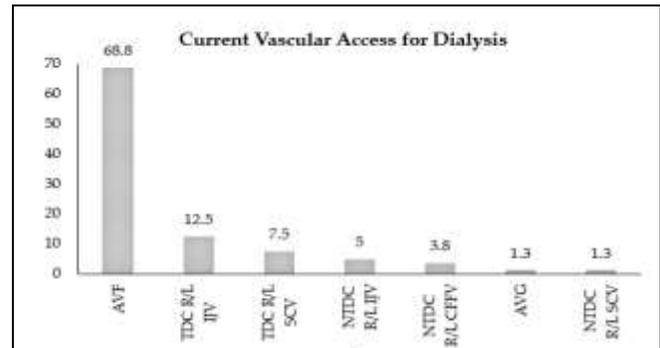


Figure-I: Haemodialysis access of patients (n=80)

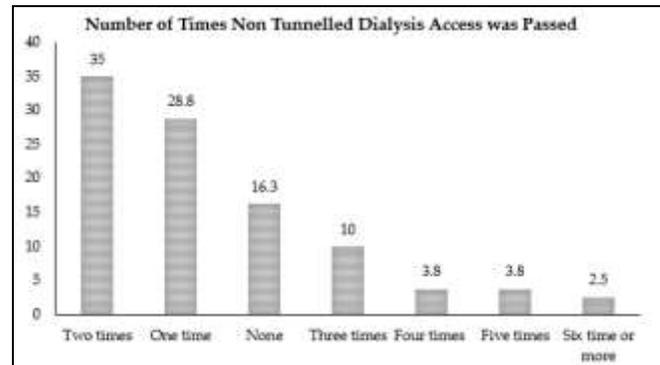


Figure- II: Number of times Double Lumen Dialysis Catheter was passed (n=80)

The patients' responses were recorded as per SF-36 questionnaire regarding physical symptoms, shown in the Table-I, while social function of SF-36 was shown in the Table-II. Dialysis access-related complications were presented Table-III.

DISCUSSION

Over the past century, the extensive use of maintenance dialysis to prolong life and the development of numerous surgical techniques for the creation of arteriovenous fistulas and grafts has been a noteworthy achievement resulting in improved survival of the patients.^{11,12}

Patients Undergoing Hemodialysis

Table-I: shows Vascular access questionnaire pertaining to physical symptoms (n=80)

	Arteriovenous Fistula n(%)	Arteriovenous Graft n(%)	Non-Tunneled Catheters n(%)	Cuffd Tunnelled catheters n(%)	p-value
Pain at HD site					
Worried always	0(0.0)	0(0.0)	1(12.5)	1(6.3)	0.35
Worried mostly	7(12.7)	0(0.0)	0(0.0)	1(6.3)	
Worried sometime	8(14.5)	0(0.0)	2(25.0)	5(31.3)	
Never worried	40(72.7)	1(100)	5(62.5)	9(56.3)	
Swelling at HD site					
Worried always	1(1.8)	0(0.0)	0(0.0)	1(6.3)	0.02
Worried mostly	2(3.6)	0(0.0)	0(0.0)	4(25.0)	
Worried sometime	10(18.2)	0(0.0)	5(62.5)	3(18.8)	
Never worried	42(76.4)	1(100)	3(37.5)	8(50.0)	
Bleeding at HD site					
Worried always	2(3.6)	0(0.0)	0(0.0)	0(0.0)	0.2
Worried mostly	1(1.8)	0(0.0)	1(12.5)	3(18.8)	
Worried sometime	7(12.7)	0(0.0)	2(25.0)	0(0.0)	
Never worried	45(81.3)	1(100)	5(62.5)	13(18.3)	
Bruising at HD site					
Worried always	1(1.8)	0(0.0)	1(12.5)	2(12.5)	0.16
Worried mostly	1(1.8)	0(0.0)	1(12.5)	3(18.8)	
Worried sometime	9(16.4)	0(0.0)	2(25.0)	1(6.3)	
Never worried	44(80.0)	1(100)	4(50.0)	10(62.5)	

Table-II: Vascular Access Questionnaire pertaining to Social Function (n=80)

	AVF n(%)	AVG n(%)	Non-Tunneled Catheters n(%)	Cuffd Tunnelled Catheters n(%)	p-value
Difficulty During Daily Activities					
Worried mostly	2(3.6)	0(0.0)	2(25.0)	0(0.0)	0.33
Worried mostly	4(7.3)	0(0.0)	1(12.5)	3(18.8)	
Worried sometimes	11(20.0)	0(0.0)	1(12.5)	3(18.8)	
Never worried	38(69.1)	1(100)	4(50.0)	10(62.5)	
Worried Due to Access Line Visibility					
Worried mostly	2(3.6)	0(0.0)	2(25.0)	0(0.0)	0.2
Worried mostly	4(7.3)	0(0.0)	1(12.5)	1(6.3)	
Worried sometimes	3(5.5)	0(0.0)	0(0.0)	3(18.8)	
Never worried	46(83.6)	1(100)	5(62.5)	12(75.0)	
Difficulty During Bathing					
Worried mostly	0(0.0)	0(0.0)	1(12.5)	3(18.8)	<0.001
Worried mostly	3(5.5)	0(0.0)	4(50.0)	3(18.8)	
Worried sometimes	0(0.0)	0(0.0)	1(12.5)	3(18.8)	
Never worried	52(94.5)	1(100)	2(25.0)	7(43.8)	
Difficulty During Sleeping					
Worried mostly	1(1.8)	0(0.0)	2(25.0)	2(12.5)	<0.001
Worried mostly	9(16.4)	0(0.0)	3(37.5)	5(31.3)	
Worried sometimes	7(12.7)	0(0.0)	0(0.0)	8(50.0)	
Never worried	38(69.1)	1(100)	3(37.5)	1(6.3)	

During this current study, 80 patients with CKD on haemodialysis were studied. More than half of the respondents were males, 59(73.8%), similar to a study conducted nationally in Karachi in 2012.¹³ It was also consistent with the findings in global studies.¹⁴ carried out in various countries in North America, Eastern Europe, Southern Asia and the Middle East during

2016 that there is a male predominance in renal replacement therapy (RRT).

Most of them were in the age group of 51 to 70. Previous studies in Pakistan.¹⁵ and other South Asian countries.¹⁶ (India, Bangladesh, Pakistan and Nepal) provided similar results. Advanced age was found to be the most strongly associated risk factor. Renal

Patients Undergoing Hemodialysis

Table-III: Vascular Access Questionnaire pertaining to Dialysis related Complications (n=80)

	Arteriovenous Fistula n(%)	Arteriovenous Graft n(%)	Non-Tunneled Catheters n(%)	Cuffed Tunneled Catheters n(%)	p- value
Difficulty during function of access in the last month					
Worried mostly	1(1.8)	0(0.0)	2(25.0)	1(6.3)	<0.001
Worried mostly	5(9.1)	0(0.0)	3(37.5)	4(25.0)	
Worried sometimes	8(14.5)	0(0.0)	1(12.5)	6(37.5)	
Never worried	41(74.5)	1(100)	2(25.0)	5(31.3)	
Dressing and cleanliness of access site					
Worried mostly	0(0.0)	0(0.0)	1(12.5)	0(25.0)	0.01
Worried mostly	1(1.8)	0(0.0)	2(25.0)	4(6.3)	
Worried sometimes	5(9.1)	0(0.0)	1(12.5)	1(68.8)	
Never worried	49(89.1)	1(100)	4(50.0)	11(68.8)	
Hospital visit anxiety due to working of access site					
Worried mostly	3(5.5)	0(0.0)	1(12.5)	0(0.0)	0.45
Worried mostly	3(5.5)	0(0.0)	2(25.0)	7(43.8)	
Worried sometimes	3(5.5)	0(0.0)	0(0.0)	1(6.3)	
Never worried	46(83.6)	1(100)	5(62.5)	8(50.0)	
Anxiety regarding working of access site					
Worried mostly	3(5.5)	0(0.0)	0(0.0)	2(12.5)	0.27
Worried mostly	4(7.3)	0(0.0)	2(25.0)	5(31.3)	
Worried sometimes	7(12.7)	0(0.0)	2(25.0)	1(6.3)	
Never worried	41(74.5)	1(100)	49(50.0)	8(50.0)	

function (GFR) starts to decline even in a healthy individual after 30 to 40 years of age, which further deteriorate after 50–60 years due to structural changes in kidneys as part of a normal physiological process. The higher prevalence of other co-morbidities can also describe the steep prevalence of CKD among the elderly.^{17,18}

Health-related quality of life (HRQOL) is one of the chief outcome measures after initiating renal replacement therapy and is known to be a good predictor of mortality in hemodialysis (HD) patients. Higher scores are interpreted as better dissatisfaction.^{19,20} The questionnaire used was similar to the one used in a study done in Pennsylvania.²¹

Of the total 80 respondents, 55(68.5%) had AVF, 16(18.18%) had tunneled cuffed catheter, 8(9%) had non-tunneled catheters, while only 1(1.13%) had AVG. The prevalence of AVF in our study is attributed to the fact that most of the patient is because of a well-established Vascular Surgery department and small waiting list. Dialysis catheters have ports for the cannulation, so essentially, dialysis needle insertion is painless in TDC and NTDC in contrary to AVF. However, the catheter is a foreign body that gives the patient a sense of constant irritation. Therefore, more patients reported pain in TDC and NTDC, which was statistically insignificant.

Three out of 8(3.7%) and 3/16(18.7%) patients were worried about their physical appearance in the TDC and NTDC group, whereas the number in the AVF group was 9/55(16%). Patients were satisfied despite the disfigurement caused by the draining vein enlargement and aneurysm formation of an AVF.

The accessibility of various renal replacement therapies (RRT) has reduced the severity of symptoms and resulted in extended survival of patients with CKD. However, long-term dialysis Focus on HRQOL outcomes in no way disregards the health magnitudes of temporary catheters or health benefits of AVF but rather recognizes that it has real consequences on patient's health outcomes such as their vascular access not working, their access being difficulty to care for, or being worried about requiring hospitalization or replacement of the access.²¹ For the surgeons, understanding the association of vascular access type with HRQOL can help improve the patients' functioning by providing patient-centred dialysis access recommendations and creating operational access that does not impose excessive social or physical disability on patients.

LIMITATION

Besides being a single-centre study with a small sample size, just one patient underwent AVG compared to the fair distribution of other types of access. In addition, all the answers were subjected to recall bias of patients.

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CONCLUSION

Incorporating HRQOL assessment in the care of end-stage renal disease (ESRD) patients is a key intervention. The HRQOL assessment in ESRD patients can inform the medical professionals on how effective the treatment interventions are, and it is also important in improving patient care, helps in better evaluation of their needs, assessing disease progression and setting treatment goals accordingly. Along with annually evaluating HQROL measurements, frequent evaluation of targeted symptoms should be done to help provide appropriate intervention for the symptoms and effective communication between care providers.

Conflict of Interest: None.

Author's Contribution

Following authors have made substantial contributions to the manuscript as under:

AA & MZ: Data acquisition, data analysis, drafting the manuscript, critical review, approval of the final version to be published.

NMM: Conception, study design, drafting the manuscript, approval of the final version to be published.

JK & AS & AMB: Critical review, data interpretation, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

REFERENCES

- Zyoud SH, Daraghmeh DN, Mezyed DO. Factors affecting quality of life in patients on haemodialysis: A cross-sectional study from Palestine. *BMC Nephrol* 2016; 17(1): 1-12.
- Gadaen RJR, Kooman JP, Cornelis T, Van Der Sande FM, Winkens BJ, Broers NJH. The Effects of Chronic Dialysis on Physical Status, Quality of Life, and Arterial Stiffness: A Longitudinal Study in Prevalent Dialysis Patients. *Nephrology* 2021; 145(1): 44-54. doi:10.1159/000510624.
- Mills KT, Xu Y, Zhang W. A systematic analysis of worldwide population-based data on the global burden of chronic kidney disease in 2010. *Kidney Int* 2015; 88(5): 950-957.
- Mujais SK, Story K, Brouillette J. Health-related quality of life in CKD Patients: correlates and evolution over time. *Clin J Am Soc Nephrol* 2009; 4(8): 1293-1301. doi:10.2215/CJN.05541008.
- Pakpour AH, Saffari M, Yekaninejad MS, Panahi D, Harrison AP, Molsted S. Health-related quality of life in a sample of iranian patients on hemodialysis. *Iran J Kidney Dis* 2010; 4(1): 50-59.
- Kim DH, Park JI, Lee JP. The effects of vascular access types on the survival and quality of life and depression in the incident hemodialysis patients. *Renal Fail* 2020; 42(1): 30-39.
- Allon M. Vascular access for hemodialysis patients: New data should guide decision making. *Clin J Am Soc Nephrol* 2019; 14(6): 954-961. doi:10.2215/CJN.00490119.
- Afsar B, Elsurer R, Covic A, Kanbay M. Vascular access type, health-related quality of life, and depression in hemodialysis patients: a preliminary report. *J Vasc Access* 2012; 13(2): 215-220.
- Moura A, Madureira J, Alija P. Type of vascular access and location in online hemodiafiltration and its association with patient's perception of health-related quality of life. *J Vasc Access* 2014; 15(3): 175-182. doi:10.5301/jva.5000182.
- Arshad AR, Khan G, Amjad Z, Butt B, Islam F, Qayyum M, et al. Predicting Quality Of Life In Haemodialysis Patients. *Pak Armed Forces Med J* 2019; 69(1): 175-181.
- GBD Chronic Kidney Disease Collaboration. Global, regional, and national burden of chronic kidney disease, 1990-2017: a systematic analysis for the Global Burden of Disease Study 2017. *Lancet* 2020; 395(10225): 709-733.
- Himmelfarb J, Ikizler TA. Hemodialysis. *N Engl J Med* 2010; 363(19): 1833-1845. doi: 10.1056/NEJMra0902710.
- Imran S, Sheikh A, Saeed Z, Khan SA, Malik AO, Patel J, et al. Burden of chronic kidney disease in an urban city of Pakistan, a cross-sectional study. *J Pak Med Assoc* 2015; 65(4): 366-369.
- Bikbov B, Perico N, Remuzzi G; on behalf of the GBD Genitourinary Diseases Expert Group. Disparities in Chronic Kidney Disease Prevalence among Males and Females in 195 Countries: Analysis of the Global Burden of Disease 2016 Study. *Nephron* 2018; 139(4): 313-318. doi: 10.1159/000489897.
- Alam A, Amanullah F, Baig-Ansari N, Lotia-Farrukh I, Khan FS. Prevalence and risk factors of kidney disease in urban Karachi: baseline findings from a community cohort study. *BMC Res Notes* 2014; 7(1): 179. doi.org/10.1186/1756-0500-7-179.
- Hasan M, Sutradhar I, Gupta RD, Sarker M. Prevalence of chronic kidney disease in South Asia: a systematic review. *BMC Nephrol* 2018; 19(1): 291. doi: 10.1186/s12882-018-1072-5.
- Jessani S, Bux R, Jafar TH. Prevalence, determinants, and management of chronic kidney disease in Karachi, Pakistan-a community based cross-sectional study. *BMC Nephrol* 2014; 15(1): 1-9. doi:10.1186/1471-2369-15-90.
- Stevens PE, Levin A; Kidney Disease: Improving Global Outcomes Chronic Kidney Disease Guideline Development Work Group Members. Evaluation and management of chronic kidney disease: synopsis of the kidney disease: improving global outcomes 2012 clinical practice guideline. *Ann Intern Med* 2013; 158(11): 825-830. doi: 10.7326/0003-4819-158-11-20130604-0000 7.
- Rizvi SA, Anwar Naqvi SA, Zafar MN, Hussain Z, Hashmi A, Akhtar F, et al. Pakistan abolishes kidney market and ushers in a new era of ethical transplantation. *Int J Organ Transplant Med* 2010; 1(4):1 93-197.
- Momeni A, Mardani S, Kabiri M, Amiri M. Comparison of Complications of Arteriovenous Fistula with Permanent Catheter in Hemodialysis Patients: A Six-month Follow-up. *Adv Biomed Res* 2017; 6: 106. doi: 10.4103/2277-9175.213666.
- Diomenick Sridharan N, Fish L, Yu L, Weisbord S, Jhamb M, Makaroun MS, et al. The associations of hemodialysis access type and access satisfaction with health-related quality of life. *J Vasc Surg* 2018 ; 67(1): 229-235. doi: 10.1016/j.jvs.2017.05.131.