

DEMOGRAPHIC CORRELATES OF PERCEIVED HEALTH STATUS AFTER RENAL TRANSPLANTATION

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Date Submitted: February 09, 2016

Date Revised: August 25, 2016

Date Accepted: August 30, 2016

ABSTRACT

OBJECTIVES: to identify the demographic factors that can make recipients vulnerable to develop poorer perceptions of health despite a healthy graft functioning and to evaluate recipients' perceived health status (PHS) influences their coping and adjustment with the altered life styles and challenges after transplant.

METHODS: In this longitudinal study, PHS was measured by a self-developed questionnaire that reflected the symptoms' severity and frequency measured by the common immunosuppressant side effects. Actual physical health status was measured by the clinical data that comprised of kidney function tests (serum creatinine, blood urea nitrogen, uric acid) and general health indicators such as blood pressure, cholesterol and haemoglobin levels.

RESULTS: There was significant correlation among sociodemographic factors and perceptions of health status after a successful renal transplant over time. Age had a significant negative association with PHS, indicating that older recipients tend to have poorer perceptions of health as compared to younger recipients. Single RTRs tend to have more a better PHS than those in a relationship. Time since transplantation showed a significant positive correlation with PHS reflecting that with the passage of time, perceptions of health tend to improve in most RTRs.

In Sociodemographic factors, significant differences were found only in age and marital status. Older and single recipients tend to report better PHS. However, PHS did not differ significantly across gender, educational level, financial and work status.

CONCLUSION: Socio-demographic factors do affect PHS to some extent and thus need to be considered as a part of transplant candidacy and psychological management accordingly.

KEY WORDS: Perceived Health Status (Non-MeSH), Actual Physical Health Status (Non-MeSH), Renal Transplant Recipients (Non-MeSH), Socio-demographic (Non-MeSH), Quality of Life (MeSH).

THIS ARTICLE MAY BE CITED AS: Kamran F, Rafique R, Anjum A, Raza Z. Demographic correlates of perceived health status after renal transplantation. *Khyber Med Univ J* 2016; 8(3): 115-122.

INTRODUCTION

The concept of quality of life (QoL) in people with chronic health conditions is mostly referred to as Health-Related Quality of Life (HRQoL) in the context of health, which refers to an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation

to their goals, expectations, standards and concerns.¹ Perceptions of health are evaluated in individuals with chronic illness to better understand how illness perceptions influence their psychological well-being and consequently their QoL.

QoL as a broader construct and perceived health status (PHS) in terms of specifically health, are considered as

significant markers of transplant efficacy.²

Kidney transplants are the most commonly performed solid organ transplants all over the world with a high success rate in terms of restoring physical health functions and improved QoL. Pakistan has an alarmingly increasing rate of 100 persons per million with renal failures every year, which means that every year, 18000 to 20,000 persons are in need of kidney transplants to live a normal life.³ Research has mainly focused on clinical factors as main determinants of recipient's health status and transplant efficacy, however, psychological factors have a significant influence on health outcomes of transplant. It has been found that despite a good physical health functioning, recipients' subjective reports and perceptions consequently lead to lower QoL.⁴ Therefore; it is important to study recipients' perceptions about their health and life after transplantation.

The aim of this study is to explore how various medical conditions might influence PHS. PHS has a significant influence on health functioning as well as life satisfaction among Renal Transplant Recipients (RTRs).

The main goal of transplantation is to add quality besides quantity to life, which involves both demographic and biological factors. These factors are equally important in influencing adherence to prescribed medication regimens. It is found that life satisfaction among RTRs positively correlates with education and income. Besides that, recipients with physical co-morbidities report a lower life satisfaction and those with frequent adverse medication side effects are most-

ly non-adherent to medical regimens.⁵ Since noncompliance is considered as the most significant risk factor for graft rejection and failure, thus, it is important to analyse how the side effect symptom experience is perceived by the recipients. Sometimes, it's the poorer perceptions and negative health beliefs that make recipients non-adherent to the mandatory immunosuppressant medications. It is therefore, important to examine the Socio-demographic factors that may influence PHS negatively and risk medication adherence leading to transplant failure.⁶

Future research is to improve efficacy of transplantation need to focus and work on personal, environmental and clinical factors that negatively influence health outcomes. A better understanding of the role of these factors is essential to develop interventions that aim to improve recipients' psychological well-being and thus ensure a better post-transplant QoL.⁷

Studies carried out in demographically diverse cohorts confirm distinct benefits of transplantation for improving recipients' QoL. However, future research needs to identify background and personal factors that influence the extent of benefit recipients.⁸

Studies investigating clinical factors after renal transplantation have found that these are directly associated with main domains of recipients QoL. Kidney functions as indicated by serum creatinine were found to be the most important factor influencing QoL.⁹

Socio-demographic factors such as age, gender, marital status and financial conditions also influence recipients' acceptance, coping and adjustment at all stages of transplantation.¹⁰ Studies have found better perceptions of physical health in younger RTRs. Physical health and psychological well-being are associated with education level and financial conditions such as income as it is found that recipients with higher education and

income have better physical and psychological well-being.¹¹

Research Questions

- a) How do most renal transplant recipients perceive their health status after a successful transplant?
- b) How do demographic factors influence RTRs perceived health status?

This study attempts to find the relative contribution of demographic factors in influencing their PHS. Exploring Socio-demographic correlates would facilitate identification of risk and facilitating factors for improved psychological well-being and transplant efficacy. The study aimed to analyse the role of Socio-demographic and clinical variables in influencing perceptions of health status among RTR in Pakistan.

METHODS

Study Design

In this study, we used a longitudinal research design with three assessments over 15 months. The aim was to investigate perceptions of health status of RTRs recruited from renal clinics in Lahore, Pakistan. The study got a favorable ethical opinion and approved from University of Surrey ethics committee, U.K.

Participants and Recruitment

Inclusion Criteria

The participants were the renal transplant recipients, who were on regular follow-ups at the nephrologists' clinic with first time renal transplant and basic formal education that enables them to read, write and understand Urdu as well as basic English, were included in the study. Recipients included had a healthy graft functioning as indicated by the lab tests of renal functions and other general health indicators including; Hemoglobin (HB), cholesterol and sugar level, Blood pressure, and Complete Blood picture.

Exclusion Criteria

Recipients found to have existing clinical/ medical and psychological co-mor-

bidities, getting free treatment on Zakat fund, having no formal schooling; Adult recipients above the age of 18, screened out for existing co-morbid conditions such as liver, respiratory system or cardiac diseases, having one failed transplant or any other co-existing transplant e.g. liver, heart or lung transplant along with a kidney transplant were not included. Besides physical screening, the participants were also ruled out for any existing psychological disorder as referred and cleared by the transplant team.

Measures

Demographic Information Sheet

The demographic background information was gathered including; recipients' age, gender, marital status, details of spouse, parents, education and work status, financial conditions, familial background (rural/urban), and family systems i.e. joint or nuclear. Housewives and students were included in the unemployed category.

Medical Information Sheet for Actual Physical Health Status (APHS)

This proforma comprised of detailed clinical information about the past and present physical health as well as kidney functioning of the recipient. Information about the course of illness E.S.R.D (End stage renal disease), time since transplant, donor type, current medications (immunosuppressant group and dosage), complete blood profile with renal functions (including, serum creatinine, blood urea, uric acid were included in the proforma.

Renal Transplant Side Effects Questionnaire for Perceive Health Status

Renal transplant recipients vary in experiencing disease specific physical and psychological impairments, sometimes attributed to the adverse side effects of immunosuppressant that are one of the main determinants of PHS. The questionnaire is self-designed to measure the frequency and severity of most

of the potential side effects of regular transplant medications that cause distress as perceived by renal transplant recipients. The scale measures the severity of common side effects influencing physical functioning, role limitations due to physical problems, social functioning, and bodily pain, vitality, and general health perceptions. It involves a self-report by renal transplant recipients and separately by the medical professionals so that the responses can be compared. The self-developed questionnaire includes information on adherence which may directly influence health outcomes. A high score on this questionnaire reflects a positive perception of health status.

Data Collection Procedure

The longitudinal study was carried out across in three phases, investigating objective and subjective health status of RTRs. The recruitment of participants was done as referrals from physicians in renal out-patient units of private & government hospitals in Lahore (Pakistan). The assessments were conducted during their follow up sessions at the clinic individually. The schedule plan of assessment was as follows;

The study comprised of three time assessments in which there was an initial evaluation (time I) considered as baseline. After six months, the second assessment was carried out. Finally, after an interval of one year the third and last assessment was conducted.

The study categorized the recipients into two categories for marital status to facilitate the analysis. For this purpose, recipients currently living with their spouses or engaged were categorized as 'in a relationship' and the recipients who were separated, widowed, divorced, or never married were categorized as 'single'. Most recipients were highly educated and currently employed. Recipients' family background/ refers to their native locality. Recipients belonging to villages are categorized as 'rural' while residents of cities were categorized as 'urban'.

The clinical information was also collected to measure recipients' actual physical health status (APHS) and find if there is conformity between the two or any discrepancies exist in the objective vs. subjective health status.

RESULTS

The study examined how most RTRs perceive their physical health after transplant. The number of participants was not consistent across three Phases due to patient dropout; however, the estimated sample size was 150 as calculated by G-Power. At Phase 1, $N = (147)$, Phase 2, $N = (149)$ and Phase 3, $N = (141)$. The mean age of recipients was 33.33 years (ranging from 18 to 54 years). The study recruited participants with a post-transplant time ranging from 6 months to 10 years (mean age=2.8 years, $S.D=1.5$) with healthy transplant functioning. The relative contribution of demographic factors was studied longitudinally across three Phases. Individual differences in PHS were analyzed to find how recipients differ in their perceptions of health status. The findings revealed that most recipients reported a positive perception of their health status with some individual differences despite healthy transplant functioning.

The clinical data included information about recipients' actual health status (AHS) renal function and general health indicators. The lab tests done at follow-up monitoring at the renal clinic were included as indicators of renal functioning. The renal function tests included recipients' recent level of serum creatinine, blood urea and uric acid. Measures of general health included; blood pressure, blood sugar, hemoglobin and cholesterol levels that are regularly monitored after transplant to maintain health. (Table II)

The lab tests indicated that most RTRs appeared to have healthy kidney functioning and good physical health reflective of transplant efficacy in Pakistan.

Demographic differences in PHS among RTRs

Age and PHS: Pearson product correlation was calculated to find correlations between demographic factors and PHS. Age was found to have a significant negative association with PHS at each Phase of assessment (Phase 1, $r = -.565$, $p = .001$, Phase 2, $r = -.500$, $p = .001$, Phase 3, $r = -.700$, $p = .001$) suggesting that older recipients tend to have poorer perceptions of health status as compared to younger RTRs, suggesting that PHS tends to deteriorate with age which can also be explained by a general deterioration in health with age.

Descriptive statistics indicate the mean scores of recipients on PHS and the associated age groups. A visible difference can be seen in the graph above between recipients below the age of 25 years and those above 46 years. Perceptions of health seemed to decline with age irrespective of their actual physical health.

Gender differences in PHS: An independent sample t-test was carried out to see group differences between both genders. The study did not find any significant gender differences at any time, reflecting that both male and female recipients had almost similar perceptions of health status.

The above table of independent sample t-test shows that male and female recipients did not differ in PHS at Phase I and 3, whereas, there is a significant gender difference at Phase 2, indicating that female RTRs reported a better PHS as compared to male RTRs. However, considering the small effect size, gender does not seem to be a stable cause of PHS scores.

Marital status and PHS: Independent sample t-test was used to compare PHS among recipients 'in a relationship' and those who were 'single' showed that single recipients had a better PHS.

Education and PHS: ANOVA was carried out to compare education and

TABLE I: DEMOGRAPHIC CHARACTERISTICS OF RENAL TRANSPLANT RECIPIENTS

Demographics		Phase 1		Phase 2		Phase 3	
		Frequency (n= 147)	%	Frequency (n= 149)	%	Frequency (n= 141)	%
Gender	Males	99	67.3	100	67.1	94	66.6
	Females	48	32.6	49	32.8	47	33.3
Marital status	In a Relationship	72	48.9	80	54.4	77	53.4
	Single	75	52.0	69	46.3	64	45.4
Education level	School level only	37	25.6	26	17.4	30	21.2
	Graduate	43	29.9	55	36.9	42	29.7
	Post graduate	66	45.8	68	45.6	69	48.9
Work status	Working	92	64.3	94	64.3	92	65.2
	Non-working	55	37.4	55	36.9	49	34.7
Home Location	Rural	88	59.8	86	58.7	81	57.3
	Urban	59	41.3	63	42.2	60	40.8
Family system	Joint	47	31.9	41	27.5	37	25.1
	Nuclear	110	74.8	108	75.52	104	73.7
Monthly Income	<Rs 36 K	11	7.4	11	7.3	8	5.4
	Rs.36-50k	78	54.2	78	54.2	72	51.0
	Above Rs.50k	58	40.3	60	40.3	61	41.5

Actual Physical Health Status (APHS)

TABLE II: CLINICAL INDICATORS OF ACTUAL HEALTH STATUS ASSOCIATED WITH RENAL TRANSPLANTATION

Variables	Phase 1		Phase 2		Phase 3		Normal Range
	Mean	S.D	Mean	S.D	Mean	S.D	
Creatinine levels (mg/dL)	1.1	.26	1.04	.183	1.17	.158	0.5- 1.4
Blood urea (mg/dL)	34.9	6.11	32.63	5.95	35.75	3.91	15- 45
Hemoglobin (G/dL)	12.9	1.66	13.83	1.09	13.73	1.01	M = 14-16 F = 12-15
Blood Sugar random (mg/dL)	140.3	60.77	127.5	28.3	124.5	24.4	70-180
Uric acid (mg/dL)	5.1	1.23	4.78	.954	4.3	0.782	M=3.4-7 F = 2.4-5.7
Cholesterol (mg/dL)	169.0	26.28	164.3	23.3	162.7	24.3	100-200

TABLE III: INDEPENDENT SAMPLE T-TEST SHOWING GENDER DIFFERENCES IN PERCEIVED HEALTH STATUS AT PHASE 1, 2 AND 3

PHS Scores	Gender	N	Means	S.D	t	df	Sig	d	R
Phase 1 (n= 147)	Male	99	29.77	3.26	-.059	144	.953	-0.01	-0.05
	Female	48	29.81	4.01					
Phase 2 (n= 149)	Male	100	28.35	2.80	-1.731	142	.005	-0.29	0.14
	Female	49	29.25	3.21					
Phase 3 (n= 141)	Male	94	31.15	3.75	1.561	139	.121	0.26	0.13
	Female	47	30.14	3.33					

Dependent variable: Perceived Health Status (PHS)

TABLE IV: INDEPENDENT SAMPLE T-TEST SHOWING MARITAL STATUS AND PERCEIVED HEALTH STATUS AT PHASE 1, 2 AND 3

PHS	Marital Status	N	Means	S.D	t	df	Sig	d	R
Phase 1 (n= 147)	In a relationship	72	29.13	3.58	-2.112	142	.036	-0.35	-0.17
	Single	75	30.36	3.39					
Phase 2 (n= 149)	In a relationship	80	27.66	3.03	-3.900	139	.000	0.66	0.31
	Single	69	29.52	2.62					
Phase 3 (n= 141)	In a relationship	77	29.35	3.13	-5.140	136	.000	-0.88	0.40
	Single	64	32.30	3.57					

Dependent variable: Perceived Health Status (PHS)

TABLE V: EDUCATION AND PERCEIVED HEALTH STATUS AT PHASE 1, 2 AND 3

	Education	N	Mean	S.D	F	Sig	η ²
Phase 1	School level only	37	29.54	3.40	F(2, 143) = .117	.889	.002
	Graduate	43	29.81	3.33			
	Post graduate	66	29.89	3.72			
	Total	147	29.78	3.51			
Phase 2	School level only	26	27.45	2.47	F (2, 141) = 8.028	.000	.102
	Graduate	55	28.04	3.13			
	Post graduate	68	29.61	2.79			
	Total	149	28.64	2.96			
Phase 3	School level only	30	30.78	4.07	F (2, 138) = .009	.991	.000
	Graduate	42	30.78	3.59			
	Post graduate	69	30.86	3.50			
	Total	141	30.82	3.64			

Dependent variable: Perceived Health Status (PHS)

TABLE VI: WORK STATUS AND PERCEIVED HEALTH STATUS AT PHASE 1, 2 AND 3

PHS	Work Status	N	Means	S.D	t	Sig.	d	r	R
Phase 1 (n= 147)	Working	92	29.26	3.52	-2.451	.015	-0.42	-0.20	-0.17
	non-working	55	30.73	3.32					
Phase 2 (n= 149)	Working	94	28.66	2.94	.273	.785	0.05	0.02	0.31
	non-working	55	28.51	2.98					
Phase 3 (n= 141)	Working	92	30.65	3.65	-.820	.414	-0.14	-0.07	0.40
	non-working	49	31.17	3.63					

Dependent variable: Perceived Health Status (PHS)

TABLE VII: PERCEIVED HEALTH STATUS AND MONTHLY FAMILY INCOME AT PHASE 1, 2 AND 3

PHS	MFI	N	Means	S.D	F	Sig	η ²
Phase 1 (n= 147)	< Rs.35000	11	28.87	2.94	F (2, 143) = 2.088	.128	.028
	Rs.36-50000	78	29.34	3.23			
	>Rs.50000	58	30.48	3.85			
Phase 2 (n= 149)	< Rs.35000	11	26.25	2.12	F (2, 141) = 2.862	.060	.039
	Rs.36-50000	78	28.74	2.92			
	> Rs.50000	60	28.84	3.01			
Phase 3 (n= 141)	< Rs.35000	8	30.37	4.10	F (2, 138) = .378	.686	.005
	Rs36-50000	72	30.63	3.75			
	> Rs.50000	61	31.14	3.46			

Dependent variable: Perceived Health Status (PHS)

TABLE VIII: CORRELATIONS AMONG PERCEIVED HEALTH STATUS AND SOCIODEMOGRAPHIC FACTORS

Socio-Demographic Factors	Correlations	*PHSp_1	PHSp_2	PHSp_3
Age	Pearson Correlation	-0.419**	-0.431**	-0.712**
	Sig. (2-tailed)	0.000	0.000	0.000
	N	147	149	141
Education in years	Pearson Correlation	-0.084	0.229**	0.010
	Sig. (2-tailed)	0.325	0.006	0.909
	N	147	149	141
Working non-working	Pearson Correlation	-0.011	-0.090	0.065
	Sig. (2-tailed)	0.900	0.283	0.445
	N	147	149	141
Monthly family income	Pearson Correlation	-0.137	0.139	0.073
	Sig. (2-tailed)	0.109	0.098	0.392
	N	147	149	141
Time Since Transplant	Pearson Correlation	0.222**	0.220**	0.189*
	Sig. (2-tailed)	0.009	0.131	0.025
	N	147	149	141

*PHS w: Perceived Health Status Phase 1,2 and 3

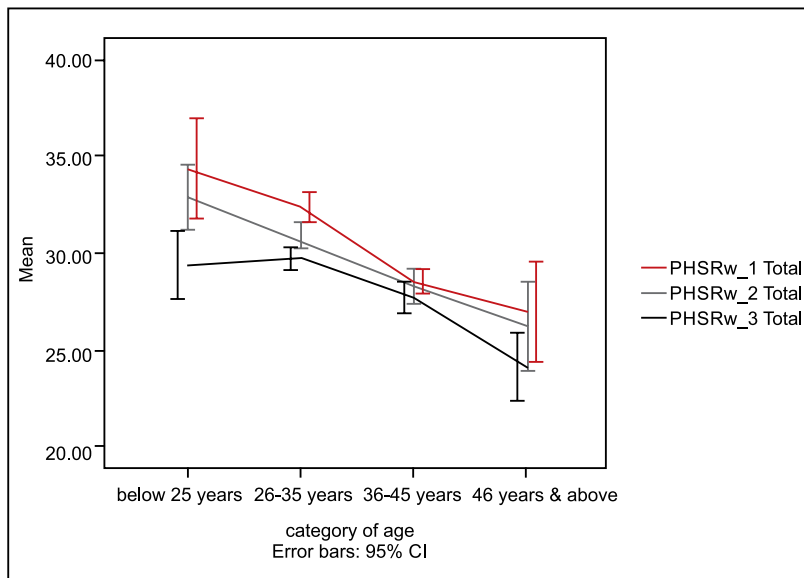


Figure 1: Graph showing descriptive statistics of Age groups & Mean scores Perceived Health Status, Phase 1, 2 AND 3

PHS. The recipients were categorized into three groups according to their formal education i.e. school-level, graduate and post graduate recipients. The aim was to find if education improves recipients' perceptions of health status.

PHS did not differ according to education level. Recipients with higher formal education did not have a better PHS.

Work Status and PHS: PHS did not differ among the employed and unemployed or non-working recipients at Phase 2 and 3.

Significant differences in PHS based on work status were found at Phase 1, indicating that those who were not working (e.g. house wives, students and retired recipients) reported a better

PHS as compared to those who were employed. Considering the small effect size, this difference in PHS cannot be fully attributed to work status.

Financial Conditions and PHS:

Financial conditions did not seem to influence recipients' PHS. Recipients with more monthly income did not perceive their health better compared to those with less income.

The above table shows that RTRs with different monthly incomes did not differ in PHS levels at Phase 1, 2 and 3.

It can be concluded that only age and marital status appeared to be significant factors for differences in perceptions of health status as older and single recipients tend to report better PHS. However, PHS did not differ significantly across gender, educational level, financial and work status.

Correlations in Demographic Factors and PHS among RTRs

The study examined how demographic factors are associated with recipients' perceptions of their health status. Individual differences in PHS were analyzed to find how recipients differ in their

perceptions of health status. Pearson correlations were calculated as shown in the Table IX.

The results indicate some interesting findings reflecting significant correlations among Sociodemographic factors and perceptions of health status after a successful renal transplant over time. It was found that age appears to have a significant negative association with PHS, indicating that older recipients tend to have poorer perceptions of health as compared to younger recipients. Single RTRs tend to have more a better PHS than those in a relationship. Time since transplantation appeared to have a significant positive correlation with PHS reflecting that with the passage of time, perceptions of health tend to improve in most RTRs.

DISCUSSION

Advancements in transplantation have yielded significant success rates not only in terms of increasing survival but also quality of life. Despite this success of transplantation, there is evidence of an increasing numbers of high-risk patients. Transplant efficacy is accomplished and maintained despite the inclusion of these high-risk patients with diverse demographic backgrounds. Research indicates that at present, most of the transplant candidates belong to an older age group with diabetes and obesity as co-morbidities with specific ethnic background, reflecting the combined role of clinical and demographic factors in transplant outcomes.⁵

Interestingly, the clinical factors affect transplant outcome through a mediating role of subjective factors that are psychological in nature such as perception of health status, psychological well-being and life satisfaction.¹² Most measurement tools for assessing HRQoL in RTRs are found to be less exhaustive for socio-demographic factors, making it difficult to determine the demographic correlates and predictive factors.

Studies have found significant associations between HRQoL, demographics and clinical factors, including; gender,

ethnicity, illness severity as indicated by hemoglobin levels, duration of dialysis prior to transplantation and time since transplantation). In addition, number of co-morbidities, chronic health conditions, age, work status, perceived work ability, income and marital relationship also appeared to have significant associations with PHS and overall QoL.¹³

Presence of co-morbid conditions and risky demographics need special attention by the transplant teams not only to prevent graft loss but improve psychological well-being and overall Quality of life. Recipients long term survival and transplant success is directly associated with particular characteristics including; age, financial & co-morbid conditions that can be achieved despite known risk factors, such as rejection or delayed graft function.¹⁴ Research consensus suggests as dire need to improve both physical and perceived health that are associated with psychological well-being. This would facilitate better QoL to determine after effectiveness of kidney transplantation through verification of the influence of Sociodemographic factors on quality of life.¹⁵

Sociodemographic factors are one of the major causes of health disparities after transplant. Health Disparities refer to the differences found in the less and more advantaged groups of a society in the context of health. The issues of accessibility and affordability for the disadvantaged social group raises a question on the provision of equal health care among all social groups without any demographic biases. Identification of vulnerable social groups and elimination of health disparities needs to be a priority in healthcare. When Sociocultural and socioeconomic disparities in graft survival, graft function, and patient survival in RTRs were reviewed, it was suggested that most studies consistently report poor health outcomes on the basis of black ethnic origin, low income, and less education as compared to Hispanic recipients, suggesting a significant role of demographics in health outcomes after transplant. However, they were unable

to clarify the distinct roles of racial/ethnic versus socioeconomic factors, leaving a gap that needs further studies to be carried out.

Previous studies have found diverse findings regarding marital status and PHS. One research did not find any significant differences in health status of married and single RTRs¹⁶ whereas another study found married recipients reporting a better PHS as compared to single ones.¹⁷ The findings of our study cannot be fully attributed to marital status as there was a low representation of divorced, widowed and separated recipients, so they were grouped together as 'single'. A larger sample with equal categories could have clarified it.

Pakistan is a developing country with a population of 185 million where expenditure on health is quite low (1.3% of the gross national product). Data shows that the estimated incidence of end-stage renal disease (ESRD) is 100 per million of the population. Kidney transplantation is a high cost procedure that is beyond the capacity of an average Pakistan. However, the Sind Institute of Urology & Transplantation (SIUT) has a remarkable contribution of providing renal replacement therapy to more than 90% of the ESRD population disenfranchised from replacement therapy.¹⁷

Implementation of culturally sensitive approaches can ensure better health care for transplant recipients, irrespective of their social groups and demographic backgrounds.¹⁸

CONCLUSION

The study found how diverse demographic factors influence the perceptions of health status after renal transplant. It was found that PHS tends to deteriorate with age which can also be explained by a general deterioration in health with age. Single recipients had a better PHS as compared to those in a relationship. The study did not find any significant gender differences at any time. Recipients' educational level, financial and work status did not influence their perceptions of

health as no significant difference was found. It can be concluded that although PHS varies considerably across time but it cannot be linked directly to time since transplant.

Clinical Implications of the study

The present longitudinal study has a novel contribution particularly with reference to identification of Sociodemographic factors that may risk poorer perceptions of health status despite a healthy kidney functioning. The three phases of assessments provided a pattern of PHS in these recipients, validating the findings which have significant future implications in terms of identifying demographic differences in PHS. The findings can be utilized in benefitting not only transplant professionals but family and care givers of recipients to develop a better understanding how and why recipients tend to perceive their health in a particular way.

LIMITATIONS

- This study would have been ideal if the pre-transplant data would have been there to provide a more clear comparison of recipients' health status before and after the transplant.
- The sample should have been more diverse and participants from public sector renal units should have been included to analyze variance in PHS across diverse demographic backgrounds.

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CONFLICT OF INTEREST

Authors declared no conflict of interest

GRANT SUPPORT AND FINANCIAL DISCLOSURE

NIL

AUTHOR'S CONTRIBUTION

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

FK: Concept & study design, data acquisition, Drafting the manuscript, final approval of the version to be published

RF: Drafting the manuscript, critical revision, final approval of the version to be published

AA & ZR: Acquisition analysis and interpretation of data, final approval of the 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.