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# Importance of Socioeconomic, Clinical, and Psychological Factors on Health-related Quality of Life in Adolescents After Kidney Transplant

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## Abstract

**Objectives:** Health-related quality of life after kidney transplant in adolescents is a major concern; nevertheless, there is a paucity of data on the variables that have an effect on it. This study evaluated the extent to which socioeconomic, clinical, and psychological characteristics explain the variance in the health-related quality of life of adolescent Iranian kidney transplant recipients.

**Materials and Methods:** Into a hierarchical regression analysis, the cross-sectional socioeconomic, clinical, and psychological characteristics were entered among 55 adolescent Iranian kidney transplant recipients.

**Results:** The relative predictive power of socioeconomic, clinical, and psychological variables with respect to health-related quality of life was 21.8% ( $P = .088$ ), 21.2% ( $P = .014$ ), and 27.6% ( $P = .001$ ).

**Conclusions:** Psychological factors had a greater relative predictive power in postrenal transplant health-related quality of life of adolescents than did the socioeconomic and clinical characteristics. Further research should target to improve the health-related quality of life in adolescent kidney recipients by psychological intervention.

**Key words:** Health-related quality of life, Adolescent, Kidney transplant, End-stage renal disease

## Introduction

Kidney transplant is the treatment of choice for adolescents with end-stage renal disease (ESRD) inasmuch as it confers freedom from dialysis, paves the way for normal growth,<sup>1</sup> contributes to a more regular lifestyle,<sup>2</sup> enhances school performance,<sup>3</sup> reduces cost of dialysis,<sup>4</sup> and alleviates family stress.<sup>5</sup> In Iran, about 300 adolescents have received their first renal transplant before 2003.<sup>6</sup>

Medical modalities often tend to predicate the restoration of general health on the improvement in health-related quality of life.<sup>7</sup> Indeed, an evaluation of health-related quality of life carries a great deal of weight<sup>8</sup> to the extent that nephrologists consider health-related quality of life as a main outcome in the treatment efficiency assessment<sup>9</sup> of such cases as kidney transplant.<sup>10</sup>

Unfortunately, a scarcity of data on the variables that have some bearing on health-related quality of life in renal transplanted patients has hampered efforts to carry out more detailed analyses.<sup>11</sup> What exacerbates the situation is the inclination on the part of researchers to lump together the data of young samples into large age groups, rendering a distinction between information on health-related quality of life in adolescence and in young adulthood difficult.<sup>12-14</sup> Therefore, we sought to conduct the present study in adolescent kidney-transplant recipients to answer the following question: Of the socioeconomic, clinical, and psychological factors, which one gives a better account for the changes in health-related quality of life?

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## Material and Methods

This cross-sectional study was carried out in Baqiyatallah Hospital, Tehran, Iran, in 2006. This study was approved by the institutional review board of Baqiyatallah University of Medical Sciences. The objects of the study were fully and clearly explained to both the adolescents and their parents before written informed consent was obtained from the subjects and their parents. The study conforms to the ethical guidelines of the 1975 Helsinki Declaration.

From 60 invited adolescents, 55 adolescents agreed to participate in our study. Those who did not participate in this survey were not significantly different from others by means of age, sex, ESRD cause, and duration from transplant ( $P > .05$ ). All participants were Iranian adolescents (< 18 years of age) who had undergone their first kidney transplant at least 6 months before commencement of the study and had a functioning graft at the time of the study. The exclusion criteria were a history of other organ transplants and being of a non-Iranian nationality. Participants were selected via consecutive sampling.

A checklist including age, sex, education level (primary school or high school), monthly family income (less or greater than USD \$300), ESRD cause (glomerulonephritis, congenital disorders, others causes, or unknown), history of dialysis before transplant, Hospital Anxiety Depression Scale (HADS), and Short Form-36 (SF36) was completed for all participants. Socioeconomic factors were entered in the first block (age, sex, education level, and family income), and the clinical factors (ESRD duration, ESRD cause, and history of dialysis before transplant), and HADS-anxiety and depression scores were entered in the second and third blocks.

The HADS is a tool for measuring the symptoms of anxiety and depression; it contains 14 items: 7 for anxiety and 7 for depression. Each item is scored from 0 to 3, giving a maximal score of 21 for anxiety and depression. Scores of  $\geq 11$  on either subscale are considered a significant case of psychological morbidity (clinical caseness).<sup>15</sup> A translated-into-Farsi version of HADS, which had been previously validated for the Iranian population<sup>16</sup> was used in Iranian renal recipients.<sup>17, 18</sup>

The SF-36 consists of 36 items for calculating the scores for 8 subscales representing physical functioning, social functioning, role limitations

owing to physical health problems, role limitations attributable to emotional problems, mental health, vitality, bodily pain, and general health perceptions. The scores ranged between 0 and 100, with a higher score indicating a better health-related quality of life. The physical and mental components of the 8 subscales are combined into a physical composite score and a mental composite score.<sup>19</sup> The SF-36 has proven reliability and validity for renal transplant patients<sup>20</sup> and also can be used in adolescents.<sup>21</sup> A translated-into-Farsi version, which had been previously authenticated<sup>22</sup> and used to evaluate health-related quality of life in Iranian kidney transplant recipients.<sup>23, 24</sup>

Sex, education level, family income, history of dialysis before transplant, and ESRD cause were reported as frequency and percentage. The median (interquartile range) of ESRD duration was considered for all the patients. Also, mean ( $\pm$  SD) was applied for the assessment of the SF-36 subscales. All the patients were considered to have a total score of anxiety and depression  $\geq 11$  = present and  $< 11$  = absent.

The appropriate material and methods having been applied, answers were sought to the following queries: In the first step, the independent sample *t* test and 1-way analysis of variance were drawn upon to find out if there was any association between health-related quality of life and different socioeconomic characteristics (sex, education level, and family income), clinical variables (history of dialysis before transplant, ESRD cause, and ESRD duration), and psychological status (anxiety and depression). The Pearson correlation coefficient test also was used to determine if there was a correlation between the SF-36 total score and age, ESRD duration, and the HADS anxiety and depression score. In the second step, a hierarchical regression analysis containing the 3 factors of socioeconomic (age, sex, education level, and family income), clinical (ESRD duration, ESRD cause, and history of dialysis before transplant), and psychological status (HADS anxiety and depression score) was used to explore the extent that socioeconomic, clinical, and psychological factors can explain the variance in health-related quality of life. Statistical analyses were performed with SPSS software for Windows (Statistical Product and Service Solutions, version 13.0, SSPS Inc, Chicago, IL, USA). *P* values less than .05 were considered significant.

## Results

### Participants:

Our study population comprised 34 boys (61.8%) and 21 girls (38.2%) between 11 and 18 years of age (mean [ $\pm$  SD] 14.2  $\pm$  3.0 years). The frequency of a primary and high school education level was 32 (58.2%) and 23 (41.8%). The frequency of a monthly family income lower than USD \$300 was 43 (78.2%). In addition, the frequencies of ESRD cause for glomerulonephritis, congenital disorder, others causes, and unknown were 15 (27.5%), 10 (18.2%), 6 (10.9%), and 24 (43.4%). From a total of 55 subjects, 38 (69.1%) had a history of dialysis before transplant. The median (quartile 25-quartile 75) of ESRD duration was 24 months (range, 10-69 months).

### Health-related quality of life:

The mean ( $\pm$  SD) of bodily pain was 73.40  $\pm$  26.77. The other means ( $\pm$  SD) of the SF-36 subscales are depicted in Table 1.

**Table 1.** Mean ( $\pm$  SD) scores of SF-36 subscales in adolescent transplant recipients.

Subscale	Mean ( $\pm$ SD)
Physical function	68.45 $\pm$ 28.73
Role limitations	71.25 $\pm$ 26.66
Bodily pain	73.40 $\pm$ 26.77
Social function	73.18 $\pm$ 25.50
General mental health	57.38 $\pm$ 16.00
Role limitations owing to emotional problem	67.57 $\pm$ 28.89
Vitality energy or fatigue	59.72 $\pm$ 15.58
General health perceptions	57.75 $\pm$ 20.98
<b>Physical component score</b>	<b>65.84 <math>\pm</math> 16.70</b>
<b>Mental component score</b>	<b>61.29 <math>\pm</math> 13.13</b>
<b>SF-36 TOTAL</b>	<b>65.39 <math>\pm</math> 14.11</b>

The mean of the SF-36 total was poorer in the males (62.34  $\pm$  13.47) than that in the females (70.33  $\pm$  14.03) ( $P = .040$ ). Similarly, the SF-36 mean was lower in the patients with a monthly family income under USD \$300 (range, \$62.47  $\pm$  \$13.69) than that in those of at least USD \$300 (range, \$75.84  $\pm$  \$10.45) ( $P = .003$ ). Patients with a HADS anxiety score above 11 had a lower mean SF-36 (51.15  $\pm$  13.08) than did those who had a HADS anxiety below 11 (67.40  $\pm$  13.82) ( $P = .018$ ). Also, patients with a HADS depression score above 11 had a lower mean of SF-36 (44.13  $\pm$  13.46) by comparison with those who had a HADS depression score below 11 (67.55  $\pm$  12.85) ( $P = .001$ ) (Table 2).

The total score of SF-36 had an inverse correlation with the HADS depression score ( $r = -0.553$ ,  $P < .001$ ) and a direct correlation with ESRD duration ( $r = 0.330$ ,  $P = .016$ ). The SF-36 total had no significant correlation with age ( $r = 146$ ,  $P = .289$ ) and the HADS anxiety score ( $r = -0.272$ ,  $P = .089$ ). Correlations between age, ESRD duration, psychological score, and SF-36 scores are shown in Table 3.

### Associations between health-related quality of life and different variables:

Sex ( $P = .011$ ), and monthly family income ( $P = .009$ ) from the socioeconomic factors, ESRD duration ( $P = .018$ ) from the clinical factors, and the HADS depression score ( $P = .001$ ) from the psychological factors were predictors of the SF-36 total score. Socioeconomic, clinical, and psychological factors

**Table 2.** Comparisons between the means ( $\pm$ SD) of SF-36 and HADS scores in subpopulations in terms of socioeconomic and clinical variables.

		HRQoL		Anxiety		Depression	
		Mean $\pm$ SD	$P$	Mean $\pm$ SD	$P$	Mean $\pm$ SD	$P$
Sex*	Male (n=34)	62.34 $\pm$ 13.47	.040	6.28 $\pm$ 4.11	.548	5.62 $\pm$ 4.73	.055
	Female (n=21)	70.33 $\pm$ 14.03		5.40 $\pm$ 4.98		3.13 $\pm$ 2.16	
Education*	Primary (n=32)	62.70 $\pm$ 14.35	.096	5.73 $\pm$ 3.89	.729	4.71 $\pm$ 4.29	.941
	High school (n=23)	69.13 $\pm$ 13.17		6.22 $\pm$ 5.08		4.61 $\pm$ 3.97	
Monthly family income (US dollar)*	<300 (n=43)	62.47 $\pm$ 13.69	.003	6.09 $\pm$ 4.69	.643	4.89 $\pm$ 4.31	.397
	>300 (n=12)	75.84 $\pm$ 10.45		5.17 $\pm$ 2.40		3.33 $\pm$ 2.34	
ESRD cause†	Unknown (n=24)	63.71 $\pm$ 15.33	.718	6.31 $\pm$ 4.76	.559	6.22 $\pm$ 4.65	.232
	Glomerulonephritis (n=15)	67.17 $\pm$ 11.63		7.17 $\pm$ 5.06		3.75 $\pm$ 3.86	
	Genetic disorder (n=10)	66.54 $\pm$ 15.40		4.33 $\pm$ 3.72		3.00 $\pm$ 3.79	
	Others (n=6)	70.63 $\pm$ 12.32		4.80 $\pm$ .84		3.80 $\pm$ 1.30	
Dialysis before* transplant	Yes (n=38)	66.46 $\pm$ 12.88	.432	4.76 $\pm$ 3.72	.060	4.37 $\pm$ 4.25	.551
	No (n=16)	63.14 $\pm$ 17.05		7.36 $\pm$ 4.50		5.29 $\pm$ 4.05	

\* Independent sample  $t$  test

† One-way ANOVA

**Abbreviations:** ESRD, end-stage renal disease; HADS, hospital anxiety and depression scale; HRQoL, health-related quality of life

explained 21.8%, 21.2%, and 27.6% of the SF-36 total score variance. The hierarchical regression analysis of the relative predictive powers of socioeconomic, clinical, and psychological variables with respect to health-related quality of life in adolescent kidney-transplant recipients are depicted in Table 4.

**Discussion**

Our study showed that socioeconomic, clinical, and psychological variables altogether predict more than 70% of the variance in health-related quality of life in adolescent renal recipients and that the psychological variables had the highest relative predictive power of the 3 variables.

The medical literature contains a great deal of data devoted to explaining health-related quality of life variance. One such study in adult kidney recipients asserted that its model for the predicting perceived health status could explain less than 40% and 50% of the variance in the physical and mental components of health-related quality of life.<sup>11</sup> Another group of investigators succeeded in explaining 40% of the total variance in adult kidney recipients via a different model.<sup>25</sup> Pediatric kidney transplant and adult kidney transplant differ in many ways.<sup>26</sup> A review of

the related literature shows that whereas such additional factors as working activities, social support, housekeeping activities,<sup>11</sup> and religion<sup>25</sup> affect health-related quality of life in adults, they may play a less important role in adolescents.

Our study of 55 Iranian adolescent renal recipients allowed us to find an explanation for a large percentage of health-related quality of life variance. About 22% of the total variance in health-related quality of life in the present study was due to socioeconomic variables, which have been previously shown to exert a negative effect on the health-related quality of life of renal transplant patients.<sup>7, 27</sup> The socioeconomic factors reported to have a bearing on health-related quality of life include age and sex<sup>21</sup> in adolescent renal recipients and education,<sup>27</sup> socioeconomic characteristics,<sup>28</sup> race,<sup>29</sup> and monthly income<sup>25</sup> in adult kidney recipients.

The present study did not consider the predictive power of cultural variables as regards the variance in health-related quality of life. Be that as it may, the use of SF-36 has previously shown that cultural issues are not the main contributors to the said variance.<sup>30</sup>

SF-36, when properly adapted to a non-Western culture (as was the case in the present study), is believed to serve the purpose quite efficiently and is,

**Table 3.** Correlation coefficients between age, ESRD duration, psychological score, and SF-36 scores.

	ESRD Duration (mo)	Anxiety	Depression	Physical health component	Mental health component	SF-36 Total score
Age (y)	0.059	0.099	-0.001	0.202	-0.017	0.146
ESRD Duration (mo)	-	0.023	-0.165	0.335*	0.054	0.330*
HADS Anxiety score		-	0.556***	-0.097	-0.504**	-0.272
HADS Depression score			-	-0.407**	-0.604***	-0.553***
Physical health component score				-	0.511***	0.945***
Mental health component score					-	0.718***

Pearson's correlation coefficient

\*  $P < .05$ , \*\*  $P < .01$ , \*\*\*  $P < .001$ ,

**Abbreviations:** ESRD, end-stage renal disease; HADS, hospital anxiety and depression scale

**Table 4.** Hierarchical regression analysis of the relative predictive powers of socioeconomic, clinical, and psychological variables with respect to HRQoL in pediatric transplant recipients.

Model	B ± SE(B)	95% CI for B	Sig	R <sup>2</sup>	R <sup>2</sup> change	Change P value
Socioeconomic block				0.218	0.218	.088
Age	0.57 ± 0.56	-0.58 to 1.72	0.320			
Sex	9.06 ± 3.30	2.27 to 15.85	0.011			
Family income	4.73 ± 1.68	1.27 to 8.19	0.009			
Education	0.45 ± 2.30	-4.27 to 5.18	0.845			
Clinical block				0.429	0.212	.014
ESRD Duration	0.08 ± 0.03	0.02 to 0.15	0.018			
ESRD Cause	2.44 ± 1.74	-1.15 to 6.02	0.174			
Dialysis before transplant	-0.49 ± 3.66	-8.01 to 7.03	0.894			
Psychological block				0.705	0.276	.001
Depression score	-2.17 ± 0.57	-3.35 to -0.99	0.001			
Anxiety score	0.31 ± 0.51	-0.74 to 1.36	0.545			

**Abbreviations:** B, unstandardized regression coefficient with standard error; CI, confidence interval; ESRD, end-stage renal disease

therefore, a useful tool for the assessing the health status outcome in most developing countries.<sup>31</sup>

Clinical variables explained 21% of the total health-related quality of life changes in our study. It is possible to categorize the clinical variables that affect the health-related quality of life in kidney-transplant recipients into 2 groups: In adolescent renal transplant recipients, graft function,<sup>26</sup> renal pathology,<sup>32</sup> immunosuppressive regimes,<sup>33</sup> and fatigue<sup>34</sup> affect health-related quality of life. In adult renal transplant recipients, it is hypertension,<sup>35</sup> hemoglobin,<sup>36</sup> hematocrit, nephrosclerosis diagnosis,<sup>7</sup> serum creatinine,<sup>37</sup> diabetes mellitus, comorbidity and modality of treatment,<sup>29</sup> failed allograft,<sup>38</sup> and number of hospitalizations during the dialysis period<sup>11</sup> that affect health-related quality of life.

Anxiety and depression accounted for approximately 28% of the total change in health-related quality of life in this study. It seems logical, however, that an assessment of other psychological variables, apart from anxiety and depression, should increase the percentage of variance explanation. One study posited that psychosocial factors influenced the pediatric and young adult renal recipients' physical health through medical treatment regimens, nonadherence, and graft survival.<sup>39</sup> Different organ transplants are believed to beget different levels of psychological morbidity, a case in point being the psychosocial problems after kidney transplant.<sup>40</sup> Indeed, one study reported that significant improvement in health-related quality of life was least marked in patients 1-5 years after transplant.<sup>3</sup> Another study highlighted a rise in health-related quality of life for a majority of recipients (80%) in the physical and emotional domains after transplant; the improvement was less remarkable in the social domain, where only 60% reported an improvement.<sup>41</sup>

Health-related quality of life is defined by the World Health Organization as a multidimensional construct comprising physical, mental, social, and economic components.<sup>42</sup> Although this complexity is dependent on the method of evaluation, such variables as demographic, psychosocial, and medical parameters have thus far been identified as the predictors of health-related quality of life.<sup>34</sup>

The results of this study generate a hypothesis that needs further studies. Based on this hypothesis, enhancement in psychological health can promote the health-related quality of life of the adolescents, a hypothesis that must be proven by further studies. It

would be wise to restate the implications in terms of the change in focus that the study would suggest might lead to better quality of life.

Like other assessments of health-related quality of life in transplant populations,<sup>43</sup> the present study was limited by the small sample size of adolescent transplant recipients. Furthermore, health-related quality of life is influenced by many not assessed clinical variables such as duration since transplant, contemporary renal function, medical compliance, somatic comorbidities or immunosuppressive regimen. Our cross-sectional design limits us to conclude any causative association. Additionally, we had no control group comprising health controls, which precluded determination of the role of kidney transplant on quality of life. In addition, our sample is more likely to have those transplant recipients with longer graft survival. These drawbacks might limit us to fully generalize our results to the community of adolescent renal transplant recipients. Larger multicenter studies are needed to check if our results will be verified.

## Conclusions

In adolescent renal recipients, the importance of anxiety / depression on health-related quality of life is a little more than socioeconomic and clinical data. Thus those with poor health-related quality of life will benefit from psychological health evaluation. In addition, given the paucity of data on the variables that can predict the variance in health-related quality of life in this group of patients, future studies seem essential.

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