Review Article

The relationship between Personality Traits, Anxiety and Depression, in Life Quality of patients under treatment by Haemodialysis (HD)

Maryam Bakhtiari[1*], Kianoosh Falaknazi[2], Mojgan Lotfi[1], Mohammad Noori[1], Alireza Naseri Saleh Abad[1]

[1] Department of Clinical Psychology, Shahid Beheshti University of Medical Sciences, Ayatollah Taleghani Hospital, Tehran, Iran

[2] Department of Medicine, Nephrology Ward, Shahid Beheshti University of Medical Sciences, Ayatollah Taleghani Hospital, Tehran, Iran

Abstract

Background: The purpose of this study is to examine personality traits in renal patients undergoing haemodialysis (HD) and its connection to depression, anxiety, and life quality. In this study we also aim to propose an intervention for treatment and prevention of these personality traits.

Methods: This cross-sectional study was performed on 70 patients affected by chronic renal failure undergoing haemodialysis treatment. Patients were selected based on an accessible sample. Required data were gathered through questioners: Hospital Anxiety and Depression, NEO-FFL, and SF-36 Health Survey.

Results: Based on the results obtained from this study 47.1% of patients undergoing HD treatment fall into the abnormal category according to the rate of depression. There is a positive meaningful correlation between conscientiousness and agreeableness and a negative correlation between extroversion, anxiety, and depression in life quality of renal patients.

Conclusion: With respect to the correlation existing between the quality of life and the personality traits, anxiety and depression, in patients under HD treatment, life quality and treatment outcome can be improved if psychological problems are diagnosed early and psycho education and social interventions are presented.

Key Words: Personality traits, depression, anxiety, life quality, chronic renal failure, haemodialysis (HD)

*Corresponding Author: Maryam Bakhtiari, Department of Clinical Psychology, Shahid Beheshti University of Medical Sciences, Ayatollah Taleghani Hospital, Tehran, Iran. Tel: (009821)23031548. Fax: (009821)22432570. E-mail: mar.bakhtiari@gmail.com.

Introduction

Approximately 400,000 individuals around the world were affected by chronic renal failure by the end of 2004, from which more than 300,000 individuals were being treated by haemodialysis (HD) [1]. According to the renal research institute and the kidney transplant of Iran, about 14,000 individuals, in Iran, were undergoing HD treatment, of which 3,700 individuals were being treated in Tehran. Based on current reports, the prevalence of renal disease is on the rise [2].

Treatment methods such as haemodialysis which result in patient's life style change, the health condition and the role in life are all factors that influence the individual's life quality and mental-health [3-6].

Therefore, in recent years researchers put special emphasis on social psychological factors that may affect patients' life quality and illness [7, 8].

Various studies have shown that the most prevalent psychological problems among dialysis patients are depression and anxiety disorders, from which the most important predictable factors are the outcome of treatment and survival of dialysis patients [4].

End-stage renal failure is followed by social psychological stressors in patients as a result of a

change in their life style and their treatment method. It is for this reason that depression and anxiety disorders are one the most prevalent psychological problems in renal patients. According to Hailey et al. (2001) 20% of HD patients had psychological problems and the majority of these patients (43.6%) were suffering from depression [9]. Another study showed that 50% of patients were affected by depression and 30% exhibited anxiety disorder, in haemodialysis patients [10]. Studies performed by Koike and his colleagues showed that for those who were suffering simultaneously from depression and physical illness, quality of patient care was lower in comparison to other patients [11].

Numerous studies support the high incidence of depression in patients suffering from chronic renal failure. Renal patients experience a significant amount of socio-psychological problems, and depression is one of the most prevalent diagnoses made by psychologists for these patients, accompanied by a high level of mortality [12].

Sensky et al. (1996) explained that there is a meaningful relationship between depression and patients' unwillingness to abide to their diet, which can put their health at risk and cause early death[13]. Christenen et al. (1998) study shows that the cause of death between 11-22% of chronic renal failure patients is due to their rejection to continued haemodialysis treatment [12].

One of the most common complaints made by renal patients is about their physical condition. Dialysis patients are at an equal or sometimes higher risk than other patients affected by chronic diseases to experience severe stress [8].

Further studies have shown that sleep disorders, tension, stress, and distress have been observed in renal patients. In addition, it is very common for these patients to feel incapable of having control on their health [7].

Consequently, among patients undergoing HD treatment, psychiatric disorders with average severity have been observed at a higher rate and severe psychological side effects have been noticed at a lower rate[7.] Dialysis patients are exposed to various stresses and their unsuitable response to stresses, according to different studies, could reduce their life quality. [14].

Patients affected by chronic renal failure go under haemodialysis treatment to obtain their health, even though stressor factors will remain and may become severe, since dialysis patients are exposed to a range of physical, psychological, and social stressor factors. These patients feel uncertain about their future because changes take place in their life style, family condition, and their personal condition. Therefore, life quality is a very important subject that should be pondered upon[15].

Maruschka et al conducted a study during 1997, in Netherlands, to examine life quality in patients undergoing haemodialysis treatment, and compared the life quality of these patients with the general public. Results showed that life quality of haemodialysis patients in relation to their physical and general health conditions, emotional role, and psychological health are all placed on a lower scale [16].

Mozlan's study (1997) showed that only one third of patients undergoing HD treatment maintained quite an optimal and acceptable life quality [17].

Patient's accommodation with their illness, due to organ failure, has significant effect on their life quality. Therefore, patients and their families should be educated about the illness and supported through occupational therapies in order to increase patients' life quality[18].

Steel's research on dialysis patients showed that there is a correlation between suitable dialysis treatment method, depression, and life quality [19].

It is important to pay special attention to renal patients' life quality and their psychological problems during haemodialysis treatment since it can prevent problems later on. Early diagnosis of psychological disorders and effective treatment methods for depression can improve life quality, survival, and timely diagnosis in these patients [20].

Methods

The patients of the dialysis ward of Ayatollah Taleghani Educational Hospital along with those of Tehranpars Specialized Hospital, who were all undergoing treatment with nephrology specialists, participated in this study. 70 chronic renal failure patients undergoing haemodialysis treatment were recruited from statistical community of renal patients. In this study, all participants signed a consent form to take part in the questionnaire and they were informed

about the aim of this study. Patients were selected based on an accessible sample and for data collection questionnaires: Hospital Anxiety and Depression Scale, NEO-FFL, and SF-36 were used. The ethics committee of clinical psychology department at Shahid Beheshti of Medical Science University approved this study. (Reference number 412/01)

NEO FFL: NEO Personality Inventory Revised (NEO PI-R) is the standard questionnaire measure of the Five Factor Model of Personality with NEO Five Factor Inventory (NEO FFI) being a shorter version that consists of 60 items and provides information on the five major domains.

Both provide a systematic assessment of emotional, interpersonal, experiential, attitudinal, and motivational styles with detailed personality descriptions. The longer NEO PI-R is the more comprehensive test measuring not only the Big 5 dimensions but also the six traits or facets that define each domain thus building up a more comprehensive and detailed assessment of normal adult personality. The shortened FFI version of the NEO PI-R does not cover off the facets but still provides a quick, reliable, and accurate measure of the big 5 domains and may be more appropriate when time is limited or general information on personality is sufficient.

The questionnaire assessing the five personality factors include:

Neuroticism- The NEO factor, Neuroticism, measures emotional stability, maladjustment, and the ability to cope with emotional stress. Examples include anxiety, depression, and self-consciousness.

Extraversion- Extraversion is a measure of sociability. This includes assertiveness, preference for time spent with others, ease of speaking with others and the tendency to experience positive emotions.

Openness to Experience- Openness to experience measures the degree to which people are conservative in various domains of life. For example, openness is comprised of a general willingness to actively explore novel ideas, entertain various unconventional values and appreciation for aesthetics.

Agreeableness- The NEO factor, agreeableness, measures interpersonal characteristics such as trust, altruism, compliance, modesty and tender-mindedness.

Conscientiousness- Conscientiousness measures self-control, the ability to control impulses. Self-discipline, competence, deliberation and achievement striving are examples of more specific aspects of conscientiousness.

Hospital anxiety and depression scale

The Hospital Anxiety and Depression Scale (HADS) is a 14-item self-report screening scale that was originally developed to indicate the possible presence of anxiety and depressive states in the setting of a medical outpatient clinic [15]. It contains two 7- item scales: one for anxiety and another for depression, both with a score range of 0±21. The HADS was developed in order to provide a screening measure for the presence of anxiety and depression. The HADS was originally developed for hospital out-patients with ages between 16- and 65-years-old and the authors did recommend additional research to validate its use in elderly patients [21].

In general the Iranian version of the HADS was found to be acceptable to almost all patients (99%). Cronbach's alpha coefficient (to test reliability) has been found to be 0.78 for the HADS anxiety sub-scale and 0.86 for the HADS depression sub-scale. Validity as performed using known group' comparison analysis showed satisfactory results. Both anxiety and depression sub-scales discriminated well between sub-groups of patients differing in clinical status as defined by their disease stage.

SF-36

Patients on maintenance hemodialysis (MHD) often show substantial reductions in quality of life (QoL). The SF36 (Short Form with 36 questions) is a well-documented, self-administered QoL scoring system which includes eight independent scales and two main dimensions, has been widely used and validated. In 65 adult outpatients on MHD, the SF36 and its scales and dimensions (scored as a number between 0 and 100), the nutritional and inflammatory state measured by subjective global assessment, near-infrared (NIR) body fat, body mass index (BMI), and pertinent laboratory values, including hemoglobin, albumin, and C-reactive protein were assessed. Twelve-month prospective hospitalization rates and mortality were used as the clinical outcomes. Multivariate (case-mix) adjusted correlation coefficients were statistically significant

between SF36 scores and serum albumin and hemoglobin concentrations. There were significant inverse correlations between SF36 scores and the BMI and NIR body fat percentage. Hypoalbuminemic, anemic, and obese patients on MHD had a worse QoL. Prospective hospitalizations correlated significantly with the SF36 total score and its two main dimensions (r between -0.28 and -0.40). The Cox proportional regression relative risk of death for each 10-unit decrease in SF36 was 2.07 (95% CI, 1.08 to 3.98; P = 0.02). Of the eight components and two dimensions of the SF36, the Mental Health dimension and the SF36 total score had the strongest predictive value for mortality. Thus, in patients on MHD the SF36 appears to have significant associations with measures of nutritional status, anemia, and clinical outcomes, including prospective hospitalization and mortality. Even though obesity, unlike under nutrition, is not generally an indicator of poor outcome in MHD, the SF36 may detect obese patients on MHD at higher risk for morbidity and mortality.

Results and Discussion

As mentioned previously, 70 patients affected by chronic renal failure undergoing hemodialysis treatment participated in this study, of which 37 were male and 33 were female.

Mean age observed in this group of patients was 59.9 years with the youngest being 21 and the oldest 84 years of age. Level of education in individuals who participated in this study is as follows: 15.6% were without a high school diploma, 72% had a high school diploma, and 12.4% had a college degree. 73% of patients were married, 11% single, 2% divorced, and 14% had a deceased spouse.

The mean score and standard error of the five personality traits (Neuroticism, extroversion, openness to hospital, hospital anxiety, experience, agreeableness, conscientiousness, quality of life, and depression) are reported in Table 1.

Analysis of results show that 34.3% of individuals under HD treatment, based on the level of anxiety, fell into the normal group, 18.6% were in the borderline abnormal group, and 47.1% were placed in the abnormal group.

Table 1: Personality traits means and standard deviation

Personality Trait	Mean	Std. Deviation	N
Neuroticism	35.2143	9.61565	70
Extroversion	39.5857	7.22013	70
Openness to Experience	35.7286	5.11299	70
Agreeableness	40.7429	8.05540	70
Conscientiousness	42.4714	9.78571	70
Hospital Anxiety	16.5000	4.35973	70
Hospital Depression	16.3429	5.10438	70
Quality of Life	83.7429	15.66098	70

An analysis was also performed for depression and showed 35.7% of patients were in the normal group, 17.1% were in the borderline normal, and 47.1% of them were in the abnormal group. In this study, correlation was used for the analysis of results, which is shown in Table 2.

Table 2 shows a positive meaningful correlation between anxiety and neuroticism (r= 0.28, n= 70, p < 0.01), a negative meaningful correlation between neuroticism and quality of life (r= -0.25, n= 70, p < 0.05), a negative meaningful correlation between extroversion and anxiety (r= -0.21, n= 70, p < 0.05), a negative meaningful correlation between extroversion and depression (r= -0.25, n= 70, p < 0.05), a positive meaningful correlation between extroversion and life quality (r= 0.37, n= 70, p < 0.01), and there is no meaningful correlation between openness to experience with any one of the factors: anxiety, depression, and life quality. Agreeableness has a positive meaningful correlation with life quality (r= 0.27, n=70, p < 0.01), and there is also a positive meaningful correlation between life quality and conscientiousness (r= 0.22, n= 70, p < 0.05). Among personal factors, there is a negative correlation between neuroticism and extroversion (r= 0.36, n= 70, p < 0.01), neuroticism with agreeableness has a negative correlation (r= -0.22, n= 70, p < 0.05), and neuroticism with conscientiousness has a negative correlation (r= -0.40, n= 70, p < 0.01). Between extroversion and agreeableness there is a positive correlation (r= 0.5, n= 70, p < 0.01) and a positive meaningful correlation between extroversion and conscientiousness (r= 0.47, n= 70, p < 0.01). There is no meaningful correlation between openness to experience with any one of the personal trait factors. But, between agreeableness and conscientiousness there is a positive correlation (r= 0.59, n= 70, p < 0.01).

Table 2: Personality traits correlation, anxiety, depression and quality of life

		Neuroticism	Extroversion	Openness to Experience	Agreeableness	Conscientiousness
Neuroticism	Pearson Correlation	1	- 0.365(**)	- 0.046	- 0.220(*)	- 0.408(**)
	Sig. (1-tailed)	0	0.001	0.354	0.034	0.000
	N	70	70	70	70	70
Extroversion	Pearson Correlation	- 0.365(**)	1	- 0.023	0.554(**)	0.480(**)
	Sig. (1-tailed)	0.001	0	0.426	0.000	0.000
	N	70	70	70	70	70
Openness to Experience	Pearson Correlation	- 0.046	- 0.023	1	- 0.113	- 0.027
	Sig. (1-tailed) N	0.354	0.426	0	0.176	0.412
		70	70	70	70	70
Agreeableness	Pearson Correlation	- 0.220(*)	0.554(**)	- 0.113	1	0.591(**)
	Sig. (1-tailed)	0.034	0.000	0.176	0	0.000
	N	70	70	70	70	70
Conscientiousness	Pearson Correlation	- 0.0408(**)	0.480(**)	- 0.027	0.591(**)	1
	Sig. (1-tailed) N	0.000	0.000	0.412	0.000	0
		70	70	70	70	70
Hospital Anxiety	Pearson Correlation	0.278(**)	- 0.216(*)	0.037	- 0.113	- 0.198
	Sig. (1-tailed)	0.010	0.36	0.379	0.177	0.050
	N	70	70	70	70	70
Hospital Depression	Pearson Correlation	0.138	- 0.251(*)	- 0.009	- 0.168	- 0.040
	Sig. (1-tailed) N	0.128	0.018	0.472	0.82	0.371
		70	70	70	70	70
Quality of Life	Pearson Correlation	- 0.253(*)	0.379(**)	- 0.191	0.288(**)	0.228(*)
	Sig. (1-tailed)	0.017	0.001	0.059	0.008	0.029
	N	70	70	70	70	70

** Correlation is significant at the 0.01 level (1-tailed)

* Correlation is significant at the 0.05 level (1-tailed)

Chronic illnesses have negative effects on a patient's general health and life quality. There is a close relationship between the patient's health and his quality of life. Chronic renal illness along with dialysis treatment is a stress causing condition followed by reactions that consists of unpleasant emotional, physical, and psychological responses; all of which can jeopardize life quality and psychological health of individuals. Despite the effect of haemodialysis treatment in end stage renal failure, these patients are exposed to various physical and psychological stress factors which consists of family problems, changes in sexual activity, dependence on others to carry on with life, changes in self-image, psychological pressures, and possibility of death [4, 5].

This study was conducted to examine the relationship between personality traits, anxiety, depression and life quality, in patients undergoing haemodialysis (HD) and showed that 34.3% of individuals under HD treatment

according to level of anxiety fell into the normal group, 18.6% of them fell in the borderline abnormal group, and 47.1% were in the abnormal group. Results obtained from this study are similar to those of previous studies conducted on this topic. Various studies have shown that patients under haemodialysis treatment are exposed to significant amount of pressures and stressors, which can reduce their life quality [6, 22]. As Mozlan showed in his study, only one third of patients undergoing haemodialysis treatment possess a good life quality. The same analysis was done to assess depression and the results showed 35.7% of patients were in the normal group, 17.1% of them were in the borderline abnormal group, and 47.1% fell in the abnormal group [17].

Many studies support the high rate of chronic depression and emotional problems in patients with physical illness [5]. Koike et al. conducted a study following 1356 patients, in the United States, for 6-12

months, which showed that the rate of depression is higher in patients suffering from physical illness compared to the general public. In this study, more than 43% of patients with physical illness had depression [11]. Drayer et al (2006) showed in their study that about 28% of individuals under haemodialysis treatment are affected by medium and high depression. High depression is mostly seen in younger patients and those patients with less social supports [4].

Correlation analysis between personality traits, depression, and quality of life showed that there is a positive meaningful correlation between neuroticism and depression (r= 0.28, n= 70, p < 0.01) and a negative meaningful correlation between neuroticism and quality of life (r= - 0.25, n= 70, p < 0.05). These findings correspond to Xiao-qing ye's findings (2013). This research emphasized the important role of the five psychological stressors as causes of depression and anxiety; the five stressors are as follows: family and occupational crisis, health concerns and its influence on family, anxiety about daily activity regarding individual social abilities and physical ability concern [23].

The analysis of results showed that there is a negative meaningful correlation between extroversion and anxiety (r= -0.21, n= 70, p < 0.05), a negative meaningful correlation between extroversion and depression (r= - 0.25, n= 70, p < 0.05), and a positive correlation between extroversion and quality of life (r= 0.37, n= 70, p < 0.01). It is important to note that as chronic renal failure initiates it significantly influence life quality of individuals, as mentioned in the introduction[24]. According to some studies, one factor that negatively affects life quality of patients under HD treatment is the lack of social and family support. A study with a similar topic showed that approximately one third of individuals suffering from chronic illness report having very little social support[11].

McEnery et al's study (1992) supports the strong relationship between social support and life quality [25].

According to Keyes and et al's study there is a meaningful and direct relationship between emotional support and life quality [26]. Extroversion factor can explain the rate of social interaction of individuals. Similarly, our results showed that social interaction and support can improve the life quality of patients under

HD treatment, only if enough attention is given to their mental health as well. Belasco et al conducted a study (2006) that showed caregivers of haemodialysis patients experience a burden of stress and mental pressure, and therefore need educational, social, and psychological interventions themselves [26].

There was no meaningful correlation between openness to experience and factors of anxiety, depression, and life quality. Agreeableness has a positive meaningful correlation with life quality (r= 0.28, n= 70, p < 0.01) and conscientiousness also had a positive meaningful correlation with life quality (r= 0.22, n= 70, p < 0.05). Thus, agreeableness is a factor that can have an influence on life quality of patients. Ultimately, sign, side-effect, and treatment of the disease has an important effect on the life style of patients. Life quality can be an independent and strong predicting factor in relation to mortality in patients being treated by HD[14].

Conclusions

Psychological problems and specially depression and anxiety disorders account as serious problems, in haemodialysis patients, which can put their health in jeopardy. Therefore, it is suggested that for early diagnosis and treatment of depression, HD patients be psychologically examined periodically. In conclusion, stressor factors must be assessed in haemodialysis patients and intervention methods must be presented for improving patients' life skills in order to prevent psychological and social stress factors.

Competing Interests

This is to notify that we didn't take any financial support from any governmental institution to construct this study and also we didn't pay money to those people that participate in each part of this study.

Acknowledgements

Also special thanks to Ms. Maryam Salehi Tazangi who translated and edited the paper into English.

References

1. Smeltzer SC, Bare BG, Hinkle JL, Cheever KH. Brunner & Suddareths: Textbook of medical surgical nursing. 11th ed. Lippincott Williams' & Wilkins a Wolters Kluwer Company. 2008; 1521-52.

2. Aghighi M, Heidary Rouchi A, Zamyadi M, Mahdavi-Mazdeh M, Rajolani H ,Ahrabi S, et al. Dialysis in Iran. Iran J Kid Dis. 2008; 2 (1): 11-5.

3. Al-Arabi S. Quality of life: subjective description of challenges to patients with end stage renal isease. Nephrol Nurs J. 2006; 33(3): 285-93.

4. Drayer RA, Piraino B, Reynolds CF 3rd, Houck PR, Mazumdar S, Bernardini J, et al. Characteristics of depression in hemodialysis patients: symptoms, quality of life and mortality risk. Gen Hosp Psychiatry. 2006; 28(4): 306-12.

5. Kazemi R, Rezaei Ghalechi E. P01-87 - Evaluation of the rate of depression in heart diseases's patients and dialysis candidates against the healthy people. Eur Psychiatry. 2010; 25 Suppl(1): 308.

6. Kutner NG, Fair PL, Kutner MH. Assessing depression and anxiety in chronic dialysis patients. J Psychosom Res. 1985; 29(1): 23-31.

7. Fukuhara S, Lopes AA, Bragg-Gresham JL, Kurokawa K, Mapes DL, Akizawa T. Heath related quality of life among dialysis patient on three continents, the dialysis outcomes and practice patterns study. Kidney Int. 2003; 64: 1903-10.

8. Tovbin D, Gidron Y, Jean T, Granovsky R, Schnieder A. Relative importance and interrelations between psychosocial factors and individualized quality of life of Hemodialysis patients. Qual Life Res. 2003; 12: 709-17.

9. Hailey BJ, Moss SB, Street R, Gersh HA. Mental Health Services in an outpatient dialysis practice. Dial Transplant. 2001; 30(11): 732-9.

10. Aghanwa HS, Morakinyo O. Psychiatric complications of hemodialysis at a kidney center in Nigeria. J Psychosom Res. 1997 May;42(5):445-51.

11. Koike AK, Unutzer J, Wells KB. Improving the care for depression in patients with comorbid medical illness. Am J Psychiatry. 2002; 159(10): 1738-45.

12. Christensen AJ, Moran PJ. Psychosomatic research in end-stage renal disease: a framework for matching patient to treatment. J Psychosom Res. 1998; 44(5): 523-8.

13. Sensky T, Leger C, Gilmour S. Psychosocial and cognitive factors associated with adherence to dietary and fluid restriction regimens by people on chronic haemodialysis. Psychother Psychosom. 1996; 65(1): 36-42.

14. Sayin A, Mutluay R, Sindel S. Quality of life in hemodialysis, peritoneal dialysis, and transplantation patients. Transplant Proc. 2007;39(10):3047-53.

15. Varricchio CG. Relevence of quality of life to clinical Nursing practice. Semin Oncol Nurs. 1990;6(4):255-9.

16. Merkus MP, Jager KJ, Dekker FW, Boeschoten EW, Stevens P, Krediet RT, Quality of life in Patients on chronic Dialysis: Self-assessment 3 months after the start of treatment. The Necosad Study Group. Am J Kidney Dis. 1997; 29(4): 584-92.

17. Molzan AE, Northcott HC, Dossetor JB. Quality of life of individuals with ESRD: Perception of patients, nurses, and physicians. ANNA J. 1997; 24(3), 325-33.

18. Ferrans CE, Powers MJ. Psychometic assessment of the quality of life index. Res Nurs Health. 1992;15(81):29-38.

19. Steele TE, Baltimore D, Finkelstein SH, Jurgensen P, Klider AS, Finkelstein FO. Quality of life in peritoneal dialysis patients . J Nerv Ment Dis. 1996;184;368-74.

20. O'Donnell K, Chung JY. The diagnosis of major depression in end-stage renal disease. Psychother Psychosom. 1997;66(1):38-43.

21. Zigmond AS, Snaith RP. The hospital anxiety and depression scale. Acta Psychiatr Scand. 1983 Jun;67(6):361-70.

22. CM Aldwin, Loriena A. Coping and health acomparison of the stress and trauma. Am Psychol Ass J. 2001; 53(7): 11-25.

23. Lin J, Guo Q, Ye X, Li J, Yi C, Zhang X, et al. The effect of social support and coping style on depression in patients with continuous ambulatory peritoneal dialysis in southern China. Int Urol Nephrol 2013;45(2):527-35 PMID 23054324

24. Mohr PE, Neumann PJ, Franco SJ, Marainen J, Lockridge R, Ting G. The case for dialy dialysis: Its impact on costs and quality of life. Am J Kidney Dis 2001;37(4):777-89.

25. McEnery PT, Stablein DM, Arbus G, Tejani A. Renal Transplantation in Children. A report of the North American Pediatric Renal Transplant Cooperative Study. N Engl J Med. 1992; 326(26), 1727-32.

26. Keyes CLM. Chronic physical conditions and aging: Is mental health a potential protective factor? Ageing Int. 2005 30(1), 88-104.

27. Belasco A, Barbosa D, Bettencourt AR, Diccini S, Sesso R. Quality of life of family caregivers of elderly patients on hemodialysis and peritoneal dialysis. Am J Kidney Dis 2006;48:955-63.