Quality of Life, Depression, and Anxiety in Patients Undergoing Renal Replacement Therapies in Saudi Arabia

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Received 7 November 2021; Revised 22 February 2022; Accepted 19 March 2022; Published 29 March 2022

Academic Editor: Omer Toprak

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Despite improvements in renal replacement therapy (RRT) for end-stage renal disease (ESRD), it continues to have serious negative impacts on quality of life (QOL) and emotional status. This study determines the association between demographic characteristics and the negative emotional states of depression, anxiety, and stress in Saudi Arabia. A comparative cross-sectional study was conducted in the Eastern Region of Saudi Arabia. Convenience sampling was used to recruit participants comprising hemodialysis (HD), peritoneal dialysis (PD), and kidney transplantation (Tx) patients. They completed the Short Form-36 Survey and the Depression, Anxiety, Stress Scale (DASS). The physical component summary (PCS) score was similar for HD (41.7) and PD (41.5), but higher among Tx (45.2). The mental component summary (MCS) score was similar between HD (48.0) and Tx (48.8), but lower in PD (42.3). The majority of patients in all groups had normal levels of depression, anxiety, and stress. Overall, the study found that PCS was higher among Tx patients compared to HD and PD, while MCS was higher among HD and Tx patients than PD patients. Most patients’ levels of depression, anxiety, and stress were within the normal range. Those findings will provide policymakers and health managers with the significant factors which can affect the QOL of dialysis and Tx patients.

1. Introduction

Chronic kidney disease (CKD) caused 1.2 million deaths in 2020 and was the twelfth leading cause of death worldwide [1]. CKD is a very stressful disease which causes many complications [2]. ESRD limits the choice of patients to RRT, including dialysis (hemodialysis or peritoneal dialysis) or kidney transplantation [3]. Consequently, the available modalities of these treatment options entail many significant changes that undermine patients’ QOL [4]. According to Chen et al. [5], patients are the best people to evaluate their own QOL.

Quality of life is a substantial indicator of welfare, which helps in health planning by shaping care priorities and the effectiveness of healthcare interventions [6]. QOL is a complicated and multifaceted concept that affects and is shaped by health outcomes. It also encompasses broader concepts such as physical health and mental, psychological, spiritual, and social wellbeing, as well as self-image and self-determination, all of which are intrinsic to QOL and which affect health outcomes [7, 8]. The World Health Organization (WHO) defines QOL as follows:

“An individual’s perception of their position in life in the context of the culture and value systems in which they live and relate to their goals, expectations; standards and concern and this include six domains; physical health, psychological status, level of independence, social relationship, environmental features, and spiritual concern” [9].

QOL research is important in evaluating the outcome of any intervention in chronic diseases. ESRD effectively incurs disability for patients and fundamentally changes their lives, leading to reduced QOL [10]. It is a measured attempt to assess the direct impact of medical intervention on patients’ ability to function well in their daily lives [11].

Since dialysis and Tx are life-prolonging and not curative treatments, they affect many patients’ psychological health status. Depression and anxiety are the most commonly reported mental problems, and psychological factors have a negative influence on patients’ QOL [12–15]. A systematic
review and meta-analysis by Palmer et al. [16] found that depression affects approximately a quarter of adults with CKD. Many scholars agreed that the prevalence of depression and anxiety among ESRD patients was higher than in the general population, as found in a single center in Saudi Arabia [14, 17]. Shirazian et al. [18] in their narrative review study found that the prevalence of depression is up to four times higher in patients with ESRD compared with the general population, and up to three times higher than in patients with other chronic illnesses.

AlDukhayel [19] carried out a study in Riyadh city in a single center and reported a high depression prevalence among PD and HD patients, at 98.5% and 83.5%, respectively. In India, in a single center, the researcher reported varying degrees of HD patient depression prevalence, e.g., 61% [20], 68% for two centers in Brazil [21], and a relatively lower rate of 23.3%, the results from two centers in Makkah, Saudi Arabia [22]. In Panama, a single center data reported 21.1% anxiety among such patients. However, depression prevalence among kidney transplant patients has been found to be relatively low, varying from 11.8% [23] to 25.7% according to the results from a meta-analysis study [16].

In a cohort study in Japan which is part from the Dialysis Outcomes and Practice Patterns Study (DOPPS), the study found that QOL among dialysis patients is lower than that of patients who undergo kidney Tx [24]. According to a multicenter study in Pakistan, there are many factors that affect the QOL of HD patients, such as age, gender, BMI, employment, educational level, income level, and other variables that are significantly correlated with QOL in general [25, 26]. The results from a single center in Riyadh, Saudi Arabia found that the mean score of QOL among Saudis on HD was 54.2 for MCS and 52.7 for PCS [27].

QOL is an important outcome measure in the assessment of chronic diseases. It measures physical and social functioning, and perceived physical and mental well-being. The importance of QOL in ESRD patients is manifest in the clinical outcome of the disease and its treatments. Moreover, evaluating the demographic characteristics of patients can help health practitioners and planners to improve management for ESRD patients and their treatment, to improve their QOL. There may be significant limitations on patients’ QOL. Most studies on QOL and ESRD have been done abroad, and QOL studies on Saudi patients are limited. To address these research gaps, the current study aimed to do the following:

1. Determine the level of QOL for ESRD patients undergoing dialysis or kidney Tx in Saudi Arabia
2. Discover the prevalence of negative emotional states of depression, anxiety, and stress for ESRD patients undergoing dialysis or kidney Tx in Saudi Arabia
3. Identify the association between QOL, DASS, and demographic characteristics

2. Materials and Methods

A comparative cross-sectional study was carried out in the Eastern Region of Saudi Arabia. There were 21,068 patients diagnosed with ESRD in 2019 in Saudi Arabia, of whom 19,522 were treated with HD, while the remainder (1,546 patients) received PD. In the eastern region in 2019, 2,416 patients received HD and 300 received PD, while there were 204 transplant patients [28]. Patients on PD treatment used automated peritoneal dialysis (APD).

The population sample consisted of all patients diagnosed as ESRD and treated with HD, PD, or Tx. Convenience sampling was utilized, with the following inclusion criteria: all participants aged 18 years or older, on dialysis or Tx for more than 3 months prior to the survey date (to allow patients to recover and stabilize their medical status, and return to activities of daily living) [29, 30].

The data were collected form HD patients in their unit which has 105 machines utilized by 218 patient who frequently on hemodialysis treatment two or three times per week. The unit is part from a public central hospital. In the PD unit which includes 33 patients, the patients are having their PD procedure through using an APD machine at home, and they should have frequent visits to the unit for medical evaluation and to collect their supplies and medicine. The Tx center is part of a specialist hospital and provides kidney transplants to the region with about 200 surgeries annually. The data were collected by face-to-face interviews while patients were on dialysis or waiting for their routine visit to collect medicine or blood test as a follow-up visit. The face-to-face interview was conducted to consider illiterate and weak patients. In addition, to give more explanation to them depend on their education level and mental health which will help in improve the quality of data. The minimum required sample size was calculated as 213 patients using G*Power software. With an estimated effect size of 0.25, and alpha was 0.1 among three predictors for analysis of variance (ANOVA) [17].

The 36-Item Short Form Survey (SF-36) is a standard questionnaire used for many purposes. It is a short-form health survey with 36 questions, and it is one of the most widely used measures of health-related QOL [14], with a valid and reliable Arabic-language version [31]. The SF-36 health survey is a generic outcome measure designed to examine a person’s perceived health status. It is a self-reported questionnaire, which includes eight health concepts, including physical function, role limitation because of physical health problems, bodily pain, social function, general mental health, role limitation due to emotional problems, vitality (energy/fatigue), and general health perception [32].

The Arabic version of the Depression, Anxiety, and Stress Scale (DASS) was designed to measure the level of the negative emotional states of depression, anxiety, and stress [33]. The DASS scale contains 42 items. It is a self-reported questionnaire designed to measure the severity of symptoms of depression and anxiety. The respondents were asked to indicate the presence of a symptom during the previous week. Each item is scored from 0 (absence of stress and depression during the last week) to 3 (a high level of depression and stress during the past week).

The study protocol was approved by the Institutional Review Board (IRB) at the university where the study was carried out. Participants’ written permission was obtained by
means of an informed consent form before data collection, including assurance that their participation was entirely voluntary and would not affect the care they received, and that their data would be maintained confidentially, available only to the research team. The data collection was started after ethical clearance was secured. SPSS was used to determine frequencies and percentages for demographic data and the DASS and the difference between groups. The mean and standard deviation (SD) were used to present QOL, and SF-36 software was used to calculate the score of QOL.

3. Results

The majority of the patients were male, married, educated to grade 9–12, and nonsmokers in the three studied treatment categories. Their mean ages were 49.1, 40.4, and 43.2 years old for HD, Tx, and PD patients, respectively. Dialysis hours per session were 4 for HD patients and 9 for PD patients. For Tx patients, the mean time since kidney transplantation surgery was 33.3 months, with a median of 22.5 months. The length of the period on dialysis for HD and PD was 44.7 and 24 months, respectively (Table 1).

QOL for PCS and MCS were calculated. The PCS score was similar for HD (41.7) and PD (41.5), but higher among Tx (45.2). The MCS score was similar between HD (48.0) and Tx (48.8), but lower in PD (42.3). On the DASS scale, for depression level, the majority of patients had a normal level of 57.1%, 73.9%, and 50.0% for HD, Tx, and PD, respectively. Anxiety was normal among the majority of patients in HD (60.0%), Tx (72.8%), and PD (55.0%). Additionally, stress was within the normal range for all categories of patients: HD (55.0%), Tx (62.0%), and PD (40.0%) (Table 2).

In HD, higher PCS scores were reported for males (p value 0.004); patients with education levels G9–12 (compared to illiterate ones) (post hoc, p = 0.047) and higher than BSc (post hoc, p = 0.025); and employed patients (compared to retirees) (post hoc, p = 0.013). For Tx, higher PCS was reported for unmarried patients (p = 0.05), patients with G9–12 (post hoc, p = 0.033), and smokers (p = 0.048). For PD, the PCS score was also higher among smokers (p = 0.022) (Table 3).

4. Discussion

This current study found that PCS was higher in Tx patients compared to their HD and PD counterparts, while MCS was higher among HD and Tx patients compared with those receiving PD. In HD, PCS was higher among males, patients with an education level of G9–12, and those in employment. For Tx, PCS was higher among unmarried patients, those with G9–12, and smokers. For PD, the PCS score was higher among smokers. In the DASS scale, most patients’ levels of depression, anxiety, and stress were within the normal range.

This study confirmed that PCS was higher in Tx patients compared to those receiving HD and PD. Also, MCS was higher among HD and Tx patients compared with PD patients. These results corroborate previous studies in a single center in Sichuan Province, China, and in a multi-center in China and Trinidad and Tobago [34–36]. A 10-year follow-up cohort study in Brazil involving ten dialysis centers reported that patients who shifted from hemodialysis or peritoneal dialysis to transplantation modalities gained better PCS and MCS scores [4]. Similarly, in Poland, a prospective study on a single-center evaluating QOL before Tx and one year after found that QOL improved after Tx for patients who were previously receiving PD or HD [37]. Additionally, a four-year multicountry cohort study with 1,685 patients comprising patients with CKD (not on dialysis), patients on dialysis (HD or PD), and transplanted patients found that QOL was highest among Tx and then CKD patients, and was worst among receivers of dialysis [38]. However, a systematic review reported that most studies found no significant differences in QOL among patients with ESRD receiving HD or PD treatment modalities [39]. On the other hand, a study in a single center in Sichuan Province, China, by Zhang et al. [34] found that the peritoneal dialysis group had higher scores of PCS and MCS than those of the hemodialysis group. For HD patients, the average level of QOL was high among CCG countries including KSA for both domains of PCS and MCS [40].

Although no single treatment provides a complete cure for the studied factors, transplant patients seem to function more normally, and one of the benefits of transplantation is to offer a state of health similar to what patients had before the onset of the disease [37]. A possible explanation for this might be that after transplantation, patients can excrete metabolic waste without mechanical intervention, and their improved nutritional status will reflect positively on their physical and mental status. Moreover, the freedom from schedule sessions will offer more chances to be involved in normal life activities that improve wellbeing and QOL [34]. On the other hand, HD patients undergo painful procedures such as needling and suffer from side effects of dialysis, such as hypotension and heart problems. Also, HD patient machine dependence and modified body fluid balance can affect their mentality, while PD does not include painful procedures, thus patient status is relatively stable [34].

The results of this study showed that in Tx patients, PCS was higher among the unmarried, patients with G9–12, and smokers. In HD, PCS was higher among males, patients with educational levels G9–12, and those in employment. For PD, the PCS score was higher among smokers. Correspondingly, the results from a multinational study reported that factors associated with reduced QOL included being female, having a lower educational level, and being single [38]. In Jordan, the data from one center found that HD patients’ PCS was associated with age, gender, marital status, and depression and MCS was significantly associated with age, gender, marital status, education, and depression [41]. In France, data from a multi-center found that PCS was lower among older and female Tx patients [42].

A multinational study found that married patients experienced better QOL [38]. Furthermore, in Brazil, the results from two centers found that smoking negatively affected the perceptions of QOL among HD patients [43], although another study found no significant relation between Tx and HD in relation to smoking status in the Netherlands [44].
The justification of worse outcomes for women may be that they are a vulnerable group with chronic diseases since they have different psychosocial perspectives on life compared to men according to multinational study [38]. Despite smoking being a well-known predictor of numerous diseases, with high levels of mortality, severe health problems, and decreased QOL, some studies found that smoking was used as a means to avoid being alone, a source of solace, and a way to reduce pain (i.e., some patients may assume that smoking is a way of dealing with CKD and its outcomes). The study was carried out in Brazil [43]. Because of the nature of kidney disease, a relatively higher level of education will allow patients to play a more proactive role in managing their own health status as pointed out in a multinational study [38]. Furthermore, education level is very crucial to improve QOL. According to the narrative review by Aguiar et al. [45], patient capability to engage with health knowledge and services is correlated with improved mental health and QOL, and dialysis patients with better health literacy had better QOL and lower levels of anxiety and depression.

| Table 1: Demographic characteristics of patients. |
|---|---|---|---|---|
| | HD | TX | PD |
| **No.** | **%** | **No.** | **%** | **No.** | **%** |
| **Gender** | | | | | |
| Male | 80 | 76.2% | 58 | 63.0% | 11 | 55.0% |
| Female | 25 | 23.8% | 34 | 37.0% | 9 | 45.0% |
| **Marital status** | | | | | |
| Unmarried | 43 | 41.0% | 31 | 33.7% | 9 | 45.0% |
| Married | 62 | 59.0% | 61 | 66.3% | 11 | 55.0% |
| **Education level** | | | | | |
| Illiterate | 20 | 19.0% | 4 | 4.3% | 2 | 10.0% |
| G1–8 | 20 | 19.0% | 18 | 19.6% | 4 | 20.0% |
| G9–12 | 39 | 37.1% | 36 | 39.1% | 7 | 35.0% |
| Diploma | 11 | 10.5% | 10 | 10.9% | 4 | 20.0% |
| BSc and above | 15 | 14.3% | 24 | 26.1% | 3 | 15.0% |
| **Employment status** | | | | | |
| Working | 21 | 20.0% | 33 | 36.7% | 11 | 55.0% |
| Not working | 61 | 58.1% | 39 | 42.4% | 6 | 30.0% |
| Retired | 23 | 21.9% | 20 | 21.7% | 3 | 15.0% |
| **Smoking** | | | | | |
| Yes | 26 | 24.8% | 6 | 6.5% | 3 | 15.0% |
| No | 79 | 75.2% | 86 | 93.5% | 17 | 85.0% |
| **Nationality** | | | | | |
| Saudi | 50 | 47.6% | 89 | 96.7% | 17 | 85.0% |
| Non-Saudi | 55 | 52.4% | 3 | 3.3% | 3 | 15.0% |
| **Age** | Mean (SD) | Mean (SD) | Mean (SD) | Mean (SD) | Mean (SD) |
| | 49.1 (16.5) | 40.4 (14.3) | 36.0 (23.5) | 40.5 (24.5) |
| **Time since start the modality** | Mean (SD) | Mean (SD) | Mean (SD) | Mean (SD) |
| | 44.7 (43.5) | 33.3 (35.1) | 22.5 (40.8) | 24.0 (51.0) |
| **Dialysis hour** | Mean (SD) | Mean (SD) | Mean (SD) | Mean (SD) |
| | 4.0 (0.2) | 4.0 (0.0) | 9.1 (1.9) | 8.5 (1.8) |

| Table 2: Mean score and frequency for QOL and DASS domains. |
|---|---|---|---|---|
| | HD | Tx | PD |
| **QOL** | Mean (SD) | Mean (SD) | Mean (SD) |
| PCS | 41.7 (10.4) | 45.2 (8.6) | 41.5 (8.1) |
| MCS | 48.0 (9.0) | 48.8 (9.4) | 42.3 (10.2) |
| **Depression** | Frequency (%) | Frequency (%) | Frequency (%) |
| Normal | 60 (57.1) | 68 (73.9) | 10 (50.0) |
| Mild | 24 (22.9) | 12 (13) | 3 (150) |
| Moderate | 9 (8.6) | 9 (9.8) | 3 (15.0) |
| Severe | 6 (5.7) | 2 (2.2) | 3 (15.0) |
| Extremely severe | 6 (5.7) | 1 (1.1) | 1 (5.0) |
| **Anxiety** | Frequency (%) | Frequency (%) | Frequency (%) |
| Moderate | 11 (10.5) | 9 (9.8) | 6 (30.0) |
| Severe | 8 (7.6) | 4 (4.3) | 0 (0) |
| Extremely severe | 10 (9.5) | 1 (1.1) | 1 (5.0) |
| **Stress** | Frequency (%) | Frequency (%) | Frequency (%) |
| Moderate | 12 (11.4) | 17 (18.5) | 3 (15.0) |
| Severe | 11 (10.5) | 10 (10.9) | 1 (5.0) |
| Extremely severe | 3 (2.9) | 3 (3.3) | 6 (30.0) |
other possible reason was that the majority of patients in the present study were male, and females generally have poorer wellbeing and QOL.

Finally, the current study had several important limitations that need to be considered. The sampling setting limits the generalizability of the findings to other areas or settings. Additionally, the cross-sectional design does not evaluate changes in QOL over time. Furthermore, the limited number of PD participants does not help us in carrying out regression analysis for this group.

5. Conclusion

This study was designed to determine the level of QOL in relation to the negative emotional states of depression, anxiety, and stress for ESRD patients undergoing dialysis or kidney Tx.

This study found that PCS was higher in Tx compared to HD and PD, while MCS was higher among HD and Tx than for PD patients. In HD, PCS was higher among males, patient with an education level of G9–12, and working
patients. For Tx, PCS was higher among unmarried, G9–12, and smoking patients. For PD, the PCS score was higher among smokers. In the DASS scale, most patients’ levels of depression, anxiety, and stress were within the normal range.

These findings have significant implications for understanding the QOL among patients on ESRD. It is expected that findings from this study will provide health care managers and policy developers with significant information about the impact of dialysis and its treatment on patients’ QOL and help identify patients’ needs, as well as particularly vulnerable patient groups. An implication of this study is the possibility that the findings provide direction for hospital decision makers on the areas that could be improved to ensure better QOL among patients. This research allows managers to better understand the relation between QOL and other variables. This will enhance awareness of pertinent risk outlines, to help administrators address such factors.

The present study extends knowledge about QOL among patients on ESRD. A key strength of the present study was the inclusion of the three modalities at the same time for the same area, to be a basis for comparison. More research is required to develop a deeper understanding of the complexity of QOL in ESRD and its longitudinal changes over time.

Data Availability

The data that support the findings of this study are available on request from the corresponding author.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Acknowledgments

The author would like to thank all patients who participated in the study for their valuable time given for filling out the questionnaires and to express thankfulness to the manager staff in the three centers for their help and support. My gratitude also goes to Abdelrahman Al-Anatifi for his help in data collection and entry.

References

[1] E. F. Carney, “The impact of chronic kidney disease on global health,” Nature Reviews Nephrology, vol. 16, no. 5, p. 251, 2020.
[2] R. Arnold, T. Issar, A. V. Krishnan, and B. A. Pussell, “Neurological complications in chronic kidney disease,” JRSM cardiovascular disease, vol. 5, Article ID 2048004016677687, 2016.
[3] S. J. Knechtsle, L. P. Marson, and P. J. Morris, Kidney Transplantation-Principles and Practice E-Book, Elsevier Health Sciences, Amsterdam, Netherlands, 8th edition, 2019.
[4] D. C. S. de Brito, E. L. Machado, I. A. Reis, D. P. Moreira, T. H. M. Nébias, and M. L. Cherchiglia, "Modality transition on renal replacement therapy and quality of life of patients: a 10-year follow-up cohort study," Quality of Life Research, vol. 28, no. 6, pp. 1485–1495, 2019.
[5] S. S. Chen, S. Al Mawed, and M. Unruh, "Health-related quality of life in end-stage renal disease patients: how often should we ask and what do we do with the answer?" Blood Purification, vol. 41, no. 1-3, pp. 218–224, 2016.
[6] E. A. Shdaifat and M. Abdul Manaf, “Quality of life of caregivers and patients undergoing haemodialysis at Ministry of Health, Jordan,” International Journal of Applied Science and Technology, vol. 2, 2012.
[7] P. Theofilou, "Quality of life: definition and measurement,” Europe’s Journal of Psychology, vol. 9, 2013.
[8] M. Post, “Definitions of quality of life: what has happened and how to move on,” Topics in Spinal Cord Injury Rehabilitation, vol. 20, no. 3, pp. 167–180, 2014.
[9] B. Alder, C. S. Abraham, E. Van Teijlingen, and M. Porter, Psychology and Sociology Applied to Medicine, Elsevier Health Sciences, Amsterdam, Netherlands, 2011.
[10] K. Megari, “Quality of life in chronic disease patients,” Health psychology research, vol. 1, 2013.
[11] P. O’Halloran, H. Noble, K. Norwood et al., “Advance care planning with patients who have end-stage kidney disease: a systematic realist review,” Journal of Pain and Symptom Management, vol. 56, no. 5, pp. 795–807, 2018.
[12] S. P. B. H. N. Chandran and D. Prabhu, “Depression and anxiety among patients undergoing dialysis: an observational study,” International Journal of Contemporary Medical Research [IJCMR], vol. 7, 2020.
[13] S. Damery, C. Brown, K. Sein, J. Nicholas, J. Baharani, and G. Combes, “The prevalence of mild-to-moderate distress in patients with end-stage renal disease: results from a patient survey using the emotion thermometers in four Hospital trusts in the West Midlands, UK,” BMJ Open, vol. 9, no. 5, Article ID e027982, 2019.
[14] Z. S. Goh and K. Griva, “Anxiety and depression in patients with end-stage renal disease: impact and management challenges – a narrative review,” International Journal of Nephrology and Renovascular Disease, vol. 11, pp. 93–102, 2018.
[15] C.-F. Lai, H.-B. Tsai, S.-H. Hsu, C.-K. Chiang, J.-W. Huang, and S.-J. Huang, “Withdrawal from long-term hemodialysis in patients with end-stage renal disease in Taiwan,” Journal of the Formosan Medical Association, vol. 112, no. 10, pp. 589–599, 2013.
[16] S. Palmer, M. Vecchio, J. C. Craig et al., “Prevalence of depression in chronic kidney disease: systematic review and meta-analysis of observational studies,” Kidney International, vol. 84, no. 1, pp. 179–191, 2013.
[17] H. Mosleh, M. Alenezi, S. Al Johani, A. Alsani, G. Fairaq, and R. Bedaiwi, “Prevalence and factors of anxiety and depression in chronic kidney disease patients undergoing hemodialysis: a cross-sectional single-center study in Saudi Arabia,” Cureus, vol. 12, Article ID e6668, 2020.
[18] S. Shirazian, C. D. Grant, O. Aina, J. Mattana, F. Khorassani, and A. C. Ricardo, “Depression in chronic kidney disease and end-stage renal disease: similarities and differences in diagnosis, epidemiology, and management,” Kidney international reports, vol. 2, no. 1, pp. 94–107, 2017.
[19] A. AlDukhayel, “Prevalence of depressive symptoms among hemodialysis and peritoneal dialysis patients,” International Journal of Health Sciences, vol. 9, no. 1, pp. 9–16, 2015.
[20] V. Kumar, V. Khandelia, and A. Garg, “Depression and anxiety in patients with chronic kidney disease undergoing hemodialysis,” Annals of Indian Psychiatry, vol. 2, p. 115, 2018.
[21] G. B. Silva Junior, E. F. Daher, A. P. A. Bussi et al., “Depression among patients with end-stage renal disease in...
hemodialysis," *Psychology Health & Medicine*, vol. 19, no. 5, pp. 547–551, 2014.

[22] I. Türkistani, A. Nuqali, M. Badawi et al., "The prevalence of anxiety and depression among end-stage renal disease patients on hemodialysis in Saudi Arabia," *Renal Failure*, vol. 36, no. 10, pp. 1510–1515, 2014.

[23] V. Vásquez, N. Novarro, R. A. Valdés, and G. B. Britton, "Factors associated to depression in renal transplant recipients in Panama," *Indian Journal of Psychiatry*, vol. 55, pp. 273–278, 2013.

[24] A. Ishiwatari, S. Yamamoto, S. Fukuma, T. Hasegawa, I. Turkistani, A. Nuqali, M. Badawi et al., "Factors associated to depression in renal transplant recipients in Panama," *Indian Journal of Psychiatry*, vol. 55, pp. 273–278, 2013.

[25] A. E. O. D. Mendonça, G. D. V. Torres, M. D. G. Salvetti, J. C. Alchieri, and I. K. F. Costa, "Mudanças na qualidade de vida após transplante renal e fatores relacionados," *Acta Paulista de Enfermagem*, vol. 27, pp. 287–292, 2014.

[26] M. Bayoumi, "Life style modification toward improving quality of life and effects on caregivers’ burden: development of new nursing therapy," *Annals of Nursing and Primary Care*, vol. 1, no. 1, 1007 pages, 2018.

[27] A. Al-Jumaih, K. Al-Onazi, S. Binsalih, F. Hejaili, and A. Al-Sayyari, "A study of quality of life and its determinants among hemodialysis patients using the KDQOL-SF instrument in one center in Saudi Arabia," *Arab Journal of Nephrology and Transplantation*, vol. 4, pp. 125–130, 2011.

[28] *Saudi Center for Organ Transplantation (SCOT)*, *Annual Report*, Riyadh, Saudi Arabia, 2019.

[29] A. E. O. D. Mendonça, G. D. V. Torres, M. D. G. Salvetti, J. C. Alchieri, and I. K. F. Costa, "Mudanças na qualidade de vida após transplante renal e fatores relacionados," *Acta Paulista de Enfermagem*, vol. 27, pp. 287–292, 2014.

[30] L. Prihodova, I. Nagyova, J. Rosenberger et al., "Health-related quality of life 3 Months after kidney transplantation as a predictor of survival over 10 years," *Transplantation*, vol. 97, no. 11, pp. 1139–1145, 2014.

[31] S. J. Coons, S. A. Alabdulmohsin, J. R. Draugalis, and R. D. Hays, "Reliability of an Arabic version of the RAND-36 Health Survey and its equivalence to the US-English version," *Medical Care*, vol. 36, no. 3, pp. 428–432, 1998.

[32] J. Ware, SF-36 Health Survey (Version 1.0) for Use in Australia, QualityMetric Incorporated, USA, 2004.

[33] L. Parkitny and J. McAuley, "The depression anxiety stress scale (DASS)," *Journal of Physiotherapy*, vol. 56, no. 3, p. 204, 2010.

[34] L. Zhang, Y. Guo, and H. Ming, "Effects of hemodialysis, peritoneal dialysis, and renal transplantation on the quality of life of patients with end-stage renal disease," *Revista da Associação Brasileira de Nefrologia*, vol. 66, no. 9, pp. 1229–1234, 2020.

[35] H. Wu, Q. Li, Y. Cai, J. Zhang, W. Cui, and Z. Zhou, "Economic burden and cost-utility analysis of three renal replacement therapies in ESRD patients from Yunnan Province, China," *International Urology and Nephrology*, vol. 52, no. 3, pp. 573–579, 2020.

[36] S. Sanchez, S. Teelucksingh, R. Ali, H. Bailey, and G. Legall, "Quality of life and health status among patients receiving renal replacement therapy in Trinidad and Tobago, west indies," *International Journal of Nephrology and Renovascular Disease*, vol. 14, pp. 173–192, 2021.

[37] J. Z. Kostro, A. Hellmann, J. Kobiela et al., "Quality of life after kidney transplantation: a prospective study," *Transplantation Proceedings*, vol. 48, no. 1, pp. 50–54, 2016.

[38] A. Krishnan, A. Teixeira-Pinto, W. H. Lim et al., "Health-related quality of life in people across the spectrum of CKD," *Kidney international reports*, vol. 5, no. 12, pp. 2264–2274, 2020.

[39] Y.-F. Ho and L.-C. Li, "The influence of different dialysis modalities on the quality of life of patients with end-stage renal disease: a systematic literature review," *Psychology & Health*, vol. 31, no. 12, pp. 1435–1465, 2016.

[40] A. AlSahow, M. AlRukhaimi, J. Al Wakeel et al., "Demographics and key clinical characteristics of hemodialysis patients from the Gulf Cooperation Council countries enrolled in the dialysis outcomes and practice patterns study phase 5 (2012–2015)," *Saudi Journal of Kidney Diseases and Transplantation*, vol. 27, no. 7, p. 12, 2016.

[41] S. Muflih, K. H. Alzouubi, S. Al-Azzam, and B. Al-Husein, "Depression symptoms and quality of life in patients receiving renal replacement therapy in Jordan: a cross-sectional study," *Annals of medicine and surgery*, vol. 66, Article ID 102384, 2021.

[42] Y. Mouelhi, E. Jouve, M. Alessandri et al., "Factors associated with health-related quality of life in kidney transplant recipients in France," *BMC Nephrology*, vol. 19, no. 1, p. 99, 2018.

[43] N. M. Jesus, G. F. D. Souza, C. Mendes-Rodrigues, O. P. D. Almeida Neto, D. D. M. Rodrigues, and C. M. Cunha, "Quality of life of individuals with chronic kidney disease on dialysis," *Brazilian Journal of Nephrology*, vol. 41, no. 3, pp. 364–374, 2019.

[44] T. T. Jansz, A. A. Bonenkamp, F. T. J. Boereboom, F. E. van Reekum, M. C. Verhaar, and B. C. van Jaarsveld, "Health-related quality of life compared between kidney transplantation and nocturnal hemodialysis," *PLoS One*, vol. 13, no. 9, Article ID e0204405, 2018.

[45] R. Aguiar, M. Pei, A. R. Qureshi, and B. Lindholm, "Health-related quality of life in peritoneal dialysis patients: a narrative review," *Seminars in Dialysis*, vol. 32, no. 5, pp. 452–462, 2019.

[46] W. J. Liu, R. Musa, T. F. Chew, C. T. S. Lim, Z. Morad, and M. A. B. Bujang, "DASS21: a useful tool in the psychological profile evaluation of dialysis patients," *The American Journal of the Medical Sciences*, vol. 355, no. 4, pp. 322–330, 2018.

[47] Y. L Lai, H. L. M Neo, A Vathsala, and K Griva, "Comparing emotional adjustment of living-donor and deceased-donor kidney transplant patients," *Transplantation direct*, vol. 6, Article ID e529, 2020.

[48] V. Shafipour, F. Alhani, and A. Kazemnejad, "A survey of the quality of life in patients undergoing hemodialysis and its association with depression, anxiety and stress," *Journal Of Nursing And Midwifery Sciences*, vol. 2, pp. 29–35, 2015.