HIPPOKRATIA 2017, 21, 4: 163-168

**RESEARCH ARTICLE**

# The role of demographic characteristics and comorbidities in hemodialysis patients' health-related quality of life

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**Abstract**

**Background:** The assessment of health-related quality of life (HRQL) is a valid tool, which can measure the degree that a chronic condition and its treatment, can affect patients' quality of life (QOL).

**Methods:** A cross-sectional study was implemented at three hemodialysis units. One hundred fifteen patients were included in the study and 107 participated (response rate 93 %). The General Health Questionnaire (GHQ-28) and the Missoula-VITAS Quality of Life Index (MVQOLI-25) were utilized for the data collection.

**Results:** Multivariate logistic regression analysis found that increased number of coexisting diseases was associated with increased total score ≥24 on GHQ-28 [odds ratio: 1.35, 95 % confidence intervals (CI): 1.03-1.77, p =0.03]. Multivariate linear regression analysis revealed that increased age was associated with an increased score on somatic symptoms subscale (coefficient beta: 1.01, 95 % CI: 1.00-1.03, p =0.007). Increased number of coexisting diseases was associated with an increased score on anxiety/insomnia subscale (coefficient beta: 1.17, 95 % CI: 1.06-1.29, p =0.003). Moreover, increased educational level was associated with decreased score on social dysfunction subscale (coefficient beta: -0.89, 95 % CI: -1.62 to -0.096, p =0.028) and decreased score on severe depression subscale (coefficient beta: -1.14, 95 % CI: -2.03 to -0.26, p =0.012). Patients with fistula/graft had a higher score on MVQOLI-25 than patients with a central venous catheter (coefficient beta: 2.31, 95 % CI: 0.43-4.19, p =0.017).

**Conclusions:** Comorbidities, educational level and vascular access were the most important findings regarding to their impact on patients' HRQL. HIPPOKRATIA 2017, 21(4): 163-168.

**Keywords:** Comorbidity, demographic, hemodialysis, health, quality of life

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## Introduction

The assessment of health-related quality of life (HRQL) is a valid tool, which can measure the degree that a chronic condition and its' treatment can affect patients' quality of life (QOL). It can provide clinicians with valuable information about health status and reveal problems, which are not possible to be recognized during daily care[1]. Anxiety, depression, sleeping disorders, and somatic symptoms, are some of the problems that hemodialysis patients' face during their life and could be detected by assessing HRQL[2-4]. Also, HRQL measurements can predict hospitalization and mortality, as patients who reported to have lower HRQL are at higher risk compared to those who have better HRQL[5,6]. The fact that these patients have suffered a series of other chronic clinical conditions (comorbidities) deteriorates, even more, their QOL and underlines the importance of HRQL measurement[5].

The aim of this study was to evaluate hemodialysis patients' HRQL and investigate the correlation between patients' demographic characteristics and comorbidities with their QOL.

## Methods

*Setting and Sample*

A cross-sectional study was implemented in two public hospital-based hemodialysis units (General Hospital of Lamia, General Hospital of Amfissa) and one outpatient unit (Attiko Hemodialysis Center). The target population consisted of all hemodialysis patients (n =155). Patients' inclusion criteria for participation in the study were defined as: i) At least one year at dialysis treatment, ii) Age >18 years, iii) Ability to communicate in the Greek language. One hundred fifteen patients who met

these criteria were included in the study while 107 agreed to participate (response rate 93 %). Each patient signed an informed written consent concerning the study purpose, volunteer participation, and anonymity. The questionnaires completion took about 20 minutes and carried out before the dialysis section. The study was conducted during the period from October 1, 2014, until March 31, 2015. The study protocol was approved by the Ethical Committees of the General Hospital of Lamia and Amfissa (No 716, 31/10/2013 and No 9, 21/10/2013, respectively).

*Instruments*

Two instruments were utilized for the data collection, the General Health Questionnaire (GHQ-28) and the Missoula-VITAS Quality of Life Index (MVQOLI).

The GHQ-28 was developed by Goldberg[7] and has been translated into Greek language and validated in Greek population[8]. The GHQ-28 questionnaire is divided into four subscales: somatic symptoms (items 1-7), anxiety and insomnia (items 8-14), social dysfunction (items 15-21), and severe depression (items 22-28). The total score for each subscale ranges between 0 and 21. Lower scores indicate better general health status.

The MVQOLI was created by Byock and Merrinam[9] and has been used in a number of studies in different healthcare settings and chronically ill patient populations[10,11]. There are two versions of the MVQOLI, the 15 items and 25 items. The MVQOLI-15 tool has been translated and validated in a sample of Greek hemodialysis patients[12]. At the present research, the MVQOLI-25 item tool was used. The researcher, Paraskevi Theofilou, translated in the Greek language both MVQOLI-15 and MVQOLI-25 tools, and this is the first published research which used the MVQOLI-25 questionnaire.

The MVQOLI-25 questionnaire is divided into five subscales: symptoms (items 1-5), function (items 6-10), interpersonal (items 11-15), well-being (items 16-20), transcendent (items 21-25), and a single item for quality-of-life status assessment. The total score of MVQOLI-25 ranges from 0 to 30. Higher scores indicate better QOL. The internal consistency of the questionnaires was assessed with Cronbach's alpha coefficient.

*Statistical analysis*

Continuous variables are presented as means with standard deviation and medians with minimum and maximum values while categorical variables are presented as numbers (percentages). The Kolmogorov-Smirnov test and graphs (histograms and normal Q-Q plots) were used to test the normality of the distribution of the continuous variables. Only age and total score on MVQOLI-25 followed a normal distribution. Chi-square test and chi-square trend test were used to identify differences between groups. Mann-Whitney test was used to compare differences of GHQ-28 subscales score among dichotomous demographic characteristics, while independent samples t-test was used to compare differences of MVQOLI-25 score among dichotomous demographic characteristics. Spearman's correlation coefficient was used to estimate the correlation between continuous variables that did not follow a normal distribution, while Pearson's correlation coefficient was used in case of normal distribution.

We used as dependent variables the total scores on GHQ-28 and MVQOLI-25 and also the scores on the subscales of GHQ-28. We did not use as dependent variables the scores on the subscales of MVQOLI-25 due to the negative values that these scores took. Demographic characteristics were used as independent variables. Scores on the subscales of GHQ-28 did not follow a normal distribution, so a logarithmic transformation of these variables was done. Results are presented in a non-logarithmic scale for better understanding.

Multivariate linear regression analysis was applied for the identification of the predictive factors which were associated with scores on GHQ-28 subscales and MVQOLI-25. Variables with $p < 0.20$ in bivariate analyses were included in multivariate modeling. Backward stepwise elimination method was used for model development in multivariate linear regression. Criteria for entry and removal of variables were based on the likelihood ratio test, with entering and remove limits set at $p < 0.05$ and $p > 0.10$. Multivariate analysis was applied for the control of each potential confounding of each statistically significant factor to the others. The predictive variables were identified in terms of coefficients beta with standard errors and 95 % confidence intervals (CI). A two-sided p-value of less than 0.05 was considered statistically significant.

Multivariate logistic regression analysis was applied for the identification of the predictive factors which were associated with the score on total GHQ-28. Variables with $p < 0.20$ in bivariate analyses were included in multivariate modeling. Criteria for entry and removal of variables were based on the likelihood ratio test, with entering and remove limits set at $p < 0.05$ and $p > 0.05$. We estimated adjusted odds ratios with 95 % CIs for the predictive factors related to the score on total GHQ-28.

All tests of statistical significance were two-tailed, and p-values of less than 0.05 were considered significant. Statistical analysis was performed using the IBM SPSS Statistics for Windows (IBM SPSS, IBM Corp., Armonk, NY, USA) version 21.0.

**Results**

The Cronbach's α value for the questionnaires GHQ-28 and MVQOLI-25 are presented in Table 1. Cronbach's α for the total GHQ-28 was 0.95 and for the four subscales was between 0.85-0.88 indicating excellent internal reliability. Cronbach's α values for the MVQOLI-25 were lower than the GHQ-28. Cronbach's α for the total MVQOLI-25 was 0.82 and for the five subscales was between 0.60-0.80 indicating moderate internal reliability.

The participants' demographic characteristics and comorbidities are presented in Table 2.

Participants were asked to assess their overall QOL,

**Table 1:** The Cronbach's α value for the General Health Questionnaire (GHQ-28) and the Missoula-VITAS Quality of Life Index (MVQOLI-25).

| Domain | Cronbach's α |
|---|---|
| Total GHQ-28 | 0.95 |
| Somatic symptoms | 0.85 |
| Anxiety and insomnia | 0.88 |
| Social dysfunction | 0.86 |
| Severe depression | 0.88 |
| Total MVQOLI-25 | 0.82 |
| Symptoms | 0.60 |
| Function | 0.80 |
| Interpersonal | 0.70 |
| Wellbeing | 0.60 |
| Transcendent | 0.60 |

responding to one written question as a part of the MVQOLI-25. The majority of the patients (54.2 %) assessed their QOL as good/very good, 37.4 % as moderate, and 8.4 % as poor/very poor. The questionnaires' descriptives GHQ-28 and MVQOLI-25 are presented in Table 3.

Bivariate analyses between demographic characteristics and scores on the questionnaires GHQ-28 and MVQOLI-25 was applied, and the results are shown in Table 4. Variables with p <0.20 in bivariate analyses were included in multivariate modeling. After multivariate logistic regression analysis, we found that increased number of coexisting diseases was associated with increased total score ≥24 on GHQ-28 (odds ratio: 1.35, 95 % CI: 1.03 to 1.77, p =0.03). After multivariate linear regression analysis, we found that increased age was associated with the increased score on somatic symptoms subscale so that with worst health (coefficient beta: 1.01, 95 % CI: 1.00-1.03, p =0.007). Also, the increased number of coexisting diseases was associated with the increased score on anxiety/insomnia subscale so that with worst health (coefficient beta: 1.17, 95 % CI: 1.06-1.29, p =0.003). Moreover, increased educational level was associated with decreased score on social dysfunction subscale (coefficient beta: -0.89, 95 % CI: -1.62 to -0.096, p =0.028) and decreased score on severe depression subscale so that with better health (coefficient beta: -1.14, 95 % CI: -2.03 to -0.26, p =0.012). After multivariate linear regression analysis, we found that patients with fistula/graft had a higher score on MVQOLI-25 than patients with a central venous catheter (coefficient beta: 2.31, 95 % CI: 0.43-4.19, p =0.017).

**Table 2:** Demographic characteristics and comorbidities of the 107 patients that were included in the cross-sectional study.

| Characteristic | Number (%) |
|---|---|
| Gender | |
| Males | 75 (70.1) |
| Females | 32 (29.9) |
| Age | 64.8 (14.2)† |
| Marital status | |
| Single/divorced/widow | 22 (20.6) |
| Married | 85 (79.4) |
| Children | |
| No | 22 (20.6) |
| Yes | 85 (79.4) |
| Educational level | |
| No education | 7 (6.5) |
| Primary school | 39 (36.4) |
| Secondary school | 42 (39.3) |
| University degree | 19 (17.8) |
| Vascular Access | |
| AV fistula/Graft | 91 (85.0) |
| CVC | 16 (15.0) |
| Years in dialysis | 6.5 (6.0)† |
| Number of coexisting diseases | 2.3 (1.5)† |
| Comorbidity | |
| Hypertension | 60 (56.1) |
| Diabetes | 30 (28.0) |
| Secondary hyperparathyroidism/ Hypoparathyroidism | 17 (15.9) |
| Coronary artery disease | 16 (15.0) |
| Hyperlipidemia | 15 (14.0) |
| Other cardiovascular disease | 10 (9.3) |
| HBV/HCV infection | 9 (8.4) |

AV: arteriovenous, CVC: central venous catheter, HBV: hepatitis B, HCV: hepatitis C, †: mean (standard deviation).

## Discussion

According to the findings of the present study, participants experienced at least two chronic diseases, with diabetes, hypertension and cardiovascular diseases to constitute the most common. These chronic diseases, according to our findings, influence negatively the general health status while they also increase anxiety and insomnia problems. Studies have revealed that comorbidities together with poor sleep quality are further associated with increased mortality risk[13,14].

However, patients with chronic conditions can experience an improved quality of life. Except for medi-

**Table 3:** Descriptives of the General Health Questionnaire (GHQ-28) and the Missoula-VITAS Quality of Life Index (MVQOLI-25).

| Domain | Mean | SD | Median | Min | Max |
|---|---|---|---|---|---|
| Total GHQ 28 | 24.3 | 13.8 | 23 | 0 | 65 |
| Somatic symptoms | 5.9 | 4.0 | 5 | 0 | 16 |
| Anxiety and insomnia | 6.7 | 4.8 | 6 | 0 | 19 |
| Social dysfunction | 8.2 | 3.4 | 7 | 0 | 18 |
| Severe depression | 3.5 | 4.0 | 2 | 0 | 20 |
| Total MVQOLI-25 | 18.1 | 3.6 | 18.5 | 8.7 | 26 |
| Symptoms | 8.8 | 8.6 | 8 | -16 | 27.5 |
| Function | 8.6 | 9.9 | 10 | -20 | 30 |
| Interpersonal | 14.8 | 9.3 | 16 | -16 | 30 |
| Wellbeing | -4.7 | 11.5 | -6 | -27.5 | 24 |
| Transcendent | 3.9 | 10.8 | 4 | -20 | 30 |

SD: standard deviation, Min: minimum value, Max: maximum value.

**Table 4:** Bivariate analyses between demographic characteristics and scores on the General Health Questionnaire (GHQ-28) and the Missoula-VITAS Quality of Life Index (MVQOLI-25).

| Characteristic | GHQ-28 | | | | | | | | | | | MVQOLI-25 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Total score <23 | Total score ≥24 | p | Somatic symptoms | p | Anxiety/ insomnia | p | Social dysfunction | p | Severe depression | p | Total score | p |
| Gender | | | 0.2[a] | | **0.07[b]** | | 0.2[b] | | 0.5[b] | | **0.1[b]** | | 0.06[c] |
| Males | 41 (54.7)[d] | 34 (45.3)[d] | | 5 (16)[e] | | 5 (19)[e] | | 7 (17)[e] | | 1 (20)[e] | | 18.5 (3.9)[f] | |
| Females | 13 (40.6)[d] | 19 (59.4)[d] | | 6 (14)[e] | | 7 (18)[e] | | 8 (15)[e] | | 3,5 (12)[e] | | 17.2 (2.6)[f] | |
| Age | 61.9 (15.6)[f] | 67.7 (12.0)[f] | **0.03[c]** | 0.29[g] | **0.003[g]** | 0.15[g] | **0.1[g]** | 0.15[g] | **0.1[g]** | 0.17[g] | **0.08[g]** | -0.14[h] | **0.16[h]** |
| Marital status | | | 0.7[a] | | 0.7[b] | | 0.8[b] | | 0.8[b] | | 0.5[b] | | 0.2[c] |
| Single/ divorced/ widow | 12 (54.5)[d] | 10 (45.5)[d] | | 6 (10)[e] | | 6 (17)[e] | | 8 (15)[e] | | 2 (20)[e] | | 17.3 (3.0)[f] | |
| Married | 42 (49.4)[d] | 43 (50.6)[d] | | 5 (16)[e] | | 5 (19)[e] | | 7 (18)[e] | | 2 (15)[e] | | 18.4 (3.7)[f] | |
| Children | | | 0.4[a] | | 0.7[b] | | 0.9[b] | | 0.3[b] | | 0.9[b] | | 0.2[c] |
| No | 13 (59.1)[d] | 9 (40.9)[d] | | 5 (11)[e] | | 6 (18)[e] | | 7 (15)[e] | | 2 (20)[e] | | 17.3 (3.2)[f] | |
| Yes | 41 (48.2)[d] | 44 (51.8)[d] | | 5 (16)[e] | | 6 (19)[e] | | 7 (18)[e] | | 2 (15)[e] | | 18.4 (3.6)[f] | |
| Educational level | | | **0.02[i]** | -0.25[g] | **0.01[g]** | -0.24[g] | **0.01[g]** | -0.22[g] | **0.02[g]** | -0.26[g] | **0.008[g]** | 0.24[g] | **0.01[g]** |
| No education | 3 (42.9)[d] | 4 (57.1)[d] | | | | | | | | | | | |
| Primary school | 16 (41.0)[d] | 23 (59.0)[d] | | | | | | | | | | | |
| Secondary school | 20 (47.6)[d] | 22 (52.4)[d] | | | | | | | | | | | |
| University degree | 15 (78.9)[d] | 4 (21.1)[d] | | | | | | | | | | | |
| Vascular Access | | | 0.3[a] | | **0.06[b]** | | 0.2[b] | | **0.02[b]** | | **0.02[b]** | | **0.02[c]** |
| AV fistula/ Graft | 48 (52.7)[d] | 43 (47.3)[d] | | 5 (16)[e] | | 5 (19)[e] | | 7 (17)[e] | | 1 (20)[e] | | 18.5 (3.5)[f] | |
| CV Catheter | 6 (37.5)[d] | 10 (62.5)[d] | | 8 (14)[e] | | 8 (16)[e] | | 9 (11)[e] | | 5 (11)[e] | | 16.2 (3.4)[f] | |
| Years in dialysis | 5.5 (29)[e] | 4 (24)[e] | 0.6[b] | -0.14[g] | 0.2[g] | -0.14[g] | 0.3[g] | -0.12[g] | 0.2[g] | -0.12[g] | 0.2[g] | -0.01[g] | 0.9[g] |
| Number of coexisting diseases | 2 (5)[e] | 3 (6)[e] | **0.04[b]** | 0.2[g] | **0.04[g]** | 0.25[g] | **0.01[g]** | 0.17[g] | **0.08[g]** | 0.20[g] | **0.04[g]** | -0.17[g] | **0.09[g]** |

AV: arteriovenous, CV: central venous, a: chi-square test, b: Mann-Whitney test, c: independent samples t-test, d: number (%), e: median (range), f: mean (standard deviation), g: Spearman's correlation coefficient, h: Pearson's correlation coefficient, i: chi-square trend test.

cines prescription, another major effort to improve the health status of people who suffer from chronic diseases can be the self-management programs. These programs have great effectiveness and result in better self-reported health status, decreased emergency room visits and hospitalizations, which in turn has led to a significant reduction in health care costs[15,16]. In addition, physical exercise programs belong to one of the most applied interventions among end-stage renal disease (ESRD) patients undergoing hemodialysis treatment. Participants showed a significant increase in physical functioning[17]. Also, improvements were documented in the era of anxiety, sleep disturbance, and overall HRQL[18].

Participants with an arteriovenous fistula (AVF) / Graft (85 % of the study population) have been found with a higher score on MVQOLI-25 comparing to those with a central venous catheter (CVC; 15 %), indicating better HRQL. The National Kidney Foundation sets the placement of a CVC in less than 10 % of patients, as a goal for permanent hemodialysis. However, the compliance with the recommendations varies widely among countries worldwide, and the patients' percentage receiving hemodialysis via CVC still remains high[19]. Patient's vascular access is an important variable that can affect their HRQL, however, the studies which explore the correlation between vascular access and HRQL are limited.

Lopes et al[20] in a large study with more than 9,000 patients from seven countries, found a correlation between catheters' use and a low score in the physical component summary. The patients' percentage with CVC was higher than 20 %. In another study, which explored the association of vascular access and HRQL, patients with AVF reported to have shown better physical and mental health, a lower burden of dialysis and ESRD, and better sleep, compared with patients with CVC[21]. Ensuring patients' vascular access via fistula or graft, during referral to a nephrologist for ESRD or dialysis initiation, should be nephrologists' first priority.

The prevalence of depression can reach up to 35 % among dialysis patients[22,23]. The results of the present study indicate that the participants did not experience severe depression when the score in the specific subscale remained very low. The increased educational level was correlated with a decreased score in severe depression subscale. These findings are consistent with the results of another study, where the subgroup of patients with higher educational level, reported a lower level of depression and higher HRQL[24]. Screening dialysis patients for depression and its' early recognition is an essential procedure for their HRQL improvement and adherence to the dialysis treatment.

The present study has a number of limitations. The main limitation was the size of the sample. Although the response rate was very high, generalizing the results has to be done with great caution, as the study was implemented only in three dialysis units. The present study explored the role of demographic characteristics and comorbidities on HRQL. However, there are several parameters, which may also affect HRQL and were not investigated in the current study (i.e., the dialysis adequacy, the nutritional status, the severity of anemia, etc). The Greek translated version of the instrument, MVQOLI-25, is being used for the first time in this study. Although, the Cronbach's α for the total MVQOLI-25 was high (0.82), more studies are required for the instruments' validation.

## Conclusion

Hemodialysis patients' physical health status remains most of the times at the center of care, underestimating other health dimensions. Clinicians are called to treat patients and not only ESRD. The measurement of patients HRQL together with the factors which affect it, is not only a significant prerequisite for their health status improvement but has a significant impact on the prevention of morbidity and mortality.

## Conflict of Interest

The authors declare no conflicts of interest. No funding was obtained for this study.

## Acknowledgments

We would like to thank Dr Alexandra Ventouri Nasopoulou and Dr Polyxeni Makri for their comprehensive support in the data collection.

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