

## Is Quality of Life of Hemodialysis Patients Affected by Fatigue?

Zyga Sofia<sup>1</sup>, Deli Magdalini<sup>2</sup>, Fradelos Evangelos<sup>1</sup>, Lavdaniti Maria<sup>3</sup>,  
Tsougia Panagiota<sup>4</sup>, Tarazi Iosif<sup>5</sup>, Alikari Victoria<sup>1</sup>

<sup>1</sup>Nursing Research and Practice Laboratory, Department of Nursing, University of Peloponnese, Greece

<sup>2</sup>Post Graduate Program Health Services Administration and Crisis Management, Department of Nursing, University of Peloponnese, Greece

<sup>3</sup>Department of Nursing, Alexander Technological Institute of Thessaloniki, Greece

<sup>4</sup>“P. & A. Kyriakou” Children Hospital of Athens, Greece,

<sup>5</sup>“Doctors’ Hospital”, Athens, Greece

Corresponding Author: Alikari Victoria

### ABSTRACT

**Background:** Patients undergoing hemodialysis are characterized by high levels of fatigue and low levels of quality of life. Patient's personal characteristics play, also, an important role.

**Aim:** To explore the relationship between fatigue, quality of life and the demographic characteristics of patients.

**Method:** The sample of the study consisted of 149 patients undergoing hemodialysis in public and private Hemodialysis Units. The tools used were the Missoula - VITAS Quality of Life Index -15 (MVQOLI -15) and the Fatigue Assessment Scale. At the same time, some questions about the demographic profile of patients were posed.

**Results:** The results of the study did not show particularly high levels of fatigue, as the mean score of total fatigue was 25.97 ( $\pm 6.105$ ). Fatigue is not related to gender, age and years of treatment of patients, but it is related to years of diagnosis, educational level, occupational status and marital status. The quality of life of patients was characterized as good. Ages is positively related to the dimension of functionality and negatively to the dimension of spirituality, while those with a low educational level, as well as males, had a low level of quality of life. Further, a negative correlation was found between fatigue and the quality of life of hemodialysis patients.

**Conclusions:** The findings of this research contradict the results of previous research, which means that other factors may have a positive effect on patients, such as the interpersonal relationships, while the factors of income and environment should also be explored.

**Key-words:** quality of life, fatigue, hemodialysis

### INTRODUCTION

End Stage Renal Disease (ESRD) is a debilitating illness with significant limitations on physical and psychosocial well-being and may interfere with the ability of HD patients to live a normal life.

[1] Hemodialysis (HD) is a life-long-term treatment for patients with end-stage renal disease. [2]

ESRD patients should be under hemodialysis on a regular basis for their survival. These patients often suffer from many other medical conditions such as cardiovascular disorders, pulmonary diseases, neuropathy, electrolyte disorders, etc., and they have to receive many different medications. These patients have to deal not only with hemodialysis complications such

as left ventricular hypertrophy, atherosclerosis and hyperparathyroidism, [3-5] but also with changes in self-perception, self-confidence and, sometimes, the reversal of roles in the family. [6]

The life of HD patients is characterized by many losses and limitations. The limitation of fluid or food, pain, itching, discomfort, physical activity limitation, fatigue, weakness, cost of care, feelings of inadequacy and negative moods were identified as the major physiological and psychosocial stressors. [7,8] Hemodialysis causes many problems, such as social isolation, loss of employment, reduced physical activity, loss of autonomy, as well as an ambiguous feeling of fear for life and death. [9-11] HD Patients experience an objective dependence on a hemodialysis machine and a group of specialized health care professionals for the rest of their lives. The hemodialysis process can increase perceived fatigue, reduce patient's mobility, affect sleep, daily life activity and work capacity. People with CKD may forget about a "normal" life. [12,13]

Despite regular hemodialysis treatment, patients are affected by fatigue-induced uremic syndrome. There is limited understanding of the level of fatigue experienced by people with renal disease, especially those undergoing hemodialysis. [14] Even fatigue is one of the most common complaints of HD patients and it is associated with patients' quality of life disorders [15] its concept is vague, and it is very difficult to be defined and evaluated qualitatively and quantitatively. Usually the term of fatigue includes several components, such as reduced physical and mental functioning, decreased activity and lower performance than expected. [16] The prevalence of fatigue ranges from 60% to 97% in patients on long-term renal replacement therapy. [17] The importance of fatigue in HD patients is underlined by the fact that 94% of HD patients have been willing to undergo more frequent hemodialysis if there is a relative increase in their level of energy. [18] Davison (2010)

highlights that fatigue was one of the major symptoms related to worse QoL [19] while Jhamb et al (2009) found that the lower the vitality score, the lower the SF-36 score in the fields of pain, physical functioning and mental health. [20] A cause of the reduced levels of physical functioning is probably the fact that HD from its self (4-hour hemodialysis session) leads to fatigue. [21] Post-hemodialysis fatigue might last from the end of an HD session till the next day or for a long time. [22] Thomas-Hawkins (2000) found that the functional status and ability of the HD patient to perform activities was significantly lower on dialysis day. [23] Hagren et al (2001) testify the words of one patient: "In reality I only have a 4-day week because the dialysis days don't count because I am too tired to do anything" [24] whereas Moua (2003) describes an episode of fatigue: "There were days I was so sick that I just wanted to look for a hot corner somewhere and sleep. I did not care who saw me and who looked at me." [25] Thus, there may be variation in well-being relative to the hemodialysis cycle. [26]

The technological and therapeutic advances that have been achieved to date have increased the survival rates for patients with end stage renal disease. [27] However, the early identification of fatigue and its effect on the quality of life (QoL) has become increasingly important as an outcome measure in evaluating dialysis therapies. [28]

It is not surprising, therefore, that fatigue among HD patients is strongly associated with quality of life to a greater extent than heart failure, diabetes mellitus, arthritis and cancer. [29]

## **MATERIALS AND METHODS**

Based on the above data, the purpose of this study was to correlate fatigue and quality of life levels in a population of patients with end stage renal disease on dialysis.

### *Design*

This is an analytic study design. Two hundred (200) questionnaires in a closed envelope were given to the Greek

Federation of Kidney Patients, explaining the purpose of the research. The file was returned after 3 months. Of the 200 questionnaires, 149 were completed (response rate: 74.5%). The sample originated from public and private dialysis units in the country. The inclusion criteria were (i) older than 18 years old; (ii) undergoing HD for at least 6 months; and (iii) to speak, write and read the Greek language. The exclusion criteria were (i) patients with severe vision and mobility problems; (ii) patients with several mental illnesses. The study was carried out between April 2016 to August 2016.

#### *Data collection*

A three-part questionnaire was distributed to the participants. The first part consisted of the Missoula - VITAS Quality of Life Index -15 (MVQOLI-15) and the Fatigue Assessment Scale (FAS) followed by a questionnaire with the sociodemographic characteristics and data from medical history of the participants.

The Missoula-VITAS Quality of Life Index scale (MVQOLI) is a psychometric tool which gathers and reports information from patients on the QoL during an advanced disease. It is designed specifically to evaluate each patient's personal experience in each of these dimensions or domains of QoL. Finally, it seeks to describe the qualitative and subjective experience of patients' QoL in a way that it can be quickly interpreted by professional caregivers. The questionnaire consists of five dimensions (symptoms, functioning, interpersonal relationships, wellness, spirituality) and the total score. In each dimension three types of information are collected: (i) Evaluation - subjective measurement of the actual situation or circumstance (ranges from -2 to +2) (ii) Satisfaction - degree of acceptance or knowledge of the actual situation (ranges from -4 to +4) and (iii) Importance - the extent to which a given dimension has an impact on overall quality of life (ranges from 1 to 5). When the sum of evaluation and satisfaction is multiplied by the

significance score, then the score of each dimension emerges. The total score of MVQoL-15 is as follows: Sum of weighted dimension scores/10) + 15. The responses are given to each question in a five-point scale (Likert), so that a lower score indicates a less desirable state and vice versa. This questionnaire contains, also, a question about the level of quality of life (overall quality of life), which is used to evaluate the converging power of MVQoL-15. The Greek version of MVQoL-15 has a satisfactory internal validity with Cronbach's alpha 0.74. [30]

The Fatigue Assessment Scale (FAS) consists of ten questions and evaluates the patient's ability to cope with various activities. To calculate the score, patients' answers to the 10 questions are summarized. The coding of answers is as follows: 1 = never, 2 = sometimes, 3 = regular, 4 = often, 5 = always. Therefore, the score is between 10-50. The internal consistency of the scale has been tested in Greek patients with chronic diseases by Alikari et al (2016) and found to be satisfactory (Cronbach's  $\alpha = 0.761$ ). [31] In this study, Cronbach's  $\alpha$  was equal to 0.758.

#### *Ethics*

Participants were informed about the purpose and the voluntary nature of their participation. Anonymity of the participants and the confidentiality of the data were ensured. Apart from the above, the researchers informed the participants that all data will be used exclusively for the purposes of this research.

#### *Data analysis*

Percentages, means and standard deviations were calculated in order to provide a broader view of data. Non-parametric tests were used, such as Spearman correlation to identify the relationship between the studied variables. For comparisons with gender, age, marital status and profession Mann-Whitney Tests and Kruskal Wallis test were used. As statistically significant was the observed significance level of 0.05%. Statistical

analysis was performed using IBM SPSS Statistics version 21 (p<0.05).

**RESULTS**

In this study, 149 patients participated. The majority of respondents were male (51.4%). The mean of age was 63.92(±13.81), 54.7 was married, 32.7% of High School graduates, while 47.3% were unemployed. The mean of years on HD was 6.26 (±5.51) (Table 1). Descriptive characteristics are presented in table 1.

**Table 1. Descriptive characteristics of participants (N=149)**

Demographic data	Frequency	Percentage (%)
Gender		
Female	73	48.9
Male	76	51.4
Marital status		
Married	81	54.3
Unmarried	10	6.71
Divorced	29	19.6
Widowed	28	18.9
Educational level		
Primary School	34	22.8
Secondary School	29	19.4
High School	49	32.8
University	32	21.4
MSc	4	2.68
Type of employment		
Private employee	17	11.5 11.4
State employee	9	6.04
Unemployment	3	2.01
Pensioner	71	47.6
Housework	16	10.8
Years on HD	Mean:	6.26(±5.51)
Age	Mean:	63.92(13.81)

In table 2 the basic descriptive measures of location and dispersion of Fatigue Assessment Scale and of five dimensions of QoL are presented. The minimum value of Fatigue Assessment Scale was zero, while the maximum was 43. The average was 25.97 (SD± 6.105). Regarding MVQoLI-15, the highest score seems to be in the field of «Interpersonal» (14.01±10,810), while the

lowest score is observed in the dimension of «Well-being» (1.18±14.372). «Transcendent» and «Symptoms» follows with mean 7.65 (±14.368), «Functioning» with mean 3.77 (±8.311) while none of the dimensions took negative mean.

**Table 2. Descriptive characteristics of FAS and MVQoLI-15 (N=149)**

FAS score				
	Min	Max	Mean	SD(±)*
	0	43	25,97	6,105
MVQoL-15 score				
Symptoms	-30	30	7,65	14,368
Functioning	-10	20	3,77	8,311
Interpersonal	-15	30	14,01	10,810
Well-being	-30	30	1,18	14,372
Transcendent	-30	30	7,65	14,368
Total Score	-20	59	31,36	16,245

\*SD=Standard Deviation

As far as the Overall QoL is concerned, patients in the majority (51%) answered «good», 32.2% «moderate», 8.7% «very good», 7.4% «poor», while 0.7% «very poor».

*Correlations*

Fatigue negatively correlated with total score of Missoula-Vitas Quality of Life Index-15. With regard to the dimensions of quality of life, fatigue is significant negatively related to «Symptoms» (r=-0.192, p=0.019), «Well-being» (r=-0.303, p≤0.001) and «Transcendent» (r=-0.192, p=0.019). However, it is not related at all to «Functionality» and «Interpersonal». There is a statistically significant negative correlation between the «Overall QoL» and fatigue (r=-0.367, p≤0.001) and the total score of MVQoL (-0.293, p≤0.001) (Table 3). This means that fatigue adversely affects the Overall quality of life of the patients who participated in the research.

**Table 3. Statistical correlation of Fatigue Assessment Scale and MVQoLI-15 (N=149)**

	Overall QoL	Total Score of MVQoL	Symptoms	Functionality	Interpersonal relationships	Wellbeing	Transcendent
Total FAS score	-.367**	-.293**	-.192**	-.128	-.128	-.303**	-.192*
	,000	,000	,019	,119	,119	,000	,019

\*\* Correlation is significant at the 0.01 level.  
\* Correlation is significant at the 0.05 level.

There was a statistically significant negative correlation between the total FAS score and the marital status (especially

among divorced) (p=0.010), between the total FAS score and the employment (especially among the unemployed)

( $p=0.035$ ) and between the high educational level and the total MVQoLI-15 score ( $p=0.020$ ).

The correlation between the dimensions of the quality of life and the demographics of the respondents was examined, also. There was a statistically significant positive correlation between age and «Functionality» ( $r=0.200$ ,  $p=0.015$ ) between age and the dimension of «Transcendent» ( $r=0.166$ ,  $p=0.043$ ), between gender (females) and «Well-being» ( $p=0.029$ ), between educational level (University graduates) and «Transcendent»

( $p=0.021$ ) between marital status (unmarried) and «Transcendent» ( $p=0.047$ ).

Finally, a logistic regression was carried out where dependent variables were the quality of life dimensions and independent variables were the total fatigue score, the age, the years on HD and the evaluation of the quality of life of the patients. «Symptoms» and «Functionality» predict total fatigue score. Also, «Functionality», «Interpersonal», «Well-being» and «Transcendent» predict the quality of life, but not the «Symptoms» (Table 4).

**Table 4: Logistic Regression Analysis of Factors affecting the dimension of MVQoLI-15**

	Symptoms		Functioning		Interpersonal		Well-being		Transcendent	
	$\beta$	P	$\beta$	P	$\beta$	P	$\beta$	P	$\beta$	P
FAS total score	-0,394	0,000	0,202	0,022	-0,066	0,410	-0,096	0,245	-0,074	0,370
Age	0,038	0,623	0,106	0,188	0,083	0,263	0,055	0,471	-0,062	0,414
Years on HD	0,046	0,554	0,042	0,596	-0,122	0,100	-0,002	0,977	-0,090	0,234
MVQoL-15 total score	0,109	0,193	-0,204	0,020	0,473	0,000	0,434	0,000	0,423	0,000

## DISCUSSION

This study was carried out in order to investigate the levels of fatigue, quality of life of HD patients and to correlate these two parameters. 149 patients were enrolled of which 73 were females and 76 men. The majority of patients (54.3%) were married. The average total score of patients in FAS questionnaire was 25.97 while in MVQOL-15 was 31.360. Regarding the gender, women had slightly higher (0.19% 0) fatigue rate than men.

Concerning fatigue, the results of the survey did not show particularly high levels, as the part of the total score of fatigue was 25.97. Specifically, patients reported to a greater extent that tire easily, and to a lesser extent have trouble thinking clearly. The fact that fatigue, whether low or high, is an important feature of patients undergoing hemodialysis is reported by many researchers. [14,15,28,32-34] Also, in the research by Tsiamis et al (2015) most patients had low levels of fatigue. [33] However, the results of this research are not consistent with the findings of Mollaoglu's (2009) study in which a high level of fatigue has been found in patients undergoing hemodialysis. [14]

With regard to the relationship between fatigue and the demographics of the participants, the results of the statistical analysis showed that fatigue is not related to the sex and age of the patients, as well as to the research by Zyga et al (2015) and Sajadi et al (2010). Furthermore, it is not related to years of treatment, as opposed to other studies. [14,32,34] Conversely, in this study, fatigue is associated with years of diagnosis, since as the years of diagnosis increase; fatigue is not increasing at the same time. Also, a correlation between fatigue and educational level was found, especially among people with a high educational level, in contrast to the findings of Zyga et al (2015) and Sajadi et al (2010). [28,32] Apart from the above, there was also a correlation between fatigue and marital status, but there is no particular trend, as divorced people referred they are more annoyed by fatigue, while married women are getting tired too fast. The finding that divorced patients are characterized by a high level of fatigue was found in the investigation of Bahgat et al (2016), [34] also. Finally, unemployed HD patients have higher fatigue scores, which is not inconsistent with the findings of Zyga et al (2015). [28]



Concerning the quality of life of HD patients, the results of this research have shown that the patients who participated in this research characterize their overall quality of life as good. This finding is inconsistent with the findings of previous studies [35-38] whereby patients undergoing hemodialysis are characterized by low levels of QoL. The highest score is observed in the field of interpersonal relations, while the lowest score is observed in the area of well-being, which is consistent with the research by Costa et al (2016). [38] This means that HD patients experience low levels of well-being that negatively affect their quality of life, but their interpersonal relationships contribute to a better quality of life. The fact that interpersonal / social relationships are an important parameter of better quality of life is also mentioned in the Eurostat survey (2015). [39] However, this finding is in contradiction with the results of Theofilou study (2011) where HD patients were found to have reduced quality of life in the dimension of social relationships. [35]

Regarding the impact of the socio-demographic profile of patients on their quality of life, research has initially found that age is positively related to the dimension of functionality, as in similar studies [40,41] and negatively with the dimension of transcendent. Gender correlation exists only in the well-being area, with men reporting lower scores than women, in contrast to the findings of Mingardi et al. (1999). [42] Also, unmarried and those with a low educational level, have low scores on quality of life and transcendent, as in the study by Abdelghany et al (2016). However, the QoL has not been found to be related to years of treatment and years of diagnosis, nor to occupational status. Similar results have been found by Abdelghany et al (2016).

A negative correlation between fatigue and the QoL of HD patients was found. Similar results were, also, found by Tsiamis et al. (2015). In more detail, fatigue was found to be negatively related to symptoms, functionality, well-being and

transcendent, as in the study of Bahgat et al (2016), but it was not related to interpersonal relationships at all. This means that the dimension of interpersonal relationships might be the one that reduces the negative impact of fatigue on quality of life. Besides, we should not forget that the majority of respondents are married, which means there is companionship, discussion of personal problems and generally positive emotions, which can contribute to a higher level of quality of life, as, also, reported in the Eurostat (2015) and Costa et al (2016) surveys.

## CONCLUSIONS

In this study HD patients do not experience high levels of fatigue and characterize their overall quality of life as good. A factor that was found to positively affect patients was interpersonal relationships. However, the different effects on the level of fatigue and, above all, the level of quality of life suggest that other factors influencing the standard of living may have to be considered. For example, the Eurostat survey (2015) states that factors such as disposable income, housing and living conditions, as well as safety and the environment, can affect positively or negatively the quality of life of individuals. Therefore, the effect of these factors on the quality of life of HD patients should be investigated.

## REFERENCES

1. Finnegan-John J, Thomas VJ. The psychosocial experience of patients with end-stage renal disease and its impact on quality of life: Findings from a needs assessment to shape a service. *ISRN Nephrology*. 2013; 308986. <http://doi.org/10.5402/2013/308986>
2. Rak A, Raina R, Suh TT et al. Palliative care for patients with end-stage renal disease: approach to treatment that aims to improve quality of life and relieve suffering for patients (and families) with chronic illnesses. *Clinical Kidney Journal*. 2017; 10(1): 68–73. <http://doi.org/10.1093/ckj/sfw105>

3. Di Lullo L, Gorini A, Russo et al. Left ventricular hypertrophy in chronic kidney disease patients: from pathophysiology to treatment. *Cardiorenal Medicine*. 2015; 5(4): 254–266. <http://doi.org/10.1159/000435838>
4. Bhatti NK, Karimi Galougahi K, Paz Y et al. Diagnosis and management of cardiovascular disease in advanced and end-stage renal disease. *JAHA: Cardiovascular and Cerebrovascular Disease*. 2016; 5(8):e003648. <http://doi.org/10.1161/JAHA.116.003648>
5. Yilmaz S, Yildirim Y, Yilmaz Z et al. Pulmonary function in patients with end-stage renal disease: Effects of hemodialysis and fluid overload. *Med Sci Monit*. 2016; 22: 2779–2784. <http://doi.org/10.12659/MSM.897480>
6. Ebrahimi H, Navidian A, Keykha R. Effect of supportive nursing care on self esteem of patients receiving electroconvulsive therapy: A randomized controlled clinical trial. *J Caring Sc*. 2014; 3(2): 149–156. <http://doi.org/10.5681/jcs.2014.016>
7. Ahmad MM, Al Nazly EK. Hemodialysis: stressors and coping strategies. *Psychol Health Med*. 2015; 20(4): 477-87. doi: 10.1080/13548506.2014.952239
8. Gorji M.AH, Mahdavi A, Janati Y et al. Physiological and psychosocial stressors among hemodialysis patients in educational hospitals of northern Iran. *Indian Journal of Palliative Care*. 2013; 19(3): 166–169. <http://doi.org/10.4103/0973-1075.121533>
9. Cobo G, Gallar P, Gama-Axelsson T et al. Clinical determinants of reduced physical activity in hemodialysis and peritoneal dialysis patients. *J Nephrol*. 2015 ;28(4):503-10. doi: 10.1007/s40620-014-0164-y
10. Mohammadi M, Fariba Ghahramani, Zahra Shamohammadi et al. Relationship between daily spiritual experiences and fear of death in hemodialysis patients. *J Biol Today's World*; 3(1): 7-11 doi: 10.15412/J.JBTW.01030102;
11. Muehrer RJ, Schatell D, Witten B et al. Factors affecting employment at initiation of dialysis. *Clin J of the Am Soc Nephrol*. 2011;; 6(3): 489–496. <http://doi.org/10.2215/CJN.02550310>
12. Shahgholian N, Yousefi H. (2015). Supporting hemodialysis patients: A phenomenological study. *Iran J Nurs Midwifery Res*. 2015; 20(5): 626–633. <http://doi.org/10.4103/1735-9066.164514>
13. Letchmi S, Das S, Halim H et al. Fatigue experienced by patients receiving maintenance dialysis in hemodialysis units. *Nurs Health Sci*. 2011; 13(1):60-64. doi: 10.1111/j.1442-2018.2011.00579.x
14. Mollaoglu M. Fatigue in people undergoing hemodialysis. *Dialysis & Transplantation*. 2009; 38(6): 1-5.
15. Motedayen Z, Nehrir B, Tayebi A et al (2014). The effect of the physical and mental exercises during hemodialysis on fatigue: A controlled clinical trial. *Nephrourol Mon*. 2014; 6(4): e14686. doi: 10.5812/numonthly.14686.
16. Sakkas GK, Karatzaferi C. Hemodialysis fatigue: Just “simple” fatigue or a syndrome on its own right? *Front Physiol*. 2012; 3:306. <http://doi.org/10.3389/fphys.2012.00306>
17. Fried L, Arnold R, Fine M et al. Prevalence, severity, and importance of physical and emotional symptoms in chronic hemodialysis patients. *J Am Soc Nephrol*. 2005; 16(8): 2487–2494.
18. Ramkumar N, Beddhu S, Eggers P et al. Patient preferences for in-center intense hemodialysis. *Hemodial Int*. 2005; 9 (3): 281– 295.
19. Davison SN, Jhangri GS: Impact of pain and symptom burden on the health-related quality of life of hemodialysis patients. *J Pain Symptom Manage*; 2010; 39 (3):477–485
20. Jhamb M, Argyropoulos C, Steel JL et al. Choices for Healthy Outcomes in Caring for End-Stage Renal Disease (CHOICE) Study: Correlates and outcomes of fatigue among incident dialysis patients. *Clin J Am Soc Nephrol*. 2009; 4(11):1779– 1786 doi: 10.2215/CJN.00190109.
21. Caplin B, Kumar S, Davenport A. Patients’ perspective of haemodialysis-

- associated symptoms. *Nephrol Dial Transplant*. 2011; 26(8): 2656–2663.
22. Lindsay RM, Heidenheim PA, Nesrallah G et al. Minutes to recovery after a hemodialysis session: a simple health-related quality of life question that is reliable, valid, and sensitive to change. *Clin J Am Soc Nephrol*. 2006; 1(5): 952–959.
23. Thomas-Hawkins C. Symptom distress and day-to-day changes in functional status in chronic hemodialysis patients. *Nephrol Nurs J*. 2000; 27(4): 369-379
24. Hagren B, Pettersen IM, Severinsson E, Lützén K, Clyne N. The haemodialysis machine as a lifeline: experiences of suffering from end-stage renal disease. *J Adv Nurs*. 2001;34(2):196-202.
25. Moua MN. (2003). Endstage. In K. Culhane-Pera, D. Vawter, P. Xiong, B. Babbitt, & 135 M. Solberg (Eds.), *Healing by heart. Clinical and ethical case stories among families and Western providers* (pp. 190-197). Nashville: Vanderbilt University Press.
26. Polaschek N. Living on dialysis: concerns of clients in a renal setting. *J Adv Nurs*. 2003; 41 (1): 44-52. <http://dx.doi.org/10.1046/j.1365-2648.2003.02504x>.
27. Munshi R, Winrow RM, Wu JS et al. Advanced dialysis fellowship. *Hemodial Int*. 2014; 18:S52–S54
28. Zyga S, Alikari V, Sachlas A et al. Assessment of fatigue in end stage renal disease patients undergoing hemodialysis: Prevalence and associated factors. *Med Arch*. 2015; 69 (6): 376–380. <http://doi.org/10.5455/medarh.2015.69.376-380>
29. Mittal S. (2001). Self-assessed physical and mental function of haemodialysis patients. *Nephrol Dial Transplant*. 2001; 16(7): 1387-1394. <http://dx.doi.org/10.1093/ndt/16.7.1387>
30. Theofilou P, Aroni A, Ralli M et al. Measuring Health: Related quality of life in hemodialysis patients. Psychometric properties of the Missoula-VITAS Quality of Life Index (MVQOLI-15) in Greece. *Health Psychol Res*.2013; 1(2): e17. <http://doi.org/10.4081/hpr.2013.e17>
31. Alikari V, Fradelos E, Sachlas A et al. Reliability and validity of the Greek version of "The Fatigue Assessment Scale." *Archives of Hellenic Medicine*. 2016; 33(2): 231-238
32. Sajadi A, Farahani F, Zanjami E. Factors affecting fatigue in chronic renal failure patients treated with hemodialysis. *Iranian Journal of Critical Care Nursing*. 2010; 3(1): 33-38.
33. Tsiamis G, Alikari V, Fradelos E et al. Assessment of quality of life and fatigue among haemodialysis patients. *American Journal of Nursing Science. Special Issue: Mental Health Care: Aspects, Challenges and Perspectives*. 2015; 4(2-1), 66-73.
34. Bahgat, Z.F., Bahgat, R.S., El-azazy, H.M. (2016). The effect of fatigue on daily living activities for adults undergoing hemodialysis. *IOSR Journal of Nursing and Health Science*, 5(3), 82-89.
35. Theofilou P. (2011). Quality of life in patients undergoing hemodialysis or peritoneal dialysis treatment. *J Clin Med Res*. 2011; 19;3(3):132-138. doi: 10.4021/jocmr552w.
36. Jadhav BS, Dhavale HS, Dere SS et al. Psychiatric morbidity, quality of life and caregiver burden in patients undergoing hemodialysis. *Medical Journal of Dr D.Y. Patil University*. 2014; 7(6): 722-727.
37. Shafipour V, Alhani F, Kazemnejad A. 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*. 2015; 2(2): 29-35.
38. Costa GMA, Pinheiro MBGN, de Medeiros SM et al. Quality of life of patients with chronic kidney disease undergoing hemodialysis. *Enfermeria Global*. 2016; 43: 87-99.
39. Eurostat (2015). Quality of life. Received from: [http://ec.europa.eu/eurostat/documents/3217494/6856423/KS-05-14-073-EN-N/Last assesses: 03/07/2017](http://ec.europa.eu/eurostat/documents/3217494/6856423/KS-05-14-073-EN-N/Last+assesses:03/07/2017)
40. Lessan-Pezeshki M, Rostami Z. Contributing factors in health-related quality of life assessment of ESRD patients: A single center study. *Int J Nephrol Urol*. 2009;1(2): 129-136.



41. Abdelghany MA, Elgohary EE, Nienaa YA. Assessment of health-related quality of life in patients receiving regular hemodialysis. *J Nephrol Ther.* 2016; 6(2): 246-250.
42. Mingardi G, Cornalba L, Cortinovis E et al. Health-related quality of life in dialysis patients. A report from Italian study using SF-36 Health Survey. *Nephrol Dial Transplant.* 1999; 14(6): 1503-1510

How to cite this article: Sofia Z, Magdalini D, Evangelos F et al. Is quality of life of hemodialysis patients affected by fatigue? *Int J Health Sci Res.* 2017; 7(9):150-158.

\*\*\*\*\*