Nutrition and Lifestyle Knowledge, Compliance and Practices Among Lebanese Hemodialysis Patients

Hadeel Tashani

Siham Hleihel

Senior Study in Nutrition-NUT499

Department of Natural Sciences

Lebanese American University

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Abstract

Background: CKD is a prevalent non-communicable disease in the world and the Arab region including Lebanon and it can be advanced to ESRD which necessitates either dialysis or kidney transplant. Nutrition plays an essential role in the maintenance and stability of the hemodialysis treatment indicating the importance of compliance to the renal diet. Several factors can affect the compliance level of HD patients and one important factor is Knowledge.

Purpose: This study aims to investigate Lebanese HD patients' knowledge and compliance to dietary guidelines, fluid intake, and attending HD sessions.

Methodology: A pilot study conducted on HD patients at the Lebanese American University Medical Center was performed. Three main questionnaires were utilized to collect data which are: End-Stage Renal Disease Adherence Questionnaire (ESRD-AQ), Chronic Hemodialysis Knowledge Survey (CHeKS), and a questionnaire to gather general info about the patients. Medical files were used to collect data such as gender, age, the number of dialysis sessions attended, medications, and presence of comorbidities.

Results: A total of 35 participants were included in the study, with a mean age of 68.71 years. The average score of correct answers to the Knowledge Questionnaire was 6.343. Moreover, the level of compliance was high among the participants. The majority of participants (91.43%) scored between 800-1000, meaning they have a good compliance rate. A significant negative correlation between compliance and intradialytic weight gain was found. Another significant correlation was found between having normal phosphorus values and being a good compliant to the renal diet.

Conclusion: There is a relatively high level of compliance among the studied sample and adequate knowledge scores. This study is probably the first one conducted in Lebanon on this topic; therefore, other studies should be carried out to further examine the situation of HD patients in Lebanon.

Nutrition and Lifestyle Knowledge, Compliance and Practices Among Lebanese Hemodialysis Patients

Literature Review

The kidneys are vital organs in our bodies needed to remove unwanted materials as extra fluids and waste products (CDC, 2020). When the kidney's function is impaired, chronic kidney disease (CKD) occurs, leading to a lack of detoxification of blood and accumulation of undesirable products (CDC, 2020). Moreover, the top three contributors to CKD are diabetes, hypertension, and cardiovascular diseases (CDC, 2020). According to the National Kidney Foundation (2017), CKD is a progressive disease that may affect the nervous system and the heart, cause hypertension and anemia, and ultimately transition to kidney failure or end-stage renal disease (ESRD). At this stage, a kidney transplant or dialysis is required (National Kidney Foundation, 2017). CKD is a prevalent non-communicable disease, with around 10% of the world population having it, and there are 340 new hemodialysis patients per day (CDC, 2020; World Kidney Day, 2015). Furthermore, CKD is highly prevalent in the Arab region, including Lebanon, due to the increased prevalence of its risk factors such as obesity, diabetes, and hypertension (Farag, Kari, & Singh, 2012). According to the National Committee of Kidney Health (2020), 4100 patients are on chronic hemodialysis in Lebanon.

Hemodialysis (HD) is a process that uses a dialysis machine and a dialyzer that filters the wastes, salts, and fluids found in the blood (National Kidney Foundation, 2020). Nevertheless, it leads to the loss of fundamental nutrients (Ju et al., 2017 as cited in Lim, Kim, Kim, Park, & Choi, 2019). Nutrition plays an essential role in the maintenance and stability of the hemodialysis treatment because it provides the patients with the needed amounts of calories, electrolytes, protein, and water (Cunningham et al., 2015 as cited in Lim et al., 2019). Moreover, the quality of life of HD patients is enhanced, and their mortality rates are less when appropriate nutritional guidelines are

followed (Ikizler et al., 2013; Nitoi, Stefan, Ionita, Andrei, & Vulpoi, 2016). However, these guidelines need patients' adherence that might sometimes be difficult to achieve (Kim, Lim, & Choue, 2015; Shapiro, Bross, Morrison, Kalantar-Zadeh, & Kopple, 2015). According to the WHO (2003), adherence is:" the extent to which a person's behavior – taking medication, following a diet, and executing lifestyle changes, corresponds with agreed recommendations from a healthcare provider." Due to the low adherence rate to the nutritional guidelines, malnutrition is common among patients with ESRD, and it is associated with a higher mortality rate (Kanda et al., 2021; Rezeq, Khdair, Hamdan, & Sweileh, 2018). This is markedly evident in many studies, such as the study conducted by Nazar & Anderson (2014), showing that 10% to 70% of ESRD patients are malnourished. Another study in Palestine revealed similar results, having 47.2% of HD patients mild to moderately malnourished (Rezeq, Khdair, Hamdan, & Sweileh, 2018). Moreover, a study was done in Egypt by Zaki, Mohamed, Mohamed, and Abdul-Zaher (2019) found that 67% of HD patients are malnourished, out of which 17% are severe cases.

Patients' compliance does not only include dietary guidelines, but it also covers the compliance to medications, fluid intake, and HD sessions (Kugler, Maeding, & Russell, 2011). This makes compliance very difficult; therefore, non-compliance is very common among HD patients; thus, hindering their treatment (Tayebi, Einollahi, Rahimi, & Sirati-Nir, 2019). In a systematic review of 44 studies done on ESRD patients, compliance to the renal diet was around 31.5%, while it was 68.5% for the fluid intake (Lambert, Mullan, & Mansfield, 2017). In the Arab region, Naalweh et al. (2017) assessed the prevalence of adherence among Palestinian HD patients, where it was reported that adherence to the diet and fluid intake is 24% and 31%, respectively. Similarly, Egyptian HD patients have a mean adherence score of 32.65±4.777 (Dawood, Khalil, & Ibrahim, 2018). Both Dawood et al. (2018) and Naalweh et al. (2017) used the End Stage Renal Disease-Adherence Questionnaire (ESRD-AQ) as an assessment tool for adherence in their studies.

Non-adherence is associated with many factors that can be psychological, sociological, medical, and patient-specific factors (Tayebi, Einollahi, Rahimi & Sirati-Nir, 2019). One of the main barriers to adherence is the treatment cost (Soliman, Fathy,

& Roshd, 2012). Soliman et al. (2012) demonstrated that while ESRD is significantly increasing worldwide, many Egyptian patients still cannot afford the treatment cost. The psychological health of patients also imposes some difficulties (Alosaimi et al., 2016; Hamody, Kareem, Al-Yasri, & Ali, 2013). Alosaimi et al. (2016) found a negative relationship between depression, anxiety, and adherence among a group of Saudi HD patients (Alosaimi et al., 2016). Similar findings were found in other studies conducted in Jordan and Iraq, where 75%, 80% of participants had depression, respectively (Hamody, Kareem, Al-Yasri, & Ali, 2013; Khalil et al., 2013). It is also important to note that visiting a psychiatrist is perceived as a stigma or shameful behavior by the Jordanian Arab people, which drives them to reject such types of medical care (Khalil et al., 2013).

Health literacy is another factor to consider (Stømer, Wahl, Gøransson, & Urstad, 2020). That is because patients with sufficient health knowledge have proven to have better kidney knowledge and compliance (Qobadi, Besharat, Rostami, & Rahiminezhad, 2015). However, 36% of CKD patients reported that they do not have knowledge about hemodialysis (Finkelstein et a., 2008). A study conducted by Kauric-Klein (2020) showed that 47% of HD patients were not able to specify the recommended level of salt intake. Moreover, 38% of the participants do not believe that high salt intake is associated with increased blood pressure and fluid retention (Kauric-Klein, 2020). Interestingly, It was recognized that the older the participants, the more they know about sodium recommendations, which is directly related to how long they stay on HD (Kauric-Klein, 2020). In addition, it was found that older adults and more educated patients are more adherent to dietary guidelines (Lambert et al., 2017). It is also important to note that 37% of them stated that they did not receive any recommendation from their healthcare providers about limiting sodium intake (Kauric-Klein, 2020). Also, a review on dietary adherence showed that patients who are aware of the benefits of the dietary requirements revealed positive attitudes and improved adherence (Lambert et al., 2017). Therefore, patients' attitude towards the renal diet is of significant importance in the haemodialysis treatment (Lambert et al., 2017).

Nevertheless, some patients may intentionally neglect the health awareness advice given by their health professionals because they rely solely on them and prefer to act

passively, which highlights the importance of the relationship with the healthcare staff that is another variable to consider related to compliance (Stømer, Wahl, Gøransson, & Urstad, 2020). Indeed, both healthcare professionals and patients contribute to the treatment process. However, some countries have limitations in this regard. For example, in Lebanon, the renal dietetics professionals are insufficient, and available ones are mostly not well trained and not fully aware of the Kidney Disease Quality Outcomes Initiative (KDOQI) nutrition guidelines (Karavetian, Elzein, Nahla, & Vries, 2013). Moreover, Naalweh et al. (2017) realized in a study done on Palestinian HD patients that the level of compliance to the HD sessions was low; they linked this to the idea that patients have a low perception of the importance of adherence. The fact that 42% of the patients reported that they have never been counseled on this topic explains the previous result (Naalweh et al., 2017). Furthermore, the longer the duration of hemodialysis treatment, the lower is the degree of adherence of patients to nutrient intake and meal control (Lim et al., 2019). However, age can be a factor as well and this is evident by Kauric-Klein (2013) who found that geriatrics are more compliant to attending HD sessions as compared to younger patients.

Despite the high rate of CKD and HD cases worldwide, few studies have been conducted in the Arab region. Moreover, to our knowledge, scarce data exist about their prevalence, risk factors, and consequences in Lebanon. Since Lebanese HD patients' knowledge and adherence to dietary guidelines, fluid intake, and attending HD sessions are not well assessed, this study aims to tackle this area of research. It is hypothesized that the prevalence of knowledge and compliance among Lebanese HD patients will be low. It is also predicted that knowledge and compliance will be positively correlated.

Methodology

Data Collection and ethical considerations

Data was collected using a pilot study design, following proper precautionary measures, and after getting the approval of Lebanese American University's Institutional Review Board (IRB). The study was conducted among hemodialysis patients attending

the Lebanese American University Medical Center (LAUMC), and it mainly consisted of four questionnaires assessing the patients' knowledge, adherence, and attitude, and general information as the age, gender, etc.

Participants

This study included 35 (n = 13 female, n = 22 male) hemodialysis patients who are between 38 and 86 years old (*M* = 68.71; *SD* = 11.47), attending LAUMC for treatment, and with no inflammatory or catabolic disease such as cancer. Regarding their educational level, 28.6% had a below high-school certificate, 31.4% had a high-school certificate, 5.7% had a technical degree, 22.9% had a Bachelor's degree, and 11.4% had Postgraduate studies. In this study, all patients were approached, adults and older adults, Lebanese and non-Lebanese, and as per LAU IRB requirements, patients were asked to provide their informed consent.

Measures

Data collection was conducted using multiple questionnaires and using medical files of the patients in the hospital. Medical files were used to collect data such as gender, age, the number of dialysis sessions attended, medications, biochemical data and presence of comorbidities.

Three questionnaires were used to collect the data. The first questionnaire has many sections: one section assesses demographics (gender, age, marital status...etc.), the second one assesses anthropometrics (height, weight, BMI..etc.) and the third assesses biochemical data(C-reactive protein, BUN, Creatine...etc.).

The second one is the **End Stage Renal Disease-Adherence Questionnaire (ESRD-AQ)** (Kim et al., 2010). It assesses patients' level of adherence, perceptions, and causes of non-adherence. It contains five categories that collectively sum up into 46 questions. The first category asks five general questions about the patients' medical history pertaining to their HD treatment, the second category contains fourteen detailed questions about their treatment and attendance, the third category has nine questions about their medications use, the fourth category is of 10 items asking about their fluid

intake, and the fifth category consists of 8 questions related to their diet. An Arabic version of the ESRD-EQ was utilized in this study (Naalweh et al., 2017). However, this translated version was not validated, therefore, a pilot study was conducted on 12 hemodialysis patients to measure the tool's validity and applicability.

The last questionnaire is the **Chronic Hemodialysis Knowledge Survey (CHeKS)** which is concerned with patients' knowledge regarding their health as dialysis patients (Cavanaugh, Wingard, Hakim, Elasy, & Ikizler, 2009). It contains 23 questions assessing the level of patients' literacy, including questions such as "You are ordering food from a restaurant menu. Which item below is best for you to <u>avoid</u> to control your potassium?" The CHeKS was translated and back-translated as well so that it is tailored to the Arabic-speaking population of this study.

Data Analysis

After data collection at LAUMC, the data was entered into an excel sheet and then imported to the statistical software SPSS (Statistical Package for Social Sciences) for analysis. Descriptive statistics such as mean and standard deviation were conducted for the continuous variables as the age. As for the categorical variables such as the marital status and education, they were represented as percentages. Different types of tests in SPSS were utilized in order to come up with correlations between several variables in relation to knowledge and compliance. These tests include Pearson's test, One-way Anova test, and Independent-t-test.

Results

This study aims to assess the knowledge and compliance of the HD patients residing in Beirut and attending LAUMC for HD. Also, it aims to investigate any association between the patients' knowledge and their age, gender, educational level, and BMI.

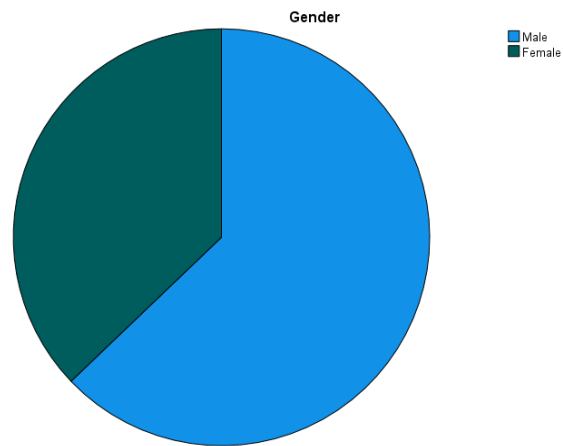*Sociodemographic and Clinical Characteristics of Participants*

A total of 35 (n = 13 female, n = 22 male) patients participated in the study, who were between 38 and 86 years old (*M* = 68.71; *SD* = 11.47). Table 1 shows that the highest percentage (97.1%) of participants were Lebanese, while the other 2.9% were Palestinians. Regarding their educational level, 28.6% had a below high-school certificate, 31.4% had a high-school degree, 5.7% had a technical degree, 22.9% had a Bachelor's degree, and 11.4% had a postgraduate degree. The majority of participants were married (82.9%). In addition, the annual household income was <6 million L.L. as reported by 18.2% of respondents, 39.4% did not know their annual household income, and 21.2% had an annual income between 15 and 30 million L.L., while the other 21.2% had an annual income of either 6-15 million L.L., 30-60 million L.L., 60-120 million L.L., or >120 million L.L.

Figure 2 shows that 20 (57.1%) of the studied patients had a normal body weight according to their Body Mass Index (BMI). Moreover, 17% of the patients were overweight, 22.9% were obese, and 2.9% were underweight.

In addition, 22.9% of the sample did not have any comorbidity. Hypertension was the main comorbidity found among the patients (20%), followed by the combination of both hypertension and heart diseases (14.3%), and the combination of hypertension, heart diseases and another indicated comorbidity whether in the presence of Diabetes Mellitus (8.6%) or its absence (8.6%). Moreover, the remaining 25.6% reported having a combination of the three main comorbidities (diabetes mellitus, hypertension, and heart diseases) and other indicated comorbidities.

The clinical characteristics of the participants were also assessed. Potassium levels were normal in 40% of the participants while below and above normal in 5.7% and 54.3% of them respectively. On the other hand, all participants have their Pre-Dialysis BUN level and creatinine level above normal. With respect to Phosphorus, 57.1% of the participants have it within normal range, while 42.9% have it above normal. Regarding Calcium and Sodium, normal levels were detected among 85.7% and 65.7% of the participants respectively, while 8.6% and 34.3% were below normal respectively.

Figure 1.

Gender

Male
Female

Table 1. Participants Socio-Demographic Findings

Characteristic	N	%
Marital Status		
Single	3	8.6
Married	29	82.9
Divorced	1	2.9
Widowed	2	5.7
Education		
Below High School Certificate	10	28.6
High School Certificate	11	31.4

Technical Degree	2	5.7
Bachelor's Degree	8	22.9
Post-graduates Studies	4	11.4
Nationality		
Lebanese	34	97.1
Palestinian	1	2.9

Figure 2. Distribution of BMI Categories
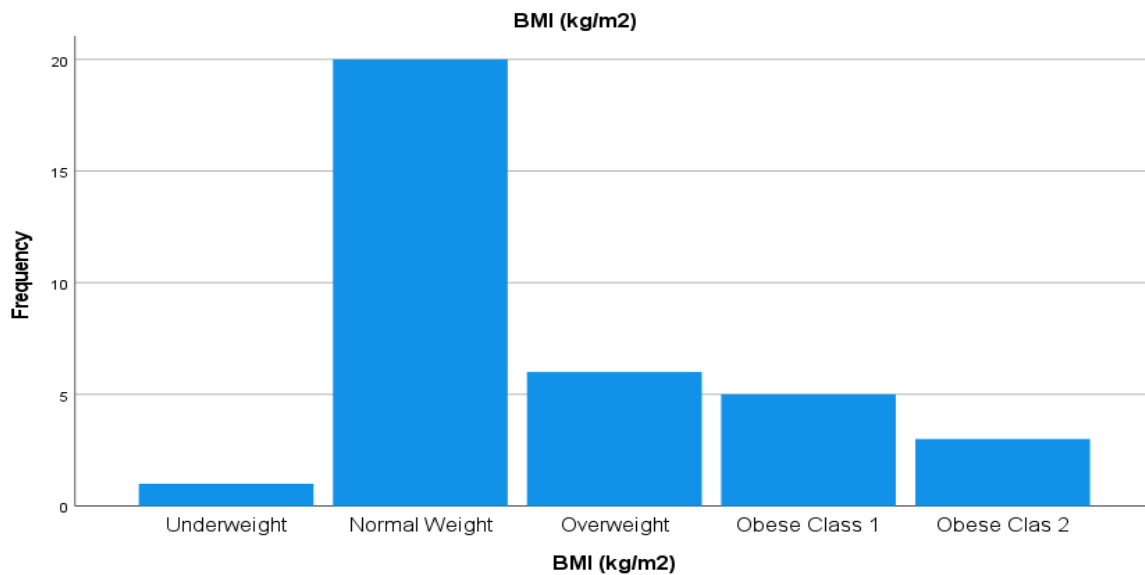
Compliance

The compliance rate for all categories (diet, HD sessions, and fluid) was calculated. The values range between <500 to 1000 (highest compliance rate), with a

value of <500 indicating a poor compliance level, 500-700 indicating a moderate compliance, and a value between 800-1000 indicating good compliance. The results revealed that the mean score was 894.29 ± 102.56 as a compliance value. Almost all participants (32) scored between 800-1000 meaning that 91.43% of them had a good compliance rate.

Correlation between Compliance, frequency of interdialytic weight gain, and Phosphorous levels

A one-way independent-samples analysis of variance (ANOVA) was performed to investigate the impact of compliance on frequency of interdialytic weight gain. This relation has shown to be significant, F (3, 31) = 3.13, *p* = .040. The highest mean compliance score of 962.50 ± 47.87 was associated with participants who had rare weight gain. Also, it has been found that the patients with normal phosphorus levels (2.4 - 4.1 mg/dL) have an average compliance value of 903.75 ± 57.51, which is considered a good compliance range (between 800-1000).

Knowledge

The average score of correct answers to the Knowledge Questionnaire was 6.343. The lowest score attained was 0 while the highest was 10. The most correctly answered question was about whether Potassium is one of the nutrients that must be limited in the renal diet, where around 88.5% of the participants knew it. However, 60% of the participants showed poor knowledge in 2 of the questions, one related to the consumption of more protein in the renal diet as compared to other diets and the other asked whether the quality of animal protein is better than that of plant protein.

Correlation between knowledge and other factors

The correlation between the knowledge score and the age was done using Pearson's correlation test in SPSS. The obtained result indicates a very weak negative correlation with no statistical significance, *r (33) = -.06, p = .719.*

An independent-t-test was conducted to compare knowledge scores between males and females. Results showed no significant difference in knowledge score between male ($M = 63.18$, $SD = 25.71$) and female ($M = 63.85$, $SD = 17.01$) groups, t (33) = -0.8, $p = .94$. These results suggest that gender does not affect knowledge score results.

A one-way independent-samples analysis of variance (ANOVA) was performed to investigate the influence of education level (Below high-school certificate, high-school certificate, technical degree, bachelor's degree, post-graduate studies) on the knowledge score. Results showed no statistically significant differences between group means as specified by one-ANOVA, F (4, 30) = .29, $p = .883$.

A one-way independent-samples analysis of variance (ANOVA) was conducted to investigate the impact of BMI (underweight, normal weight, overweight, and obese) on the knowledge score. There were relatively no statistically significant differences between group means as determined by one-way ANOVA, F (4, 30) = 2.02, $p = .116$.

Also, there was no effect of the annual household income on the knowledge scores. As indicated by one-ANOVA, F (6, 26) = .94, $p = .482$.

Correlation between knowledge and compliance

The correlation between the knowledge and the compliance outcomes was done by Pearson's correlation test in SPSS. It was shown that there is a weak negative correlation between them, r (33) = -.045, $p = .797$.

Discussion and Conclusion

The current pilot study assessed the knowledge and compliance of HD patients in Lebanon. The results showed a high level of compliance to the HD sessions, diet recommendations, and fluid restrictions with 91.43% of studied patients having a good compliance. Moreover, this result indicates that HD patients in Lebanon may have better compliance than other Arab HD patients as in Palestine, where Naalweh et al. (2017) conducted a study on Palestinian HD patients, that showed a compliance level of 45% that is between poor and moderate.

It was shown by our study that patients' knowledge about hemodialysis diet was fair (63.43%) with some areas of poor knowledge which is comparable with the study conducted by Cavanaugh et al. (2009). Although this correlation was not significant, higher knowledge score was associated with younger age. This result is consistent with Cavanaugh et al. (2009) study which showed that lower knowledge scores were associated with older age. Moreover, there was no significant association shown in our study between knowledge and education level. However, Cavanaugh et al. (2009) showed that lower knowledge scores were associated with fewer education years. Our results can be explained by the fact that having a high educational level in general may not necessitate having kidney and hemodialysis knowledge in specific.

These two results about the prevalence of compliance and knowledge among Lebanese HD patients do not confirm our hypothesis since it has been shown that their score ranged between moderate and high.

As indicated earlier in the results section, a weak negative correlation exists between compliance and knowledge. This finding was not expected and contradicts our hypothesis because usually people with better health literacy and kidney knowledge would comply more (Qobadi et al., 2015). This result may reflect the insufficient knowledge of Lebanese dietitians about the KDOQI guidelines (Karavetian et al., 2013). In other words, although patients have a relatively good amount of knowledge, they may have not been followed up properly by the dietitians and given the right recommendations.

Interestingly, it was found that the highest mean of compliance score refers to the patients who had rare intradialytic weight gain and this correlation was significant. This may indicate that when patients are more compliant to the diet and fluid intake, they tend to retain less water, so less weight gain. Moreover, it has been found that the patients with normal phosphorus levels have a good compliance range. This shows the significance of compliance to the renal diet in having normal lab values.

Hypertension was the main comorbidity found among the participants. This finding is expected since hypertension is one of the leading causes of kidney failure

worldwide (CDC, 2020). This finding is also in line with the study of Dawood et al. (2018) done in Egypt.

This study has some limitations that should be noted. The main limitation is the sample size which is a small sample (n = 35). Thus, it is not representative of the HD patients in Lebanon, which makes it almost impossible to generalize the findings. Moreover, the IRB approval was provided late, and this brought about another limitation which is the inability to examine the patients' attitudes towards the renal diet. As such, in future work, the inclusion of this variable is recommended. Also, the patients' attitudes during data collection were not optimal which may have prevented us from having completely accurate results, and this can be explained by their discomfort since data collection was done during the dialysis treatment.

Nonetheless, the present study is possibly the first study examining this topic in Lebanon. In addition, it is one of the few studies in the region to examine the association between knowledge and compliance among HD patients. It is also noteworthy to point out that the awareness of the participants about the study's theme lent some support and credibility to the findings. Future research should consider other variables such as the length of the HD session, the psychological aspect and the patient's relationship with the healthcare provider. Finally, this study provides an insightful view about the situation of HD patients in Lebanon that would help healthcare providers to deliver better treatment for them.

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