

Research Article

Impact of Health Education Intervention on Fluid Management and Quality of Life Among Patients with Chronic Kidney Disease Undergoing Hemodialysis

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Abstract

Introduction: Chronic Kidney Disease (CKD) is a global concern, impacting over 13% of individuals. Hemodialysis (HD) poses challenges, and education on fluid management can improve quality of life (QOL) of individuals with CKD. This study is aimed to evaluate, the impact of health education intervention on fluid management and QOL among dialysis-receiving CKD patients in Dialysis units (DU) at the National Hospital of Sri Lanka (NHSL).

Methods: One-group pretest-posttest design was utilized. Two interviewer-administered questionnaires were used to collect data from randomly selected 110 CKD patients receiving HD. The instrument consisted of items assessing the history of the disease condition, signs and symptoms of fluid overload, and fluid management status. The Kidney Disease Quality of Life (KDQOL) questionnaire was used as instrument II. Both instruments were administered before and after health education intervention regarding control of fluid intake during HD. Descriptive statistics and paired samples t-tests were performed for data analysis. The Ethics Review Committee of NHSL approved this study.

Results: The study primarily involved CKD patients, with a significant majority (46.4%) falling in the 51-70 years age group, and a predominance of males (76.4%). Almost half (44.5%) had attained education up to the Ordinary Level, and the majority were married (80.9%). The findings revealed a positive impact of health education sessions on fluid management, with post-scores increasing from 67% to 79%, indicating a significant reduction in fluid overload symptoms ($p < 0.05$). However, pre- and post-quality-of-life scores did not show significant differences ($p = 0.051$) with the effect of education intervention.

Conclusions: The results revealed a significant reduction in fluid overload symptoms after the educational intervention, indicating a positive impact on fluid management. However, the same intervention did not demonstrate an observable improvement in the patient's quality of life, emphasizing the need to explore the underlying reasons for remaining QOL unchanged. Since health education intervention has shown a positive impact on fluid status management of CKD patients undergoing HD, it would be beneficial to conduct such intervention across DU in Sri Lanka after further studies.

Keywords: CKD, Fluid management, Hemodialysis, Health education interventions, KDQOL

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Introduction

Chronic kidney disease (CKD) is a progressive, irreversible deterioration in renal function from any cause persisting for a period of three months or more. The two main risk factors for the onset and course of CKD are hypertension and diabetes mellitus (Bakarman et al., 2019) while a variety of environmental risk factors, including exposure to heavy metals, agrochemicals, and nephrotoxic compounds, have been identified as likely causes of CKD (Gunatilake et al., 2015).

Chronic kidney disease has been recognized as a leading public health problem worldwide (Bakarman et al., 2019) and more than 13% of patients are suffering from CKD all over the world (Lv & Zhang, 2019). In Sri Lankan rural areas, it was reported that the prevalence of CKD is between 15.1% – 22.9% (Rajapakse et al., 2016). Although kidney transplantation is the preferred treatment for end-stage renal disease (ESRD), many patients find the procedure to be challenging (Kurt et al., 2012). The most popular treatment for CKD at the ESRD stage is hemodialysis (HD) (Kim et al., 2022). While dialysis provides life-sustaining benefits, it also presents significant challenges, notably in fluid management, which greatly influences patients' quality of life (QOL) (Pace, 2007). Poor adherence to HD therapy (Xu et al., 2023) is widely recognized, and inadequate adherence is often associated with less favorable outcomes (Ozen et al., 2019). Moreover, lack of consistent guidance from healthcare professionals on the importance of attending dialysis sessions and infrequent advice on strict adherence significantly

associates with poor compliance with HD (Alzahrani & Al-Khattabi, 2021).

Fluid overload is the most common issue (Zazzeroni et al., 2017) in HD patients, and it also contributes to complications such as hypertension (Alikari et al., 2019), congestive heart failure, and pulmonary edema (Baser & Mollaoglu, 2019). Additionally, hemodialysis (HD) is associated with significant physical and psychological stressors (Alencar et al., 2020), including pain, fluid restrictions, pruritus (Rayner et al., 2017), limitations on physical activity (Baser & Mollaoglu, 2019), exhaustion, neglect of self-care, feelings of inadequacy, disturbed sleep patterns (Kraus et al., 2016) and mood swings (Alencar et al., 2020). Therefore, it is not unexpected that ESRD has a greater impact on QOL than other conditions (Alikari et al., 2019).

Proper fluid management assists in improving the QOL among patients (Duzalan & Pakyuz, 2018), minimizing complications and recurrent admissions for dialysis, and maintaining daily living activities as usual (Christensen et al., 2002). The available literature indicates that the health condition of individuals with ESRD undergoing HD is significantly worse than that of the general population (Bakarman et al., 2019). Nurses' health education regarding HD plays a crucial role in improving the QOL and fluid management for patients with CKD (Alikari et al., 2019; Bakarman et al., 2019; Duzalan & Pakyuz, 2018; Thomas et al., 2009). It empowers patients with the knowledge and skills needed for better disease management and informed decisions making (Hasan et al., 2018).

Two studies, one in Greece and another in Jeddah, Saudi Arabia, examined the effects of health education on HD patients. In Greece, Alikari et al. (2019) found a significant increase in knowledge scores in post-intervention than pre-intervention (15.88 ± 4.76 to 20.20 ± 3.75), indicating that nurse-led education improved patients' understanding of hemodialysis. Similarly, in Jeddah, Saudi Arabia, Bakarman et al. (2019) reported significant enhancements in health-related QOL (HRQOL) scores following an educational program. The initial QOL score was 51.5 ± 13.2 and after the educational program, the QOL score was measured as 64.4 ± 12.2 , highlighting the beneficial impact of structured education on HD patients' knowledge and QOL.

A two-group quasi-experimental study conducted in Greece involving HD patients found that the post-test knowledge score in the intervention group, which received health education, increased from 15.88 ± 4.76 to 20.20 ± 3.75 with a change of 4.32 ± 2.98 in the with health education (Alikari et al., 2019). The study concluded that education provided by nurses significantly improved HD patients' knowledge of their treatment. Similarly, Bakarman et al. (2019) conducted a study in Jeddah, Saudi Arabia, assessing the health-related QOL of patients with HD. Initially, QOL scores were low (51.5 ± 13.2). However, after an educational program, it has shown a significant positive impact, improving all HRQOL parameters (64.4 ± 12.2) for HD patients.

Improving the QOL remains a key objective in the treatment of patients undergoing dialysis for ESRD (Chen et al., 2016). With

the increasing prevalence of renal failure, treatment costs are rising and the QOL of affected individuals is declining (Kefale et al., 2019). The recognition of quality of life (QOL) as a primary priority in renal treatment (Chen et al., 2016) emphasizes the need for patient-centered educational activities (Barnett et al., 2008). To promote greater health knowledge, it is essential that patients feel empowered and actively participate in their treatment plans. Despite substantial worldwide research on the QOL of dialysis patients, studies on this topic in Sri Lanka remain limited.

Therefore, the purpose of this study was to evaluate the impact of health education intervention on fluid management and QOL among hemodialysis-receiving CKD patients in dialysis units (DUs) at NHSL.

Methods

Study design and setting

A one-group pretest-posttest design was utilized to evaluate the impact of a health education intervention on fluid management and QOL among dialysis-receiving CKD patients. This study was conducted in two Dialysis Units (DUs) in the NHSL from May 2022 to August 2022. The NHSL is the largest Teaching Hospital in Sri Lanka, consisting of 3356 beds. Two DUs consist of 19 dialysis machines and 19 dialysis beds. According to the annual report of the NHSL in 2021, 14543 HDs were performed in year 2021 for the patients who were diagnosed with ESRD. As shown in DU statistics in 2021, around 1300 dialysis interventions have been performed monthly for 150 patients requiring HD therapy.

Study population

The population for this study was HD receiving CKD patients admitted to the two DUs of NHSL.

Inclusion and exclusion criteria

Patients who were undergoing regular HD for more than three months, receiving HD at least once a week, and who are aged between 18-85 years irrespective of their gender were included in the study. Patients who were with altered levels of consciousness, cognitively impaired, or disabled were excluded from the study.

Sample size and sampling

The calculated sample size for the study was 110 chronic kidney disease (CKD) patients receiving regular hemodialysis, determined using the following sample size calculation formula. These patients were randomly selected based on the sequence of admissions to the dialysis units (DUs).

$$n = \frac{2SD^2 (Z(1 - \alpha) + Z(1 - \beta))^2}{d^2}$$

n = Required minimal sample size

Z (1- α) = 1.96; Critical value of specified confidence, at 95% confidence interval

(1- β) = power of study = 0.8, 80%

d = effect size = difference between mean values

SD = standard deviation

sample size (n) = 98

Anticipated nonresponse rate = 10%

n=107.8

Sample size (n) was rounded into = 110

Study instrument

Two interviewer administered questionnaires were used as data collection instruments.

Questionnaire 1

The first questionnaire was designed by the researchers considering relevant literature and the researcher's experiences related to HD of CKD patients. It was comprised of four distinct sections. Section A encompassed seven items aimed at capturing the participants' demographic characteristics. Section B featured eight statements intended to elicit information regarding the participants' medical history. Section C was designed to ascertain signs and symptoms indicative of fluid overload. It was filled by the researchers through observation of patients and using their clinical records maintained by medical officers of the DUs including signs and symptoms of shortness of breath (SOB), oxygen saturation, pulmonary edema, ascites, peripheral edema, peri orbital edema, facial edema, leg edema, and scrotal/breast edema. Section D encompassed four items designed to assess the patients' fluid management status, including the amount of fluid intake, and weight before health education intervention and after initiation of the intervention.

The amount of patient's weight gained from each consecutive HD intervention was calculated over one month. Both weight and oxygen saturation of patients were measured using a calibrated weight scale (Model-FWB 152), and pulse oximeter (Model-PC 9005) respectively. The content validity of the questionnaire-1 was ensured by the

consultant nephrologists. The internal consistency reliability of the scale, as measured by Cronbach's alpha was 0.711.

Kidney disease and quality of life (KDQOL) - Questionnaire II

The HRQOL of patients was assessed using the previously validated KDQOL tool in the Sri Lankan context (Senanayake et al., 2017). The QOL of patients was measured before and after the health education interventions. The KDQOL-36 questionnaire is structured into five subscales: the Physical Component Summary (PCS), Mental Component Summary (MCS), Burden of Kidney Disease (BKD), Symptoms and Problems of Kidney Disease (SPKD), and Effects of Kidney Disease (EKD). The PCS (6 items) score and the MCS (6 items) with response alternatives varying from 2 to 6-point scales (Ware et al, 1996). Three scales of SPKD (12 items), BKD (4 items), and EKD (8 items) were comprised of five response options. The scale scores of the KDQOL- 36 questionnaire are transformed from 0 to 100 with higher scores indicating better HRQOL.

Pre-test

Questionnaires were pre-tested before data collection among 10 CKD patients who underwent HD at another setting. A few minor modifications suggested for Questionnaire 1 were incorporated and finalized instruments were used for data collection.

Data collection

Data collection was started by researchers after obtaining ethical clearance for the study and permission for data collection from the

relevant authorities of the hospital. Qualified patients were recruited for the study considering inclusion and exclusion criteria. The questionnaire was translated into Sinhala and Tamil by a qualified language translator and Sinhala, Tamil, and English versions of instruments I and II were administered according to the participant's preferred language to those who were willing to participate in the study without any disturbance to their treatments at DUs.

All the information was gathered anonymously, and a coding system was used to identify the patient to re-administer the instruments to the same patient before and after health education interventions. Data were collected before and after the intervention when patients were admitted for HD to DUs. Data were collected from 8-10 patients per day.

Health education intervention

Participants, who were recruited for the study were educated individually regarding the importance of fluid restriction, signs and symptoms of fluid management, how to measure fluid intake and urine output at home, amount of daily fluid intake, importance of salt restrictions, and thirst control strategies.

In addition to the individual education session, each participant was provided information through a leaflet to remember important instructions provided at the education session at home. The leaflet was designed in English and translated into Sinhala and Tamil by a professional sworn translator.

The validity of the leaflet was checked and

confirmed by a Consultant Nephrologist. After the initial data collection, participants were requested to measure 24-hour fluid intake, and it was considered to calculate the required daily fluid intake for the respective days of the month of the study. Patients were reminded during subsequent HD session visits regarding the above information to improve adherence to fluid management. After completion of the one-month instruments I and II were re-administered.

Data analysis

Data were analyzed using Statistical Package for the Social Sciences (SPSS) version 26. Frequencies, percentages, means and standard deviations were used for demographic variables and to describe the scores of the study variables. Paired Samples T-test was used to compare mean scores obtained before and after the education intervention. The level of significance was accepted at $p < .05$ for statistical tests.

Ethical considerations

This study was approved by the Ethics Review Committee of the NHSL, Colombo (AAJ/ETH/COM/2022/APRIL). Permission to access data collection was obtained from hospital authorities. Participants were enrolled in the study after being fully informed about the study.

All the participants volunteered for the study and signed informed consent. Privacy and the confidentiality of them were ensured and the right to withdraw from the study was granted.

Results

The response rate was 100%.

Socio-demographic characteristics of the participants

The socio-demographic characteristics of the participants are shown in Table 1. Most of the participants were males ($n=84$, 76.4%), married ($n=89$, 81%) and belonged to the age group 51-70 years ($n=51$, 46.4%). The educational backgrounds of the participants were found to be diverse; 44.5% had completed their education to an ordinary level, 21.8% to an advanced level, and a minimal 0.9% never attended school. Just 17.3% of participants reported having monthly revenues beyond Rs.75,000, whereas the bulk of participants reported earnings falling between LKR 25,000 to 49999.

Disease related characteristics of the participants

Findings regarding disease-related characteristics of the participants are shown in Table 2. Accordingly, 30% of patients in the sample ($n=33$) have had HD for less than six months and 81.8 % ($n=80$) of them received HD for two days per week. A substantial proportion of the participants ($n=68$, 61.8%) were recommended to take ≤ 500 ml fluids per day. More than 23% of the patients had urine output less than 50 ml per day while 21.8% of them had urine output between 201-300 ml per day. When considering the presence of co-morbidities, the majority of the participants (78.9%, $n=101$) were diagnosed with hypertension.

Signs and symptoms of fluid overload before and after health education intervention

Overall findings comparing the fluid overload signs and symptoms scores before and after a health education intervention are displayed in Table 3. As revealed, there was a significant difference between mean $\pm$ SD pre and post scores of signs and symptoms, indicating that signs and symptoms of fluid overload were found to be significantly decreased due to the impact of health education intervention ($t = 6.617$, $p < 0.05$).

Table 4. shows individual means scores obtained for signs and symptoms experienced by the participants before and after the health education intervention (a higher score denotes lower signs and symptoms and, vice versa). As indicated, there was a significant difference between pre and post-test scores for all signs and symptoms considered indicating fluid overload ($p < 0.05$). As found, there was a significant difference between pre and post-test scores obtained for shortness of breath (pretest = 52.5 vs 92.35) indicating that participants with shortness of breath were significantly decreased in the post-test compared to the pretest $p = 0.000$).

Participants' weight gain before and after health education intervention

The weight gain of the participants was compared before and after health education intervention (Table 5). As denoted by findings, there was a significant reduction in weight gain after health education intervention compared to before health education intervention ($t = 5.547$, and $p = 0.000$).

The HRQOL before and after the health education session

The HRQOL of participants was assessed before and after the education intervention. As revealed, there was no significant difference between pre and post-test scores obtained through the KDQOL ($t = -1.997$, and $p\text{-value} > 0.05$) (Table 6). Table 7 delineates the subscale scores of the KDQOL. The findings reveal statistically significant alterations in scores across subscales of PCS and MCS ($p < 0.05$) and demonstrated comparatively higher scores obtained before health education intervention than post-assessment.

Discussion

End stage renal failure is a major burden on the healthcare system of Sri Lanka (Wijewickrama & Herath, 2022) and fluid management is crucial to the treatment of ESRD to decrease fluid overload and to improve the QOL and survival (Kraemer et al., 2006). This study aimed to evaluate the impact of health education interventions on fluid management and QOL among dialysis-receiving CKD patients in DUs at NHSL. The findings of this study revealed a significant impact of health education intervention on fluid management among these HD patients.

According to the demographic profiles of the participants, compared to females, more male patients (23.6% vs 76.4%) underwent HD, which might be explained by differences in lifestyle variables based on gender. A similar observation has been reported in a study in

Table 1: Socio demographic characteristics of the participants (N=110)

Characteristics	Frequency (n)	Percentage (%)
Age (years)		
18 – 30	12	10.9
31 – 50	43	39.1
51 – 70	51	46.4
71 – 85	04	3.6
Gender		
Male	84	76.4
Female	26	23.6
Civil status		
Married	89	81
Single	16	14.5
Separate / widow	05	4.5
Education level		
Not attended to school	1	0.9
Grade 1 – 5	10	9.1
Grade 6 – 8	17	15.5
G.C.E.O/L	49	44.5
G.C.E.A/L	24	21.8
Diploma/Graduate/PhD	9	8.2
Employment		
Employed	55	50
Unemployed	55	50
Monthly income (LKR)		
10000 >	11	10
10000 – 24999	22	20
25000 – 49999	44	40
50000 – 75000	14	12.7
75000 <	19	17.3

Athens indicating more male (60%) patients than females (40%) diagnosed with end-stage renal disease (Alikari et al., 2019).

Present study findings demonstrated a notable reduction in signs and symptoms of fluid overload among patients following a

health education intervention in comparison to their pre-education status (post score=59.07, pre score=50.88, $t=6.617$, $p=0.000$). The compelling evidence assertion that the mean scores of signs and symptoms related to fluid overload have increased

Table 2: Disease-related characteristics of the participants (N=110)

Characteristics	Frequency (n)	Percentage (%)
Years from 1st HD		
Less than 1 year	61	55.5
1 year – 5 years	39	35.5
6 years – 10 years	7	6.3
More than 10 years	3	2.7
Dialysis sessions per week		
1	20	18.2
2	90	81.8
>2	00	0
Urine output per day (ml)		
<50	26	23.6
50-100	7	6.4
101-200	9	8.2
201-300	24	21.8
301-400	14	12.7
401 - 500	16	14.5
>500	14	12.8
Other disease conditions		
Hypertension	101	78.9
Diabetes mellitus	48	37.5
Asthma	1	0.8
Heart Failure	12	9.4
Another	12	9.4
Daily recommended fluid intake (ml)		
< 500	68	61.8
501 - 1000	42	38.2

Table 3: Overall fluid overload signs and symptoms mean scores before and after health education intervention (N=110)

	Mean	SD	t	p-value
Pre score	50.88	13.51	6.617	0.000
Post score	59.07	13.34		

significantly after the health education intervention. This affirms the positive impact of the health education intervention on the management of fluid in the CKD cohort studied in this study. Notable improvements are evident in several criteria of patients' mean percentage scores. Particularly, ascites ratings improved from 75% to 92%, pulmonary edema scores ascended from 75% to 85%, oxygen saturation levels improved from 93.7% to 98%, and shortness of breath values improved from 52.5% to 92.35%. This suggests that the majority of patients were able to effectively reduce the signs and symptoms of fluid overload as a result of education intervention.

In addition, the research indicates that a notable proportion of patients demonstrated improved compliance with fluid management protocols and guidelines following the health education intervention in contrast to their pre-dialysis appointments.

The current results line up with previous studies highlighting that fluid restriction and adherence-promoting therapies for long-term HD patients should include a number of important components. According to Smith et al. (2010), they include addressing the elements that drive patients, evaluating and improving their knowledge, fostering social support, and assisting them in accurately self-assessing their fluid status. Moreover, it has been shown that a comparable educational program can improve the knowledge of individuals receiving HD (Fadlalmola & Elkareem, 2020). By improving patients' general understanding of HD, its related problems, fluid management, limitations, and

coping mechanisms, the execution of this educational program had favorable results (Fadlalmola & Elkareem, 2020).

Present study findings indicate substantial evidence of the impacts of the health education intervention for decreasing post-weight gain (mean pre-weight gain - 24.77 vs mean post weight gain -18.26, $t = 5.547$, $p < 0.05$). Consistent with the present findings, a Turkey study has shown a significant reduction in pre-dialysis weight mean ($p < 0.001$) and mean interdialytic weight gain ($p = 0.006$) (Kurt et al., 2012). This outcome emphasizes the importance of patient education in achieving successful weight management and control among patients undergone HD. Moreover, findings of a Malaysian study have demonstrated the effectiveness of a patient education program on fluid compliance among patients receiving HD (Barnett et al., 2008) by indicating a significant reduction of patients' mean interdialytic weight gain following the educational intervention from 2.64 kg to 2.21 kg ($p < 0.05$). Moreover, the same study has reported increased adherence to fluid restrictions from 47% to 71% following the intervention. Accordingly, the positive impact of educational intervention in fluid management among patients receiving HD is apparent.

Previous studies have reported poor QOL of CKD patients undergoing HD in the global context (Joshi et al., 2017; Marwan et al., 2018). As reported in a Nepal study that assessed QOL in patients undergoing HD using the WHOQOL-BREF questionnaire reported low scores for the psychological domain, social domain, and physical domain

Table 4: Mean percent pre and post-scores of signs and symptoms experienced by participants (N=110)

Signs and symptoms	Mean of pre-score	Mean of post-score	p-value
Shortness of breath	52.5	92.5	0.000
Oxygen saturation	93.7	98	0.006
Pulmonary edema	75	85	0.049
Ascites	75	92	0.001
Peripheral edema	30	77.5	0.000
Periorbital edema	45	62.5	0.000
Facial edema	45	75	0.000
Leg edema	33.3	46	0.001
Breast/Scrotal edema	92.5	97.5	0.019

Note: A higher score denotes lower signs and symptoms and vice versa.

Table 5: Patients' weight gain score before and after the health education session (N=110)

	Mean	Std. deviation	t	p-value
Pre-weight gain total	24.77	12.95	5.547	0.000
Post-weight gain total	18.26	12.60		

Table 6: Patients' KDQOL score before and after health education session (N=110)

	Mean	Std. deviation	t	p-value
Total of_KDQOL_pre-score	85.13	11.23	1.977	0.051
Total of KDQOL_post-score	84.84	11.09		

Table 7: KDQOL scores for subscales

Subscale	Mean±SD Pre score	Mean±SD Post score	t	p-value
Physical component summary	15.39 ± 1.78	15.25 ± 1.75	2.097	0.038
Mental component summary	11.24 ± 1.97	10.92 ± 2.12	3.207	0.002
Burden of kidney disease	9.89 ± 4.23	9.97 ± 3.89	-0.327	0.711
Symptoms and problems of kidney disease	23.92 ± 6.88	23.40 ± 6.56	1.593	0.114
Effects of kidney disease	24.75 ± 7.11	24.48 ± 6.95	0.651	0.516

(Joshi et al., 2017). Several studies have been conducted to evaluate the impact of educational interventions on the QOL of such patients and reported some improvements (Alikari et al., 2019; Fadlalmolaa & Elkareemb, 2020). Though expected, overall KDQOL of patients in the present study has not shown any significant improvement as a result of the educational intervention, scores obtained for sub-scales of symptoms and problems of kidney disease and effects of kidney disease were also shown similar behavior. However, sub-scales of the burden of kidney disease reported a slight improvement in post-score compared to pre-score it was not significant. Interestingly, present study findings revealed significant differences between pre and post-scores of subscales of PCS and MCS. Perhaps, the reasons for receiving such different findings could be due to the socio-demographic characteristics of the participants and the extent of the burden of the disease and its HD therapy across different settings. One of the previous Sri Lankan studies assessed QOL among CKD patients in the rural population who reported poor HRQOL (Senanayake et al., 2020). As further reported, superior socio-economic status and less physical and psychological symptoms burden were found to be independently associated with better QOL (Senanayake et al., 2020). Increased patient knowledge and awareness can substantially improve self-management behaviors and treatment adherence in CKD, leading to enhanced QOL and clinical outcomes (Xie et al., 2016). Research consistently demonstrates that well-informed patients are more likely to adhere to prescribed regimens

and lifestyle modifications, such as dietary restrictions and medication schedules. This proactive engagement enables timely recognition of disease exacerbations, reducing complications and hospitalizations. Moreover, informed patients engage in shared decision-making with healthcare providers, fostering treatment satisfaction and strengthening therapeutic alliance (Senanayake et al., 2020; Alikari et al., 2019; Fadlalmolaa & Elkareemb, 2020). Overall, it was observed that health education may improve patients' QOL.

Further, different findings on QOL reported in the present study may be due to the nature of research designs and QOL instruments used. The present study utilized a one-group pretest-posttest design to evaluate the impact of a health education intervention on the improvement of QOL and failed to reveal a significant improvement of QOL as a result of health education intervention. In fact, treatment-related burden and deterioration of physical and psychological health status of CKD patients undergoing HD are likely to gradually increase with the frequency of exposure, and the selected study design might allow to observe this change. Contrary to the present findings, a quasi-experimental interventional study carried out using the Missoula Vitas Quality of Life Index -15 by Alikarin et al. (2018) found, that an education intervention can improve knowledge, adherence, and QOL among HD patients.

Healthcare providers may prioritize integrating structured educational programs into routine care settings, ensuring that patients receive comprehensive information about their condition, treatment options, and

self-management strategies. These programs could also encompass dietary training. These findings suggest that health education programs can help HD patients understand their condition better, stick to their treatment plans, and achieve better fluid management. Additionally, healthcare teams may emphasize the importance of ongoing patient education and support, utilizing various modalities such as group sessions, individual counseling, and digital health tools to reinforce learning and encourage active engagement in self-care. Furthermore, healthcare systems may allocate resources to train multidisciplinary teams in patient education techniques and communication skills to effectively deliver educational interventions and promote patient empowerment. Overall, these changes in clinical protocols and interventions have the potential to enhance patient outcomes, reduce complications, and improve the overall well-being of HD patients.

The study examined the impact of health education interventions on fluid management and QOL among HD patients with CKD. It was found significant improvements in fluid management and reduction in symptoms of fluid overload following the intervention. Although overall QOL scores were not significantly changed, subscales related to physical and mental health showed notable improvements. The study highlights the potential benefits of health education programs in enhancing patient outcomes and well-being in CKD management, suggesting the need for further research in diverse settings.

Limitations of the study

The findings of this study cannot be generalized due to being limited to a single study setting. The study's focus on only two units may not capture the diversity of patient experiences, treatment practices, and healthcare settings present in different HD facilities. As a result, findings may not be applicable or generalizable to other HD units or patient populations with different demographic characteristics, healthcare access, or treatment protocols. Therefore, while the study provides valuable insights, caution should be exercised when applying its findings to broader contexts, and further research with larger and more diverse samples is needed to confirm and generalize the results effectively. It was not possible to test the hemodynamic status of the participants due to the non-availability of funds.

Conclusion and recommendations

The study findings indicate a notable reduction in signs and symptoms related to fluid overload among CKD patients receiving HD following the health education intervention. This suggests a positive effect of the educational intervention on fluid management. However, the health education intervention did not yield a discernible improvement in the QOL of these patients. Consequently, health education intervention achieved a positive impact only in the realm of fluid management, while QOL remained largely unaffected. The findings of the present study emphasize the importance of patient education in improving the fluid management of CKD patients who underwent HD. Therefore, it is important to implement planned educational sessions for

these patients across DUs after further studies in multiple settings. Since the QOL of the HD patients did not find any changes as a result of education intervention, underlying reasons would be beneficial to explore in future studies.

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Conflict of interest

The authors declare that they have no conflicts of interest.

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