



Can A HD Patient Diary Control Interdialytic Weight Gain (IDWG) in Hemodialysis Patients?

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Abstract. End stage renal disease (ESRD) patients who undergo hemodialysis must make lifestyle changes throughout their lives. This aims to prevent interdialytic weight gain (IDWG). IDWG is the result of excessive fluid and/or food intake and sodium intake. IDWG control needs to start from improving a healthy lifestyle. Behavior change according to Social Cognitive Theory in health promotion requires at least two components, namely providing health information and monitoring. The purpose of this study was to determine the impact of the HD Patient Diary to overcome IDWG in hemodialysis patients. This study used an experimental pre-post test without control group research design with a total research sample of 121 hemodialysis patients. Most respondents were male (52.1%), aged less than 60 years (74.4%), had undergone hemodialysis for more than 2 years (52.1%), there was an increase in the proportion of good IDWG after the intervention by 14.8%, and there was a significant difference between the average IDWG before and after the intervention (p value = 0.034). The HD Diary Book is a tool for nurses to provide ongoing education and counseling that must be accompanied by family involvement.

Keywords: HD diary, hemodialysis, interdialytic weight gain, monitoring, health promotion

1. Introduction

End Stage Renal Disease (ESRD) is a progressive and irreversible disorder that affects kidney function, which disrupts the body's ability to maintain fluid and electrolyte balance. The disruption of fluid and electrolyte balance will result in the accumulation of metabolic waste in the body including water and uremia [1]. Therefore, ESRD patients will get problems in the form of fluid accumulation characterized by limb edema, ascites or even pulmonary edema.

Currently, hemodialysis is one of the most preferred renal replacement therapies for patients with ESRD. Data in the US shows that only 1 in 2 ESRD patients do not undergo hemodialysis therapy [2]. In Singapore, 87.7% of ESRD patients choose hemodialysis as their kidney replacement therapy [3]. Meanwhile, in Indonesia, 89.3% of ESRD patients are actively undergoing hemodialysis [4].

ESRD patients who choose hemodialysis as their kidney replacement therapy must make lifestyle changes throughout their lives. Hemodialysis patients should limit the food consumed every day, for example foods that contain potassium such as bananas, potatoes, and oranges [5], [6]. Parker (2019) also explained that hemodialysis patients must limit fluids not only from drinks such as white water but also from other foods that contain fluids such as fruits or other foods and drinks other than water. This must be done because it prevents Interdialytic Weight Gain (IDWG), where IDWG is the result of excessive fluid and/or food intake and sodium intake [7]–[9].

IDWG can have a negative impact on hemodialysis patients. Hemodialysis patients who have IDWG > 4.0 Kg have a higher risk of cardiovascular problems and even death from cardiovascular causes [10], [11]. In addition, patients with IDWG >4% can increase the risk of hospitalization of ESRD patients due to symptoms caused by fluid accumulation, especially in the lungs [12], [13]. Uncontrolled IDWG will also have an adverse impact during the patient's hemodialysis. The results of another study showed that there was an association between IDWG and changes in blood pressure at the 1st hour fluid withdrawal ($p = 0.043$) and muscle cramps at the 4th hour fluid withdrawal ($p = 0.039$) [14]. In addition, the presence of hypotension, hypertension, muscle cramps, headache, nausea and vomiting during fluid withdrawal in hemodialysis can be related to IDWG, the amount of fluid withdrawn, and the high ultrafiltration rate (UFR), where the high and low UFR rate is influenced by the high and low IDWG [15]–[17]. This shows that IDWG is a problem that must be addressed properly by the patient, family or patient companion, and nurses.

Controlling IDWG needs to start with improving healthy lifestyles. Behavior change according to Social Cognitive Theory in health promotion requires at least two components, namely providing health information and monitoring. The provision of health information is expected to motivate patients to change because they know the adverse effects of previous behavior. Meanwhile, self-monitoring by patients will have an impact on increasing self-efficacy so that it can increase behavioral control [18], [19].

The results of previous studies showed that by providing nutrition education using booklets in hemodialysis patients for 4 months, there was a decrease in the average IDWG from 3.20 ± 1.70 to 1.89 ± 1.06 Kg, ultrafiltration volume (UF) from 2.88 ± 1.25 to 2.59 ± 1.32 liters, and patient systolic blood pressure from 75.26 ± 9.22 to 71.12 ± 6.36 mmHg [20]. Another study showed that education based on Self-efficacy Theory (SET) regarding diets and fluid restriction had an impact on increasing compliance with diets and fluid restrictions and a decrease in IDWG [20]. The results of another study that provided interventions in the form of nutritional counseling including fluid restriction showed that there was a decrease in the average IDWG of hemodialysis patients from 6.0 ± 0.7 to $5.3 \pm 0.9\%$ [21]. The results of research by Sakai et al (2017) also showed that there was an increase in compliance in fluid restriction for hemodialysis patients. This shows that proper education and regular monitoring can have a positive impact on hemodialysis patients, especially in controlling IDWG.

The purpose of this study is to determine the impact of the HD Patient Diary which contains general information related to hemodialysis, IDWG detection, diets for hemodialysis patients, and hemodialysis monitoring sheets to overcome IDWG in hemodialysis patients at RSPAD Gatot Soebroto, Jakarta Indonesia.

2. Method

This study was conducted using an experimental pre-post test without control group research design. The sample in this study were 121 hemodialysis patients in the Hemodialysis Unit of Gatot Soebroto Army Hospital. Sampling was carried out using purposive sampling technique with the inclusion criteria of being more than 18 years old, having undergone hemodialysis for more than 6 months, undergoing hemodialysis two times a week with a duration of four hours, and willing to become a respondent. The exclusion criteria in this study were undergoing hospitalization and died during the data collection process. The instrument used was the HD Patient Diary compiled by the researcher, which contained general information related to hemodialysis, introduction to IDWG, diets for hemodialysis patients, and monitoring sheets. The monitoring sheet in the HD Diary contains vital signs and intradialytic complications recorded before, during and after hemodialysis as well as recording weight before and after hemodialysis. This study was conducted for 4 weeks, where every time the patient underwent HD the researcher was always reminded to record on the monitoring sheet and conduct health education to control IDWG and intradialytic complications. Data were analyzed univariate and bivariate. Univariate analysis was conducted to determine patient char-

acteristics including age, gender, length of hemodialysis, and IDWG. Meanwhile, bi-variate analysis was performed using the Paired T-Test test using SPSS 26 to determine the effect of HD Diary on IDWG.

3. Result

The results of the study related to the characteristics of respondents are presented in Table 1. Table 1 shows that most of the respondents were male (52.1%), aged less than 60 years (74.4%), and had undergone hemodialysis for more than 2 years (52.1%). Meanwhile, when viewed based on IDWG, before the intervention, it was found that most respondents had good IDWG (57.9%) and after the intervention, it was found that most respondents had good IDWG (72.7%). This shows that there was an increase in the proportion of good IDWG after the intervention by 14.8%.

Table 1. Distribution of Respondent Characteristics

Characteristics	n	%
Gender		
Male	63	52,1
Famale	58	47,9
Age		
< 60 Years	90	74,4
≥ 60 Years	31	25,6
Duration of Hemodialysis		
< 2 Years	58	47,9
≥ 2 Years	63	52,1
Pre Intervention IDWG		
Good	70	57,9
Bad	51	42,1
Post Intervention IDWG		
Good	88	72,7
Bad	33	27,3

Table 2. Relationship Analysis of HD Diary with IDWG

Variable	Mean	Std Deviasi	Std Error	<i>p value</i>	n
IDWG					
Pre Intervention	2.15	1.124	0.10	0.034	121
Post Intervention	2.0	0.836	0.07		

4. Discussion

Gender is one of the factors that affect IDWG [22]. The results showed that most of the respondents were male. Linberg et al (2010) explained that men tend to be at risk of experiencing high levels of IDWG. This can be caused because male patients have poor compliance behaviors such as always drinking every time they feel thirsty and

consuming favorite foods, eating salty or spicy without any restrictions [23]. In addition, men are also associated with high activity so fluid control is very poor [23]. This is consistent with the results of the interviews conducted, where most male patients are still actively working so they are forced to consume fluids beyond the prescribed limit. Excess fluid intake occurs especially in patients who actively work outdoors, so the influence of weather and activity causes an excessive increase in fluid intake.

The second factor associated with IDWG is age. The results showed that most patients were less than 60 years old. Basically, patients with younger age (less than 40 years) are at risk of having worse IDWG [24]. This is because patients of younger age tend to have a high appetite, where this high appetite is also followed by high fluid intake so that they are more at risk of having high IDWG levels [22], [25]. In addition, thirst is lower in elderly people compared to younger people so that the decrease in fluid intake is also greater in elderly people [26]. The results showed that although most patients were less than 60 years old, they had a good IDWG. This shows that hemodialysis patients already have good diets and fluid restrictions that need to be improved to control IDWG.

Length of hemodialysis is one of the factors that can determine IDWG. The results showed that most patients had undergone hemodialysis for more than 2 years. Patients who have been undergoing hemodialysis for a long time will have good fluid restriction compliance. This is because patients have received sufficient information and knowledge about fluid restriction, so that patients are able to limit fluid intake to control IDWG [27]. However, patients who undergo hemodialysis for a long time also have a higher risk of non-compliance compared to patients who are new to hemodialysis due to the boredom of patients who have to limit their diets and fluids [28]. Therefore, education and monitoring of diets and restrictions as well as problems during hemodialysis must be continuously carried out so that patients have a recall of the problems experienced during hemodialysis so that patients are able to control IDWG by increasing compliance with diets and fluid restrictions.

In this study, there was an increase in the proportion of good IDWG by 14.8% (from 57.9% to 72.7%) after the HD Diary intervention. This finding is in line with several previous experimental studies that showed a decrease in the IDWG level of hemodialysis patients after being given interventions in the form of education, counseling, and monitoring [29]–[31]. The increase in the proportion obtained in this study indicates that hemodialysis patients have better fluid control and diets. It is thought that the health information received by patients and the monitoring mechanisms that help control behavior. Health information received by patients can create motivation to change towards a healthier lifestyle. This is when patients get health information and will realize the adverse effects of previous behavior [18], [19]. In addition, the presence of monitoring sheets containing vital signs, weight before and after hemodialysis, intradialytic complications and fluid intake that are filled out independently by patients can increase patient self-efficacy, which contributes to improving patient fluid control and is manifested by an increase in the proportion of good IDW [18], [19].

Statistical tests showed a significant difference in mean IDWG before and after the intervention (p value 0.034). This finding is in line with previous research which shows there is a decrease in average IDWG after being given nutrition education including fluid restriction [32]. The results of research conducted by Ramezani et al (2018), showed an increase in dietary compliance and fluid restriction after being given

Self-Efficacy Theory (SET) based education. The results of the study by Ramezani et al (2018) also showed a significant difference in average IDWG before and after the intervention (p value 0.056). The results of this study are also in line with research conducted by Sakai et al (2017), where the results of their research showed a decrease in average IDWG after being given nutritional counseling and fluid restriction interventions. This shows that the provision of nutrition education and fluid restriction is very influential in helping patients to control IDWG so as to minimize intradialytic complications and other problems caused by IDWG.

Basically, diet and fluid restriction education contains how patients obtain and consume protein, salt, and how much fluid the patient can consume appropriately [33]. In addition, Kara et al (2007) also explained that potassium and calorie restriction are also included in the series of diets and fluid restrictions. Potassium really needs to be limited because potassium is one of the compositions contained in almost all fruits and vegetables [34]. In addition, providing solutions for patients to overcome hot weather and excessive thirst should also be conveyed and discussed with hemodialysis patients. This aims to prevent patients from increasing fluid intake so that there is no increase in IDWG. These things have been included in the HD Diary educational materials listed in the self-management of HD patients.

The development and implementation of education and counseling on diet and fluid restriction is multidisciplinary. The multidisciplinary team includes doctors, nurses, nutritionists, psychologists, and pharmacists. Meanwhile, adherence to the implementation of diets and fluid restrictions also involves a multidisciplinary team, especially nurses and people closest to the patient, such as spouses, families, or patient companions. This is because compliance is very important because without compliance, good IDWG targets cannot be achieved so that the survival rate of HD patients will shorten [35], [36].

Nurses are the most important role holders in helping patients achieve adherence to hemodialysis regimens and diets and fluid restrictions [37]. Nurses should be able to motivate patients to improve their self-management skills [38], [39]. In addition, nurses must also provide holistic care to hemodialysis patients, especially in providing education and counseling. Nurses play a very important role in ensuring the sustainability of the education that has been provided. This can be achieved by providing continuous education and counseling according to the patient's needs for a minimum of 10-15 minutes every time the patient undergoes hemodialysis [32]. In addition, nurses must also always include the patient's family in education and counseling.

The results showed that family support had a significant relationship with patient compliance with fluid restriction ($p = 0.00$) ($p = 0,00$) [40]. Basically, the family is the closest and inseparable part of the patient. The presence of the family will provide a feeling of pleasure and peace because the patient gets attention, support, and encouragement. Attention, support, and encouragement provided interpersonally will provide self-efficacy in patients so that they are able to manage the problems they face and patients will follow suggestions from the family to overcome these problems [41], [42]. In addition, family support can affect patient compliance, where the results of previous studies show that patient compliance in carrying out fluid restrictions is influenced by 23.1 times family support [43]. This is because families can help patients eliminate the temptation of non-compliance and families are often a support group to achieve compliance [44].

The HD Patient Diary has an impact in improving fluid control so that an increase in the proportion of good IDWG is obtained and accompanied by significant statistical test results. Education and counseling provided using the HD Patient Diary is a means for nurses to provide ongoing education and counseling according to patient needs. In addition, family support or the closest person to the patient is needed to improve diet compliance and fluid restriction so that IDWG can be controlled.

5. Conflict of Interest

The author(s) declared no conflict of interest.

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