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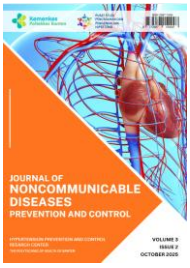

Research Article

THE EFFECT OF ICE CUBES THERAPY EDUCATION ON THIRST AND INTERDIALYTIC WEIGHT GAIN IN CHRONIC KIDNEY FAILURE PATIENTS UNDERGOING HEMODIALYSIS AT BALARAJA HOSPITAL

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KEYWORDS

Chronic kidney failure
Hemodialysis
Ice cubes therapy

ABSTRACT

Chronic kidney disease (CKD) is a disorder of kidney function in which the body is unable to maintain metabolic processes, fluid balance, and electrolyte homeostasis, resulting in increased urea levels. The main problems experienced by patients with chronic kidney disease undergoing hemodialysis are thirst and increased interdialytic weight gain (IDWG). During the interval between dialysis sessions, patients may experience fluid accumulation in the body. One way to prevent this is through ice cube therapy, which may help patients control fluid intake and its effects between dialysis sessions. To determine the effect of ice cube therapy education on thirst and interdialytic weight gain in patients with chronic kidney disease undergoing hemodialysis at Balaraja Regional General Hospital. This study employed a quasi-experimental design using a pre-test and post-test control group design. The sampling technique used was purposive sampling. The sample consisted of 30 respondents. The instruments used in this study included ice cubes, a cool box, a weighing scale, an educational lesson plan for ice cube therapy, a thirst observation sheet, and an interdialytic weight gain observation sheet. The results of the independent samples test showed a p-value of 0.000 for thirst and 0.008 for interdialytic weight gain, both of which were lower than the significance level ($\alpha = 0.05$). The findings of this study indicate that ice cube therapy education has a significant effect on thirst and interdialytic weight gain in patients with chronic kidney disease undergoing hemodialysis.

Kata Kunci

Gagal ginjal kronik
Hemodialisis
Terapi *ice cubes*

ABSTRAK

Gagal Ginjal Kronik (GGK) adalah masalah pada fungsi ginjal tubuh kesulitan untuk menjaga proses metabolisme, keseimbangan cairan, serta elektrolit, yang menyebabkan peningkatan kadar ureum. Masalah utama pasien gagal ginjal kronik yang menjalani hemodialisis adalah rasa haus dan peningkatan *Interdialytic Weight Gain* (IDWG), pada hari-hari di antara sesi dialisis pasien bisa mengalami masalah penumpukan cairan di dalam tubuh. Salah satu cara untuk mencegah hal itu terjadi yaitu dengan dengan terapi *ice cubes*, sehingga pasien bisa mengendalikan asupan cairan dan dampaknya pada saat waktu dua dialisis. Mengetahui Pengaruh Edukasi Terapi *Ice Cubes* Terhadap Rasa Haus Dan *Interdialytic Weigth Gain* Pada Pasien Gagal Ginjal Kronik Yang Menjalani Hemodialisis Di RSUD Balaraja. Metode yang digunakan dalam penelitian ini yaitu *quasy experiment* dengan desain *pre and post with control group*. Cara pengambilan sampel pada penelitian ini yaitu *purposive sampling*. Sampel yang digunakan dalam penelitian ini yaitu 30 responden. Instrumen dalam penelitian ini yaitu *ice cubes*, *coolbox*, timbangan berat badan, SAP edukasi terapi *ice cubes*, lembar observasi rasa haus, lembar observasi *interdialytic weight gain*. Hasil uji *independent sampel test* didapatkan *P value* 0,000 untuk rasa haus dan 0,008 untuk *interdialytic weight gain* lebih kecil dari nilai signifikan (α=0,05). Hasil penelitian ini menunjukkan terdapat pengaruh edukasi terapi *ice cubes* terhadap rasa haus dan *interdialytic weigth gain* pada pasien gagal ginjal kronik yang menjalani hemodialisis.

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INTRODUCTION

Chronic kidney disease (CKD) is a persistent and irreversible impairment of kidney function in which the body is unable to adequately maintain metabolic processes, fluid balance, and electrolyte homeostasis, resulting in elevated urea levels. Patients with chronic kidney disease generally experience a permanent condition that cannot be completely cured and therefore require long-term therapies such as kidney transplantation, peritoneal dialysis, hemodialysis, and ongoing outpatient care (Daryani et al., 2021).

The World Health Organization (WHO) reported in 2017 that more than 500 million people worldwide were affected by chronic kidney disease. The WHO also noted that the number of patients with kidney failure in 2017 had increased by 50% compared with the previous year (Daryani et al., 2021). According to the 2023 Indonesian Health Survey (SKI), the prevalence of chronic kidney disease in Indonesia among individuals aged ≥15 years was approximately 638,178 cases. Meanwhile, the prevalence of chronic kidney disease in Banten Province among individuals aged ≥15 years was approximately 27,784 cases (BPKP Kemenkes, 2023). Patients with chronic kidney disease undergoing hemodialysis are required to restrict their fluid intake. However, increased thirst may lead patients to be nonadherent to fluid restriction recommendations, which can result in fluid overload or overhydration. Fluid overload requires special attention and preventive measures, as it may lead to several complications, including worsening hypotension and hypertension, shortness of breath, cardiopulmonary edema, and impaired physical function (Armiyati et al., 2019).

One non-pharmacological approach to preventing excessive thirst and increased interdialytic weight gain is fluid restriction supported by ice cube therapy education. Ice cube therapy refers to the practice of sucking on ice cubes. This intervention is considered effective in reducing thirst among patients with chronic kidney disease undergoing hemodialysis. Sucking on ice cubes helps moisten the oral mucosa as the ice melts, thereby reducing the sensation of dry mouth. In addition, the cooling effect produced as the ice melts in the mouth may help alleviate thirst. As a result, patients are expected to better adhere to recommendations for limiting fluid intake and to avoid excessive weight gain between dialysis sessions (Rosaulina et al., 2021).

A previous study conducted by Mohamed et al. (2024) among children at Minia Hospital showed that sucking on ice popsicles had a significant effect on reducing thirst and interdialytic weight gain, with a p-value of 0.001 ($p < 0.05$). Thus, the null hypothesis was rejected, indicating significant differences in thirst and interdialytic weight gain before and after ice cube therapy among pediatric patients with chronic kidney disease undergoing hemodialysis at Minia University Children's Hospital, involving 52 respondents.

Based on the preliminary data obtained by the researcher, this study aims to investigate the effect of ice cube therapy education on thirst and interdialytic weight gain among adult patients with chronic kidney disease undergoing hemodialysis at Balaraja Regional General Hospital.

MATERIALS AND METHODS

Instruments, Materials, and Samples

This study consisted of an independent variable, namely ice cube therapy education, and dependent variables, namely thirst and interdialytic weight gain (IDWG). This study employed a quantitative method using an experimental research design, specifically a quasi-experimental design with a control group. The study population comprised all patients with chronic kidney disease undergoing hemodialysis at Balaraja Regional General Hospital. The sampling technique used was purposive sampling, and the sample size was determined using the Sopiyudin Dahlan formula for quasi-experimental studies, resulting in a total sample of 30 respondents.

The respondents were then selected based on the inclusion criteria, which were as follows: patients who had no allergy to ice cubes or cold exposure and no other complications related to ice cubes or cold exposure; patients with stage 5 chronic kidney disease undergoing hemodialysis aged 25–74 years; patients who were compos mentis; and patients with chronic kidney disease undergoing hemodialysis routinely at least twice a week who were willing to participate as respondents. The exclusion criteria were patients with a history of conditions for which reduced ice consumption was recommended; patients with cardiovascular complications; patients with decreased consciousness and unstable hemodynamic status, indicated by $SpO_2 <$ 96% or the use of a ventilator; and patients who refused to participate.

This study was conducted over a period of 14 days. During the first week, the pre-intervention group was observed on Monday and Wednesday, while the pre-control group was observed on Tuesday and Thursday. During the second week, the post-intervention group was observed on Monday and Wednesday, while the post-control group was observed on Tuesday and Thursday. The intervention was administered by the researcher during the second week at the hospital by first providing education, the required materials, and

a demonstration on the first dialysis day. Subsequently, patients continued the ice cube intervention of 100 mL at home during the days between two dialysis sessions, with online monitoring conducted by the researcher.

Thirst was measured using a thirst scale that had been tested for validity and reliability by Kara (2013), with an overall reported Cronbach's alpha coefficient of 0.78. Interdialytic weight gain was measured using the IDWG calculation formula, based on body weight measured at the first and second dialysis sessions. Afterward, changes in thirst and interdialytic weight gain before and after the provision of ice cube therapy education were assessed.

This study had received ethical approval from the relevant ethics committee and was declared ethically approved under research ethics approval number 070/LPPM-UYM/III/2025.

RESULT AND DISCUSSION

The results of this study describe the characteristics of the respondents based on age, sex, and duration of hemodialysis, as well as thirst and interdialytic weight gain before and after the intervention and in the control group. The study variables examined were ice cube therapy education, thirst, and interdialytic weight gain.

Table 1. Respondent Characteristics by Age, Sex, and Duration of Hemodialysis at Balaraja Regional General Hospital (N = 30)

	Respondent Characteristic	Intervention Group Frequency (%)	Control Group Frequency (%)	Total Frequency (%)
1.	**Usia**			
	26-35 years	4 (13,3)	1(3,3)	5(16,7)
	36-45 years	5 (16,7)	2 (6,7)	7(23,3)
	46-55 years	2 (6,7)	2 (6,7)	4(13,3)
	56-65 years	4(13,3)	9(30,0)	13(43,3)
	>65 years	0	1(3,3)	3 (3,3)
	Total	**15 (50,0)**	**15 (50,0)**	**30 (100,0)**
2.	**Sex**			
	Female	6 (20,0)	11 (36,7)	17 (56,7)
	Male	9 (30,0)	4 (13,3)	13 (43,3)
	Total	**15 (50,0)**	**15 (50,0)**	**30 (100,0)**
3.	**Duration of Hemodialysis**			
	<12 months	0	1(3,3)	1(3,3)
	12-24 months	0	1(3,3)	1(3,3)
	>24 months	15(50,0)	13(43,3)	28(93,3)
	Total	**15 (50,0)**	**15 (50,0)**	**30 (100,0)**

Table 2. Distribution of Mean, Median, Standard Deviation, Range, and Minimum–Maximum Values of Study Variables (N = 30)

Variables	N	Mean	Median	SD	Min-Max
Thirst, Pre-Intervention	15	17,07	17,00	2,789	12-23
Thirst, Post-Intervention	15	8,60	8,00	1,502	7-12
Thirst, Pre-Control	15	14,20	15,00	2,808	10-19
Thirst, Post-Control	15	15,80	16,00	1,971	12-19
IDWG, Pre-Intervention	15	5,299	5,600	0,930	3,87-6,79
IDWG, Post-Intervention	15	4,289	4,140	0,713	2,93-5,43
IDWG, Pre-Control	15	3,070	2,960	0,730	2,07-4,96
IDWG, Post-Control	15	3,458	3,350	0,875	2,43-5,85

Table 3. Differences in Mean Thirst and Interdialytic Weight Gain Scores Before and After Ice Cube Therapy in the Intervention and Control Groups

Variable	N	Mean	SD	P *value* (Sig.)
Pre-test and post-test thirst in the intervention group	15	8,467	2,167	0,000
Pre-test and post-test thirst in the control group	15	-1,600	3,521	0,100

Pre-test and post-test interdialytic weight gain in the intervention group	15	1,010	1,062	0,002
Pre-test and post-test interdialytic weight gain in the control group	15	-0,388	0,790	0,078

Table 4. Differences in Mean Post-Test Thirst and Interdialytic Weight Gain Between the Intervention and Control Groups

Variable	N	Mean	Mean Difference	SD	P *value* (Sig.2 tailed)
Thirst					
Post-test thirst in the intervention group	**15**	**8,60**	**-7,200**	**1,502**	**0,000**
Post-test thirst in the control group	**15**	**15,80**	**-7,200**	**1,971**	**0,000**
IDWG					
Post-test IDWG in the intervention group	**15**	**4,28**	**0,831**	**0,713**	**0,008**
Post-test IDWG in the control group	**15**	**3,45**	**0,831**	**0,875**	**0,008**

Based on the research that has been conducted, the discussion in this study covers the respondents' characteristics, including age, sex, and duration of hemodialysis, among patients with chronic kidney disease undergoing hemodialysis.

As shown in Table 1, the age distribution indicated that the largest proportion of respondents was in the 56–65 years age group (late elderly), accounting for 13 respondents (43.3%), while the smallest proportion was in the >65 years age group (elderly), with only 1 respondent (3.3%). The age classification used in this study was based on the Ministry of Health classification as cited in Suciana et al. (2020). After the age of 40 years, glomerular filtration rate (GFR) declines continuously until the age of 70 years, with an approximate decrease of 50%. Tubular function, including reabsorption and concentrating ability, also declines. These physiological changes contribute to the development of kidney disease, which is why many patients are diagnosed with kidney failure after the age of 40 years (Karmiyati et al., 2021).

This finding is supported by the study of Daryani et al. (2021), which reported that respondents aged 20–40 years accounted for 5%, those aged 41–50 years accounted for 31%, those aged 51–60 years accounted for 37%, and those aged over 60 years accounted for 27%.

Table 1 also shows the frequency distribution by sex, indicating that most respondents were male, with 17 respondents (56.7%), compared with 13 female respondents (43.3%). This result may be explained by the fact that men are considered to have a twofold greater risk of developing chronic kidney disease than women. Male patients are also more vulnerable to chronic diseases such as heart disease, hypertension, and chronic kidney disease due to biological factors, including hormones, as well as unhealthy lifestyle behaviors.

This finding is consistent with the study by Daryani et al. (2021), which found that 58% of respondents were male and 42% were female. This is in line with the view that men are more susceptible to prostate enlargement and renal stone formation, both of which may potentially lead to kidney failure. In addition, men are more likely to engage in behaviors that may adversely affect their health, such as smoking, drinking coffee, consuming alcohol, and taking supplements, all of which may contribute to systemic diseases that reduce kidney function (Komariyah et al., 2024).

Table 1 further presents the frequency distribution according to duration of hemodialysis, showing that the largest proportion of respondents had undergone hemodialysis for ≥24 months (long duration), accounting for 93.3%, while the lowest proportion was found in the ≥12 months (moderate) and 12–24 months (new) categories, each represented by 1 respondent (3.33%). This classification was based on the study by Ikhawati (2023), in which hemodialysis duration was categorized into three groups: ≤12 months (new), 12–24 months (moderate), and >24 months (long duration) (Rosa et al., 2025). The duration of hemodialysis influences fluid status and body weight, particularly in relation to the patient's ability to adapt. The longer patients undergo hemodialysis, the better they are expected to adapt to their illness, especially in complying with fluid restriction. This implies better adherence to the hemodialysis program and fluid restriction, which

in turn contributes to improved health status and quality of life among patients with chronic kidney disease (Feronika et al., 2025).

This finding is supported by the study conducted by Feronika et al. (2025), in which the statistical test showed a p-value of 0.009, which was lower than the predetermined significance level of α = 0.05. This indicates a relationship between the duration of hemodialysis and interdialytic weight gain (IDWG) among patients with chronic kidney disease in the hemodialysis unit. However, this finding contradicts the study by A. Kristantii et al. (2024), which found no relationship between the duration of hemodialysis and interdialytic weight gain. That study suggested that the duration of hemodialysis required by patients with chronic kidney disease varies depending on disease severity, how patients regulate their fluid and food intake, and how regularly they undergo hemodialysis.

Based on the distribution data presented in Table 2, the intervention and control groups each consisted of 15 respondents. After receiving ice cube therapy, a decrease in thirst was observed in the intervention group. At pre-test, most respondents in the intervention group experienced moderate thirst, accounting for 13 respondents (86.7%), with a mean score of 17.07 (SD 2.789). At post-test, most respondents in the intervention group experienced mild thirst, also accounting for 13 respondents (86.7%), with a mean score of 8.60 (SD 1.502). In the control group, most respondents experienced moderate thirst at pre-test, accounting for 12 respondents (80.0%), with a mean score of 14.20 (SD 2.808). At post-test, all respondents in the control group (100%) experienced moderate thirst, with a mean score of 15.80 (SD 1.971). It can therefore be concluded that the mean thirst score in the intervention group decreased by 8.47, whereas the mean thirst score in the control group increased by 1.6.

Based on the same table, a decrease in interdialytic weight gain was also observed in the intervention group after ice cube therapy. At pre-test, most respondents in the intervention group had moderate IDWG, accounting for 11 respondents (73.3%), with a mean score of 5.299 (SD 0.930). At post-test, most respondents in the intervention group remained in the moderate IDWG category, also accounting for 11 respondents (73.3%), with a mean score of 4.289 (SD 0.713). In the control group, most respondents had mild IDWG at pre-test, accounting for 14 respondents (93.3%), with a mean score of 3.070 (SD 0.730). At post-test, most respondents in the control group still had mild IDWG, accounting for 13 respondents (86.7%), with a mean score of 3.458 (SD 0.875). It can therefore be concluded that the mean IDWG score in the intervention group decreased by 1.01, whereas the mean IDWG score in the control group increased by 0.358.

As shown in Table 3, the results of the paired-samples test demonstrated a significant difference in the intervention group before and after the intervention in terms of thirst, with a mean difference of 8.46, an SD of 2.167, and a p-value of 0.000. Likewise, in the intervention group, there was a significant difference in interdialytic weight gain before and after the intervention, with a mean difference of 1.01, an SD of 1.062, and a p-value of 0.002.

Furthermore, based on the results of the independent-samples t-test shown in Table 4, the analysis of mean differences after ice cube therapy on thirst and interdialytic weight gain among patients with chronic kidney disease undergoing hemodialysis at Balaraja Regional General Hospital showed significant results. For thirst, the post-test mean difference between the intervention and control groups was -7.200, with a p-value of 0.000, indicating that the p-value was less than 0.05. For interdialytic weight gain, the mean difference was 0.83, with a p-value of 0.008, which was also less than 0.05. Therefore, the null hypothesis (H0) was rejected and the alternative hypothesis (Ha) was accepted.

CONCLUSION

Based on the results of the paired-samples t-test, there were significant differences in the intervention group before and after the intervention in terms of thirst, with a mean difference of 8.46, a standard deviation of 2.167, and a p-value of 0.000. Likewise, in the intervention group, there was a significant difference in interdialytic weight gain before and after the intervention, with a mean difference of 1.01, a standard deviation of 1.062, and a p-value of 0.002.

Based on the results of the independent-samples t-test analyzing the mean differences after ice cube therapy on thirst and interdialytic weight gain among patients with chronic kidney disease undergoing hemodialysis at Balaraja Regional General Hospital, the mean difference for thirst was -7.200 with a p-value of 0.000, indicating that the p-value was less than 0.05. For interdialytic weight gain, the mean difference was 0.83 with a p-value of 0.008, which was also less than 0.05. These findings indicate that ice cube therapy education had a significant effect on thirst and interdialytic weight gain among patients with chronic kidney disease undergoing hemodialysis at Balaraja Regional General Hospital.

It is expected that the findings of this study may contribute to reducing the incidence of complications related to increased thirst, interdialytic weight gain, and other related problems among patients with chronic kidney disease undergoing hemodialysis in healthcare institutions. Future researchers are also encouraged to develop more innovative approaches to ice cube therapy education at home, such as using newer technologies or barcode-based systems to monitor interventions carried out at home.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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