

ISSN 2354-8428
e-ISSN 2598-8727

JURNAL KEPERAWATAN

KOMPREHENSIF

COMPREHENSIVE NURSING JOURNAL

Published by :

**Sekolah Tinggi Ilmu Keperawatan
PPNI Jawa Barat**

Vol. 9 No. 4, October 2023



JURNAL KEPERAWATAN KOMPREHENSIF	VOL. 9	NO. 4	Bandung October 2023	ISSN 2354-8428	e-ISSN 2598-8727
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Research Article

The Effect of Ice Cubes Sipping on Reducing Thirst Among Hemodialysis Patients

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Received : 08/10/2023

Revised : 15/10/2023

Accepted : 30/10/2023

Online : 31/10/2023

Published : 31/10/2023

Abstract

Aims: Patients with chronic kidney disease undergoing hemodialysis must limit fluids to prevent fluid overload, which worsens the condition of patients with chronic kidney disease. Restricting fluids results in reduced oral intake, which results in a dry mouth and rarely flowing water on the tongue. This condition can trigger a feeling of thirst. One way to manage thirst is to chew ice cubes.

Objective: to determine the effect of chewing ice cubes on reducing thirst in patients undergoing *hemodialysis*.

Method: This research is a type of quantitative research with *Quasy Experiment research with a pretest and posttest* approach with a sample size of 60 respondents, 30 respondents in the intervention group, and 30 respondents in the control group using *purposive techniques sampling*. And for data collection using the DTI (*Dialysis*) *questionnaire Thirst Inventory*).

Results: The effect of giving the intervention of chewing ice cubes to patients undergoing hemodialysis obtained a *p-value of 0.000* ($p < 0.05$) for *pre-post* in the intervention group and a *p-value of 0.317* ($p > 0.05$) for *pre-post* in the control group. It can be concluded that the *posttest value* of the intervention group and the *posttest value* of the control group obtained a *p-value of 0.000* (< 0.05). It can be concluded that there is a significant difference in group *posttest* scores between the intervention group and the control group.

Conclusion: The results of the study show that the intervention of chewing ice cubes in patients with chronic kidney disease has an effect so that it can be used.

Keywords:

Chewing ice cubes, chronic kidney failure, thirst

INTRODUCTION

Chronic Kidney Disease (CKD) is a condition where kidney function decreases over a long period. CKD is a non-communicable disease where the process takes a long time and is irreversible. Damaged nephrons no longer function normally. CKD is progressive and can cause death because it interferes with kidney function, which regulates water, electrolyte balance, and the

excretion of waste such as nitrogen (1). Kidney function indicators can use the Glomerular Filtration Rate (GFR) and albuminuria. Higher protein levels in the urine (albuminuria) can be associated with risk factors for kidney disease that require substitute/kidney replacement therapy (2).

Hemodialysis is a therapy for patients with end-stage chronic kidney disease to ensure they survive apart from kidney

transplantation. Hemodialysis is not therapeutic but palliative; therefore, CKD patients must undergo hemodialysis. Patients undergoing hemodialysis (HD) must limit daily fluid intake. Excess fluid will cause increased body weight (BB), hypertension/high blood pressure, and dyspnea. The permitted fluid restriction is 500 ml to 600 ml for 24 hours (3). Hemodialysis is carried out 2 to 3 times/week and lasts 4 to 5 hours (4).

Patients undergoing hemodialysis can feel thirsty as a result of the recommended fluid restriction program. Restricting fluids during hemodialysis causes several effects on the body, one of which is complaints of thirst and dry mouth (xerostomia) due to reduced salivary gland production (5). Apart from that, non-functioning kidneys in patients undergoing hemodialysis can be a physical stressor that affects the patient's life both from a social and psychological perspective. Hemodialysis patients will experience nausea or vomiting, muscle weakness, pain, and edema (6).

There are non-pharmacological therapies that can be done to reduce thirst, including drinking from a small glass, reducing salt intake, consuming sugarless chewing gum (*Xylitol*), gargling with mint-flavored mouthwash, sucking *slimmer ice*, *frozen grapes*, and popsicles, gargling with boiled water. Several of these interventions have been shown to be effective in reducing thirst in hemodialysis patients. In this study, ice cube sipping therapy will be used. There is a therapy that is still not widely used, namely the Ice Cube Sipping therapy, which could be an option to reduce thirst. Controlling thirst is very important for CKD sufferers who undergo hemodialysis to reduce thirst so that fluid intake can be reduced. Chewing ice cubes can make the oral mucosa moist when the ice cubes melt, so the mouth doesn't dry out. Ice cubes provide a cold sensation when they melt in the mouth so that thirst can be reduced (7).

Research on the effect of sipping ice cubes on reducing the scale of thirst in chronic

kidney disease patients undergoing hemodialysis at RSUD Dr. M.Yunus Bengkulu carried out by obtained the pretest results on the Thirst Scale of 6.40 and the average posttest value of the Thirst Scale, namely 4.86, there is an effect of chewing ice cubes on reducing the feeling of thirst in chronic kidney disease patients undergoing hemodialysis at RSUD Dr. M. Yunus Bengkulu with a value of ρ Value = 0.000 (< 0.05) (8).

Based on the background above, therefore, this research is important to carry out because seen from previous research, thirst when undergoing hemodialysis can be overcome by sucking ice cubes. If thirst is not overcome, it will impact changes in fluid and electrolyte balance in patients with chronic kidney disease, resulting in changes in composition. in addition to changes in the composition of saliva flow, patients with chronic kidney disease will experience changes in dry mouth/xerostomia, which are caused by an increase in the concentration of urea in the blood (9). And with the prevalence of chronic kidney disease undergoing hemodialysis, many people still experience complaints of thirst when undergoing hemodialysis. Researchers hope that research on the effect of sipping ice cubes on reducing thirst in patients undergoing hemodialysis will motivate nurses to provide non-pharmacological therapy to reduce thirst in patients undergoing hemodialysis.

METHODS

This quantitative research uses a *quasi-experimental research design with a two-group pretest-posttest* research design. This study aims to reveal cause and effect. There is an intervention group and a control group. This method is used to determine the effect of chewing ice cubes on reducing thirst. This research was carried out in the Hemodialysis Room at Muhammadiyah Hospital Bandung. This research lasted for one week, from June 19 2023 to June 26 2023.

The population of this study was hemodialysis patients at Muhammadiyah Hospital Bandung, which has a population of 100. The number of samples from the study was calculated using *G-Power software* Version 3.1.9.4 with *t-test: Two dependent Groups (matched pairs): Wilcoxon (non-parametric)* with assumptions $\alpha=0.05$, *effect size 0.5*, *power level 0.95* *numerator df = 1*, *numerator of groups = 2*, *number of covariates=1* with a total sample size of 47. To avoid errors, add an *attrition rate of 20%*. The total sample size is 60 people. Respondents were divided into two groups, namely: control group 30 and intervention group 30. Sampling used *purposive sampling technique* where, which technique was carried out by directly selecting samples with predetermined characteristics, in this study, those who met the inclusion criteria during the study were included in the sample. And then become a respondent. The inclusion criteria in this study are age over 18 years, patients who feel thirsty, patients who routinely undergo hemodialysis, the patient who is willing to be a respondent, and patients who are not sensitive to cold temperatures. To measure the level of thirst felt using the *Dialysis Thirst Inventory (DTI)* measuring instrument, which was developed by (10). This questionnaire consists of seven items. Each item has a point on a Likert scale (never = 1 to very often = 5). Using the DTI questionnaire is a

tool for measuring thirst used by Bots et al., (2004) . Which has a Pearson correlation ($R = 0.376$ $P < 0.005$). Results of tests carried out by Bots et al., (2004) . Found that *Cronbach's score* for thirst the reliability is 0.87.

Therefore, the results of the variable reliability test above can be used in further data testing. The data collection technique in this research uses questionnaire sheets. Respondents were given questionnaires during *the pretest* and also *the posttest*, namely filling out *the dialysis third inventory (DTI)* questionnaire again. Meanwhile, in the control group, respondents were given *pretest* and *posttest* questionnaires without any intervention. This research has passed ethical permits from STIKep PPNI Jabar with number 019/KEPK-RSAI/5/2023 and was granted a research permit by the hospital with number 132/II.6.AU/H2023.

RESULTS

This chapter explains the results of research regarding the effect of chewing ice cubes on reducing thirst in patients undergoing hemodialysis at the Muhammadiyah Hospital in Bandung. This research was carried out from June 19-26, 2023, in the Hemodialysis room. The sample in this study was 60 respondents from hemodialysis patients who met the inclusion and exclusion categories.

Table 1. Demographic Characteristics of Respondents

Characteristics	Intervention (n=30)	Control (n=30)
Age		
< 30 years	3 (10.0%)	1 (3.3%)
31-45 years old	7 (23.3%)	9 (30.0%)
46-60 years old	17 (56.7%)	15 (50.0%)
> 60 years	3 (10.0%)	5 (16.7%)
Mean (±SD)	47.43 (±12.042)	49.40 (±11.628)
Min-Max	23-73	24-73
Gender		
Man	14 (46.7%)	9 (30.0%)
Woman	16 (53.3%)	21 (70.0%)

Characteristics	Intervention (n=30)	Control (n=30)
Length of HD		
< 11 months	8 (26.7%)	16 (53.3%)
24 months	6 (20.0%)	5 (16.7%)
36 months	10 (33.3%)	4 (13.3%)
> 48 months	6 (20.0%)	5 (16.7%)
Mean (±SD)	36.30 (±32.564)	11.93 (±12.911)
Min-Max	5-120	1-60

Table 1 shows that the majority of patients are 40-60 years old. In the intervention group, there were 17 people (56.7%), with an average of 47.43. while in the control group, there were 15 people (50.0%) with an average of 49.40. Based on gender, the majority of respondents were female, showing a score of 16 people (53.3%) in the intervention group and 21 people (70.0% in the control group). Based on the length of time undergoing hemodialysis, the majority of respondents in the intervention group were in the 36-month range, ten people (33.3%) with an average of 36.30. However, in the control group, the majority of respondents were in the range < 11 months, 16 people (53.3%) with an average of 11.93.

Table 2. Frequency Distribution of Thirst Levels

Variable	Pretest F	%	Posttest F	%
Intervention				
Never thirsty	0	0	0	0
Ever thirsty	0	0	0	0
Sometimes thirsty	0	0	27	90.0
Almost often thirsty	27	90.0	3	10.0
Very often thirsty	3	10.0	0	0
Control				
Never thirsty	0	0	0	0
Ever thirsty	1	3.3	1	3.3
Sometimes thirsty	15	50.0	15	50.0
Almost often thirsty	14	46.7	14	46.7
Very often thirsty	0	0	0	0

Based on Table 2, it can be seen that before being given the ice cube-sipping therapy intervention, some respondents in the intervention group had a level of almost frequent thirst of 27 people (90.0%). After being given the intervention, the majority of respondents showed a level of occasional thirst, 27 people (90.0%). However, in the control group, the majority of respondents had an occasional thirst level of 15 respondents (50.0%), whereas the posttest did not show any changes.

**Table 3. Average thirst score before and after intervention
In the intervention group and control group**

Variable	Intervention (n=30)		Control (n=30)	
	Pretest	Post test	Pre Test	Post test
Mean (±SD)	24.93 (±SD 2,728)	19.00 (±SD 1,781)	20.90 (±SD 2,510)	20.93 (±SD 2,504)
Min-Max	22-33	15-23	14-25	14-25

Based on table 3, there is an average pre-intervention thirst score of 24.93 (±SD 2,728), and post-intervention 19.00 (±SD 1,781), there is a decrease of 5.93. Meanwhile, in the pre-control group, 20.90 (±SD 1.781), they were sometimes thirsty, and in the post-control group, 20.93 (±SD 2.504), there was a slight increase, namely 0.03.

Table 4. Difference in mean scores for thirst before and after intervention in the intervention group and control group

Group	Mean (±SD) Pretest	Posttest	p-value
Intervention	24.93 (±2,728)	19.00 (±1,781)	0,000
Control	20.90 (±2,510)	20.93 (±2,504)	0.317

Table 4.4 above shows that there is a significant difference in thirst scores in hemodialysis patients before and after the ice cube-sipping therapy intervention with an average pretest value of 24.93 and posttest of 19.00 in the intervention group obtained a *p-value* of 0.000 (<0 .05). So chewing ice cubes affects reducing thirst. Meanwhile, in the control group, the pretest value was 20.90, and the posttest value was 20.93, resulting in a *p-value* of 0.317 (> 0.05). So, it can be concluded that H_0 is accepted and H_a is rejected.

Table 5. Posttest Thirst Score in the intervention group and posttest control group

Group	Mean	Z	P-value
Intervention	22.43	-3,613	0,000
Control	38.43		

Based on table 5 above, the result is Z - 3.613. A negative value on Z indicates that the intervention of chewing ice cubes can reduce thirst. The results of statistical tests in the intervention and control groups obtained a *p-value* = 0.000 ($p < 0.05$), so H_a was accepted, and H_0 was rejected. This means chewing ice cubes has an effect on reducing thirst.

DISCUSSION

Based on the results of this study, it shows that patients undergoing hemodialysis had an average age of 47 years in the

intervention group, while in the control group the average age was 49 years. This is in accordance with *the Report of the Indonesian Renal Registry*, where the most patients undergoing hemodialysis were in the 45-54 age group (30.82%) (11). In line with previous study, most patients undergoing hemodialysis were in the 42-50 age group, 14 people (41.17%) (12). Previous research showed that the largest age group is 46-55 years old, 26 people (30%) (13). Influences the distribution of a person's body fluids, that the need for fluid intake in the elderly decreases along with the aging process. This is caused by changes

in body composition, namely a decrease in muscle cells and an increase in fat cells, which causes a decrease in the need for fluids to carry out body functions.

Based on the results of this study, it shows that 16 patients undergoing hemodialysis were female (53.3%) in the intervention group, while in the control group 21 people (70.0%). This is in line with research by Fajri, Sulastri, & Kristini (2020), the majority of patients undergoing hemodialysis were female, 11 people (55%). According to research, the majority of patients undergoing hemodialysis were 20 women (58.8%) (14). Gender is not the main risk factor for chronic kidney disease because apart from gender, factors such as race, genetics, and environment are relationships that can have an influence (13). Clinically, gender will influence a person's body fluids and weight, where women have proportionally less body water because they contain more fat than men, so that fat clients have a lower proportion of water than thin ones.

Based on the results of this study, it shows that patients who underwent hemodialysis for an average of 36 months in the intervention group, but in the control group the average was 11 months. This is in line with the previous research stated that the patients with the longest duration of hemodialysis were 3-4 years, 32 people (44.4%) (15). According to previous research, the patients with the longest duration of hemodialysis were 3 years, namely 23 people (48.9%) (16). The longer a patient undergoes hemodialysis, the higher the urea and creatinine levels will be. As a result, the number of red blood cells decreases or what is called anemia. The length of time undergoing hemodialysis is related to the patient's ability to adapt. The longer the patient undergoes hemodialysis, the more the patient adapts to the condition of the disease, especially adapting to fluid restrictions. In CKD patients who live in tropical areas, fluid restriction is related to difficulty controlling thirst. High

environmental temperature will increase excessive fluid expenditure, high environmental temperature will cause loss of body fluid through sweat because it is the body's attempt to get rid of heat in the body. Body fluids lost through sweat will trigger thirst to appear as a response to the human body to meet the needs of lost body fluids.

Thirst is one of the body's normal indicators of stimulating an imbalance that occurs in the body. A healthy person's response to reducing this is to drink so that thirst disappears. However, this does not apply to CKD patients, where sufferers must limit fluid intake so that quality of life is maintained by avoiding complications caused by excess fluid. Regarding the thirst felt by CKD patients, efforts need to be made to reduce or reduce thirst. One way to reduce thirst in CKD patients undergoing hemodialysis is by chewing ice cubes. Rolling ice cubes is a therapy that can be used to reduce thirst/reduce fluid intake experienced by CKD patients, by using small pieces of ice cubes made with 10 ml boiled water and the pieces of ice cubes in the mouth or put in the mouth until they melt over time. 4-5 minutes. The water content in ice cubes can provide a cold sensation in the mouth and the water in the mouth can reduce the feeling of thirst that appears and the vitamin C content contained in it can provide care for the mouth (5).

Ice cubes can reduce thirst when melted ice cubes are put into the mouth because this process involves heat transfer or heat transfer, the temperature of the mouth is higher so that the flow of saliva in the mouth is warmer, transfers heat to colder ice, making the temperature of the ice drop and ultimately making ice melt. After the ice melts in the mouth, it will give a cold sensation and have a refreshing effect on the throat. Water intake is regulated by the feeling of thirst through changes felt in the mouth, and is regulated by the *hypothalamus* (the brain center that controls the maintenance of water balance, body and stomach temperature). After



intake, the feeling of thirst decreases because fluid needs have been met (17).

After conducting research at the Bandung Muhammadiyah Hospital with 60 respondents, it showed that there was a difference in thirst before and after being given the intervention using the *Wilcoxon test*. The average pretest value in the intervention group was 24.93 and posttest 19.00, with *p-value* 0.000 (<0.5). So it can be concluded that there is an effect of chewing ice cubes on reducing thirst in the intervention group. Meanwhile, for the control group, the average pretest score was 20.90 and posttest 20.93 with a *p-value* of 0.317 (> 0.05), which means that ice cube chewing therapy had no effect on reducing thirst in the control group. This research is in line with research conducted by Rosaulina (2021) regarding the effect of chewing ice cubes on reducing thirst. The pretest results were 5.74 (moderate thirst), and after intervention it was 2.94 (light thirst). This shows a decrease of 2.8 with a *p-value* of $0.000 < \alpha = 0.05$. Lina (2019) regarding the effect of chewing ice cubes on the thirst scale, the pretest results for the Thirst Scale were 6.40 and the average posttest score for the Thirst Scale was 4.86, there was a decrease in the thirst scale of 1.54, this shows that there is a significant influence of chewing ice cubes on reducing taste. thirsty with *p value* = 0.000 (< 0.05). other research that is similar to this research, namely research conducted by Basuki (2018) regarding sucking *Slimber Ice* on the intensity of thirst pre-intervention with an average of 6.00 (in the moderate thirst category), post-intervention with an average of 2.97 (in the light thirst category). there was a decrease in the intensity of thirst, the average was 3.03 with a significant *p-value* of 0.000 ($p < 0.05$).

Based on this, the researchers responded that chewing ice cubes can be used as an independent intervention to reduce thirst, because ice cubes have a cooling effect on the throat and freshness on the mouth, so they can hold back thirst longer than drinking plain/warm water. Apart from

that, ice cubes can make the mucosa of the mouth moist after the ice cubes melt, a dry mouth can trigger a feeling of thirst which causes fluid intake to increase, causing weight gain. Especially for patients who are active outside the home in hot weather, but this intervention should not be applied to patients who have a history of sore teeth when consuming ice, patients who have malignancies in the oral cavity and have a history of disease that recommends not consuming ice.

CONCLUSION

Based on the research that has been carried out and the conclusions obtained, the researcher formulates suggestions for It is hoped that ice cube chewing therapy will be an alternative way to reduce thirst by doing it regularly during dialysis sessions and outside of dialysis. It is hoped that the results of this research can help nurses carry out ice cube chewing interventions because they are equipped with existing SOPs. The results of this study can be basic data for further research regarding other strategies to reduce thirst in patients undergoing hemodialysis with more varied updates.

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