Changes in Saliva Acidity (pH) Using Low Sugar-Chewing Gum Therapy in Patients with Kidney failure Patients Who Have Done Hemodialysis in Hospital

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Abstract:

Back ground- Chronic renal failure is a progressive and irreversible renal function disorder where the body fails to maintain electrolyte fluid balance resulting in increased urea. Hemodialysis therapy is an appropriate action to replace the work of the kidneys, in these conditions the patient must undergo a fluid diet. This situation can cause a decrease in saliva production which can trigger the pH of saliva to become acidic, which can cause dry mouth until thrush occurs.

Objectives: To determine the effect of low sugar (xylitol)-chewing gum on changes in the saliva acidity (pH) in patients with chronic renal failure undergoing hemodialysis at the public hospital on April 20-May 3 2019.

Materials and methods: The design in this study is Quasi Experiment Design using Non Equivalent Control Group design. The population was all patients with chronic renal failure undergoing hemodialysis at the hospital as many as 40 active patients in April 2019.

Study design: The design of this study used the Quasy Experiment Design with a Non Equivalent Control Group design. The sampling technique used is Non Probability Sampling with the type of Consecutive Sampling with the number of respondents as many as 36 patients divided into 2 groups, namely the control group and the intervention group saliva was measured pre and post treatment.

Result: Independent t-test in the treatment of P-value <0.05 means that there is a change in the degree of saliva (pH) of saliva in the intervention grouplow sugar-chewing gum.

Discussion:This low-sugar gum can produce more saliva which can increase oral mucosa pH. Xylitol is sugar alcohol whose sweetness is the same as sucrose sugar and produces calories in the same amount as sucrose which is 4 cal / gt. Xylitol than non-xylitol is more suitable because sugar content contained in xylitol gum is lower.

Conclusion: This study concluded that low sugar-chewing gum affected the change in salivary acidity (pH) in patients with chronic renal failure undergoing hemodialysis. From the results of this study it is expected that nurses can apply nonpharmacological therapy to chew low-sugar gum which is useful for controlling fluid diet in patients with chronic renal failure undergoing hemodialysis.

Keywords: **kidney failure, hemodialysis, chewing gum, low sugar (xylitol), and degree of saliva acidity (pH)**

I. INTRODUCTION

Kidney failure is a serious problem in all countries, because the complexity and prevalence is increasing from year to year, including in Indonesia. Kidney failure is often found in people with heart disease. Besides this disease can also cause heart failure. This happens because of increased pressure on glomerulus blood vessels caused by reciprocal increases in heart pressure. The heart must work very hard to meet the body's needs, but the preload is too large. The risks of kidney failure include: diabetes, hypertension, kidney damage, cardiovascular disease, kidney structure disease, opportunistic detection of hematuria (Gansevoort et al, 2011; James et al., 2015).

Kidney failure is defined as kidney damage or glomerular filtration ratio of less than 60 ml per minute per 1.73 mt2. Kidney failure is usually experienced for 3 months or more depending on the cause. Some causes of kidney failure include: type 2 diabetes mellitus (50%), type 1 diabetes mellitus, hypertension, glomerulonephritis, neoplasms, chronic tubulointerstitial nephritis, etc. the process of kidney failure is divided into 3 categories: prerenal (reduced blood perfusion pressure to the kidney), intrinsic renal (due to glomerular, vascular or tubular damage), or postrenal (obstruction) (Webster et al, 2017; Aeddula et al, 2019; Lee, 2017).

The World Health Organization (WHO) said the growth of patients number with kidney failure in 2013 had increased by 50% in previous year. The incidence of kidney failure in world globally exceeds 500 million people and patients who have to go through life with hemodialysis a total of 1.5 million people. In Indonesia, kidney failure sufferers reach 17193 people. While the rate of kidney failure in East Java in 2014 was 3621 patients (Casey et al, 2014).

Kidney failure is a progressive and irreversible disorder of kidney function, the patient's body is unable to maintain metabolism and fails to maintain electrolyte fluid balance which results in blood ureum increasing (uremia). So patients

with kidney failure must undergo hemodialysis therapy during his life and must undergo liquid diet. In patients undergoing hemodialysis, fluid status in the body is regulated by reducing excess fluid by ultrafiltration and reducing sodium levels. So this can cause a person to become dehydrated (Lindley et al, 2011; Baillie et al, 2015).

In hemodialysis, excess fluid will be removed using an external filter or dializer which has a semipermeable membrane. Separation of the liquid is done by the opposite current gradient between the bloodstream and the liquid dializer. Metabolic waste products (urea and creatinine) diffuse in dialysate (NaCl, NaHCO3, acid concentrate and deionized water). The larger the particle the slower the rate of diffusion across the membrane (Macunluoglu et al, 2016; Tattersall et al, 2011).

Fluid restriction is very difficult for patients with kidney failure, because in normal conditions humans cannot last long without fluid intake (Potter & Perry, 2008). In these conditions the patient will experience several problems including a decrease in saliva production which can affect the decrease in the saliva acidity (pH) (Fitri. A M, 2013).

In fact, sufferers tend to break the fluid diet. Decreased salivary production is caused by strict fluid restriction so that thirst can occur. Increased discomfort in the oral cavity results in patients not being obedient to carry out fluid intake so as to increase weight gain.Patients with kidney failure will experience several problems if they are unable to maintain their fluid intake, sufferers will experience weight gain, edema, increased blood pressure, shortness of breath and heart problems. Excessive fluid will increase Intradialitic Weight Gain (IDWG). Addition of IDWG values that are too high can cause negative effects such as hypotension, muscle cramps, and shortness of breath (Picoli et al. 2017; Lim et al. 2019; Kalantar-Zadeh et al. 2015).

The degree of saliva acidity (pH) is an important factor that plays a role in the oral cavity, so that saliva can function properly, the composition and nature of saliva must be optimal balance in degrees of acidity. pH is strongly associated with some masticatory activities that occur in the oral cavity (Honarmand et al. 2017; Gautam et al. 2014). Decreased amount of saliva due to fluid restriction can cause discomfort in the oral cavity, pain, increased dental caries, oral infections, difficulty speaking and difficulty swallowing food.Decreased salivary production in patients with chronic renal failure leads to xerostomia and thirst which causes the sufferer to fulfill his thirst by breaking fluid diit as evidenced by the high non-compliance of fluid retriction by 3.4% -74% (Lopez et al. 2017; Khanum et al. 2017; Kaushik et al. 2013).

As for some actions that can be taken to stimulate increased saliva production including mechanical or chemical stimulation. Stimulation through mechanical factors can be done by chewing food or gum. Chemical stimuli such as sour, sweet, salty, bitter and spicy (Karami-Nogourani et al. 2011; Lorgulescu, 2009).

One of treating dry mouth is to chew so that it stimulates the salivary glands to work well. Some ways to overcome thirst due to decreased salivary production in patients undergoing hemodialysis include: Frozen Grapes, brushing teeth, rinse mouth with cold mouthwash (not swallowed) (Anna, 2016).

In this study, researchers chose the act of mechanical stimulation in the form of low-sugar gum (Xylitol). Low-sugar gum (xylitol) can produce more saliva and can increase the pH of the oral mucosa higher than non-xylitol gum so that it can be one way to treat dry mouth and reduce thirst (Oza et al, 2018).

Researchers have conducted a preliminary study in the Hemodialysis Room at a public hospital in 2017. The results of interviews conducted with nurses in January to September stated that as many as 295 patients had kidney failure. The total number of patients undergoing hemodialysis during April to September 2017 was 101 patients, but there were 40 active patients undergoing hemodialysis in the past month. The prevalence of xerostomia in patients undergoing hemodialysis is around 33-76%. While the incidence of xerostomia in patients undergoing hemodialysis in the hemodialysis room at the general hospital was 29 patients out of 36 patients. In addition, it is known that there is no non-pharmacological therapy in the provision of low-sugar gum in the Hemodialysis Room in a public hospital (Data of Medical Associates at Sakinah Hospital, Mojokerto, 2017).

So based on the background above, the writer would like to conduct research on the effect of low sugar-chewing gum on increasing the saliva acidity (pH) in kidney failure patients undergoing hemodialysis, because it can be easily done and can overcome complaints of dry mouth and thirst so as to overcome the lack of adhere to the patient for fluid diet.

The general objective of this study was to determine the effect of low sugar-chewing gum on increasing levels of salivary acidity (pH) in patients with chronic renal failure undergoing hemodialysis at public hospitals.

This research is expected to provide information about the quality of life of patients with chronic renal failure undergoing hemodialysis, provide alternative nonpharmacological therapies, and for further research development.

II. METHOD

The design in this study is Quasi Experiment Design using Non Equivalent Control Group design. Basically this design involves two groups or using a control group. So in this design there is a pre-test before it is given treatment and there is a post-test after it is given treatment. That way the treatment results can be known to be more accurate, because they can compare the results of interventions with similar control groups but are not given an intervention (Krishnan, 2019). In this research design, there was one intervention group, the "Low Sugar Chewing Gum" treatment group and one control group. In the measurements carried out by pre-test and post-

test. Measurements were made before being given treatment and after being given treatment to one intervention group 4 times (2 times on the first day, 2 times on the second day of the week) carried out for up to 2 weeks.

Researchers used this type of research to determine changes in salivary acidity (pH) levels in patients with kidney failure who underwent hemodialysis before and after Chewing Low-Sugar Chewing Gum in the Hospital.

In this study the population was all patients with chronic renal failure undergoing hemodialysis at the hospital as many as 40 active patients in April 2019, based on the RSI Sakinah Mojokerto Hospital Medical Record Report in the Hemodialysis Room in 2019 as many as 101 patients but only 40 were active.

The sample used in this study were some patients with kidney failure who underwent hemodialysis at the hospital. Samples need to meet the criteria, the determination of sample criteria is very helpful for researchers to reduce the bias of research results. Sample criteria can be divided into two, namely inclusion criteria and exclusion criteria. A total of 36 people, as a sample of 18 people low sugar-chewing gum and 18 people as a control group.

The sampling technique uses a consecutive sampling approach in which the selection of samples that meet the research criteria is included in the study until a number of samples are obtained, so that the required number of patients is met (Setia, 2016). Each patient with kidney failure who underwent hemodialysis and met the criteria of the researchers was included in the study until a certain time until the number of samples reached 36 people.

This research was carried out in the Hospital Hemodialysis Room, when the research will be carried out from April 20 to May 3 2019

The univariate analysis in this study was low sugar-chewing gum (independent variable) and changes in salivary acidity (pH) (dependent variable). Numerical respondent data are age, sex, education, length of HD, HD time span, water consumption, dry mouth complaints, and mouth problems

Test for normality using Shapirowilk. The level of statistical test results was 95% and the error rate was set at 5% (α = 0.05). Statistical test results obtained Pvalue> 0.05, it can be concluded that the pre-test and post-test results are normally distributed.

Statistical Test Results using paired t-test obtained the control group Pvalue = 037, while the intervention group Pvalue = 0.00 <α = 0.05, meaning that there is a significant difference to reduce the acidity (pH) of the respondent's Saliva in RSI SakinahMojokerto 2019.

III. RESULTS AND DISCUSSION

A. Respondent Distribution Tables

The following is a distribution table of respondents for kidney failure patients undergoing hemodialysis therapy.

1. Characteristics of Respondents by Gender

TABLE I

DISTRIBUTION of RESPONDENT CHARACTERISTICS by GENDER in HEMODIALYSIS ROOM (20 APRIL-3 MAY 2019)

Gender	Sample Group		Total	Percentage (%)
	Intervention Group	Control Group		
Female	8	7	15	41,7
Male	10	11	21	58,3
Total	18	18	36	100

2. Characteristics of Respondents by Age

TABLE II

DISTRIBUTION of RESPONDENT CHARACTERISTICS by AGE IN HEMODIALYSIS ROOM at SAKINAH MOJOKERTO HOSPITAL (APRIL 20 TO MAY 3 2019)

Variable	N	Min	Max	Mean	Std. Deviation
Age Intervention group	18	24	68	49,50	10,966
Age Control group	18	29	73	46,83	10,336

3. Characteristics of Respondents Based on Education

TABLE III

DISTRIBUTION of RESPONDENT CHARACTERISTICS BASED on EDUCATION in SPACE HEMODIALYSIS at GENERAL HOSPITAL (20 APRIL-3 MAY 2019)

Pendidikan Responden	Sample group		Total	Percentage (%)
	Intervention group	Control group		
Elementary school	5	6	11	30,6
Junior high school	8	5	13	36,1
Senior high school	3	5	8	22,1
Bachelor	2	2	4	11,1
Total	18	18	36	100,0

4. Characteristics of Respondents Based on the Length of Living HD

TABLE IV

DISTRIBUTION of RESPONDENT CHARACTERISTICS BASED on HEMODIALYSIS LENGTH in HEMODIALYSIS ROOM (20 APRIL-3 MAY 2019)

Variable	N	Min	Max	Mean	Std. Deviation
HD timeIntervention group	18	2,00	3,00	2,111	32338
HD time Control group	18	2,00	3,00	2,278	46089

5.Characteristics of Respondents Based on Hemodialysis Time Span

TABLE V

DISTRIBUTION of RESPONDENT CHARACTERISTICS BASED on HD TIME SPAN (20 APRIL-3 MAY 2019)

Sample group	Rentang waktu menjalani hemodialisa		Total	Percentage (%)
	Intervention group	Control group		
2 times/ week	13	16	29	80,6
3 times/ week	5	2	7	19,4
Total	18	18	36	100,0

6.Characteristics of Respondents Based on Daily Water Consumption

TABLE VI

DISTRIBUTION of RESPONDENT CHARACTERISTICS BASED on WATER CONSUMPTION PER DAY (20 APRIL-3 MAY 2019)

Sample group		Konsumsi Air Perday		Total	Percentage (%)
		Intervention group	Control group		
	>600 ml/ day	13	10	23	63,9
	<600 ml/day	5	8	13	36,1
Total		18	18	36	100,0

7.Characteristics of Respondents Based on Dry Mouth Complaints

TABLE VII

DISTRIBUTION of RESPONDENT CHARACTERISTICS BASED on COMPLAINTS of DRY MOUTH in the HEMODIALYSIS ROOM in GENERAL HOSPITAL (20 APRIL-3 MAY 2019)

Sample group		Keluhan Mulut Kering		Total	Percentage (%)
		Intervention group	Control group		
	Feel Dry mouth	15	14	29	80,6
	Don't feel dry mouth	3	4	7	19,4
Total		18	18	36	100,0

8. Characteristics of Respondents Based on Mouth Problems

TABLE VIII

DISTRIBUTION OF RESPONDENT CHARACTERISTICS BASED ON PROBLEMS IN THE MOUTH IN THE HEMODIALYSIS ROOM IN THE GENERAL HOSPITAL PERIOD 20 APRIL-3 MAY 2019

Sample group		Mouth problem		Total	Percentage (%)
		Intervention group	Control group		
	Dry Mouth	13	12	25	69,4
	Sprue	5	6	11	30,6
Total		18	18	36	100,0

B. Research Results

1.The degree of saliva acidity (pH) before and after chewing low sugar gum in the intervention group

TABLE IX

TEST RESULTS DESCRIPTION on the DEGREE of ACIDITY BEFORE and AFTER CHEWING GUM LOW SUGAR in TREATMENT GROUP at ROOM HEMODIALYSIS (20 APRIL TO 3 MAY 2019)

Variable	Mean	N	Std. Deviation	Std. Error Mean
Pre Intervention	5.1111	18	.40423	.09528
Post Intervention	6.8333	18	.24254	.05717

TABLE X

TEST RESULTS OF PAIRED T-TESTS on DEGREE of ACIDITY BEFORE and AFTER CHEWING LOW-SUGAR CHEWING GUM in INTERVENTION GROUP IN THE HEMODIALYSIS ROOM (20 APRIL-3 MAY 2019)

Variable	mean	Std. Deviation	t	Sig. (2-tailed)
Pre Intervention-Post Intervesi	1.722222	.35240	20.735	.000

2.Saliva Acid (pH) Degree Before and After Treatment in the Control Group

TABLE XI

DESCRIPTIVE TEST RESULTS ON THE DEGREE OF ACIDITY BEFORE AND AFTER CHEWING GUM LOW SUGAR IN THE CONTROL GROUP IN THE HEMODIALYSIS ROOM (20 APRIL-3 MAY 2019)

Variable	Mean	N	Std. Deviation	Std. Error Mean
Pre control	4.6806	18	.46814	.11034
Post control	4.5694	18	.45216	.10658

TABLE XII

PAIRED T-TEST RESULTS ON THE ACIDITY BEFORE AND AFTER LOW SUGAR-CHEWING GUM IN THE CONTROL GROUP IN THE HEMODIALYSIS ROOM (20 APRIL-3 MAY 2019)

Variable	Mean	Std. Deviation	t	Sig.(2-tailed)
Pre control – Post control	.11111	.28726	1.641	.119

3.Effects of Low Sugar Sugar Chewing on Changes in Salivary Degrees of Pre and After Acid in the Intervention and Control Groups

TABLE XIII

INDEPENDENT T-TESTRESULT ON RESPONDENTS WITH CHRONIC RENAL FAILURE IN THE INTERVENTION AND CONTROL GROUP IN THE HEMODIALYSIS ROOM (20 APRIL-3 MAY 2019)

Variable	t	Sig. (2-tailed)	Mean Difference
Control group	.778	.448	.27778
	.837	.415	.30556
Interventi on Group	.121	.905	.02778
	5.747	.000	.44444

C. Discussion

1.The degree of saliva acidity (pH) before and after chewing low sugar gum in the intervention group

The results of this study indicate that low sugar-chewing gum can change the saliva acidity (pH), in this case shows that there is a difference between before and after chewing low-sugar gum. The administration of low sugar gum aims to change the value of the saliva acidity (pH) to be neutral. Low sugar-chewing gum is one of the mechanical stimuli carried out to stimulate increased saliva. This low-sugar gum can produce more saliva so that it can change the level of acidity (Buzalaf et al. 2012).

Chewing sugar lace gum can increase the pH of saliva. The xylitol substances in chewing gum cannot be fermented by oral Streptococus bacteria and other microorganisms so the bacteria do not secrete acids that can reduce salivary pH.Xyitol can also neutralize low salivary pH with beneficial effects on oral health (Nayak et al. 2014).

The results of observations during the study showed that the condition of the teeth of chronic renal failure patients undergoing hemodialysis experienced dental caries due to acidic oral conditions, average salivary pH 5. The administration of gum containing xylitol has the effect of increasing the concentration of bicarbonate, phosphate, and calcium. This change can prevent a decrease in salivary pH, and xylitol provides a fresh and cool sensation due to the high endhotermic heat solution it provides. Another advantageous property of xylitol is that the fermentation by dental plaque microbes takes place slower than sucrose fermentation, resulting in very little acidic product. The work of xylitol here supports the taking of acid base in the mouth so that the process of tooth demineralization can be prevented (Chavan et al. 2015).

Low sugar-chewing gum can increase salivary secretion, especially in patients with kidney failure undergoing hemodialysis. There is a change in the degree of saliva acidity (pH) after chewing low-sugar gum. Low sugar-chewing gum is a method that can increase the degree of saliva acidity (pH).

2. Saliva Acid (pH) Degree Before and After Intervention in the Control Group Without Chewing Low Sugar Gum

Based on table IX above shows the value of the salivation degree (pH) of the saliva in the control group without the intervention given chewing low sugar gum in pre test with a mean value of 4,6806 with a standard deviation of 48814 while the results of the post test mean 4.5694 with a standard deviation of 45216 So that in these circumstances it can be seen that there is no change or tends to decrease with a difference of 0.1112. This is because the control group was not chewed with low-sugar gum, so there was no mechanical stimulation that could produce more salivary secretions.

Age factors can affect saliva production experienced by hemodialysis patients. Age can affect the flow rate of unstimulated saliva saliva will be lower when healthy individuals aged 65 to 83 years compared with individuals aged 18-35 years. The need for fluid intake in elderly decreases with aging process. This is caused by changes in body composition, which decreases fat cells which causes a decrease in fluid requirements to carry out bodily functions. The relationship between age and decreased thirst showed a relationship between age, indicating that the older respondent's age the greater the perceived thirst increase (Bruzda-Zwiech et al. 2014; Bruzda-Zwiech et al. 2018).

The increasing age of an older person has an impact on functioning decline of the system in body so that the defense against a disease also decreases (Tri et al. 2016). Based on study result in table II it is known that patients average with kidney failure undergoing hemodialysis is above 49 years. So the study result are in line with the theory of Smelzer et al (2008) in patients with kidney failure increased in adulthood because the course of the disease that is chronic and progressive. Increasing age simultaneously renal function and urinary tract and tubular function including the ability of reabsorbsi will be reduced. After the age of 40 years the glomerular filtration rate will progressively decrease <50% from normal to 70 years (Staples & Wong, 2010).

In addition to the age of kidney failure sufferers will experience a decrease in output. To maintain fluid balance in patients with kidney failure, fluid intake is limited. Fluid restriction will cause decreased salivary flow and saliva will become thick. Besides complaints of dry mouth are also a

major factor in the lack of saliva production (Villa et al. 2014). Study result indicate that respondents experienced complaints dry mouth as many as 14 out of 18 respondents as many as 80.6% of patients suffering from kidney failure who underwent hemodialysis stated that experiencing dry mouth, this is caused by fluid restrictions that must be lived by the respondent and events this is increased when the respondent is not treated with chewing gum which can affect the decrease in saliva acidity (pH) degree.

Study result shows respondents in control group salivary acidity (pH) tended to decrease. This happens because there is no change in acidity level caused by mechanical stimulation from low sugar-chewing gum process that occurs inlips and tongue movement, the secretory cells in submandibular glands work which can increase salivary secretion and increase saliva which causes watery saliva to runny and the bicarbonate content can increase with the saliva pH being neutral.

3. Effects of Low Sugar Chewing Gum on Changes in Salivary Degrees (pH) in Intervention and Control Groups

From statistical test,results normality test can be concluded that all P_{value}values are normally distributed, that is P_{value}> 0.05. So in the next conclusion, researcher uses paired t-test and independent t-test. In paired t-test the results showed there was an influence between pre and post intervention in intervention group chewing low-sugar chewing gum value of <0.05 which means that there was a significant effect on changes in saliva saliva acidity (pH) between and before the intervention of chewing gum low in sugar. It is known the number of respondents 18 after being given 4 times the treatment of low sugar-chewing gum experienced a change in the degree of saliva acidity (pH).

Meanwhile paired t-test results in control group showed no influence between pre and post intervention with P_{value} = 415 or P_{value}> 0.05, which means there was no significant effect on changes in salivary acidity (pH) levels in the control group. It is known that as many as 18 respondents did not experience significant changes in changes in the degree of saliva acidity (pH).

Based on independent t-test, the results showed that there was an effect of low sugar-chewing gum on salivary acidity (pH) change in intervention group with P_{value}= 0,000 or P_{value}<0.05 which showed that there were significant changes in the intervention group . But it is different from the control group with P_{value}= 415 or P_{value}=> 0.05 which shows no significant change.

In table I it can be seen that the majority of male respondents are 21 respondents (58.3%) and female respondents are 15 respondents (41.7%). Analysis of sex characteristics result shows that most of respondents were male (58.3%). The results of research conducted by Gan, et al (2003) found that out of 34 respondents 20 of them were male. Stating that the tendency of men to pay less attention to self-care than women, while women pay more attention to themselves totally, including in health care for themselves. So this theory is in accordance with the results of the study that the most respondents in this study were male respondents.

Patients with kidney failure who undergo hemodialysis therapy, saliva flow rate below normal is caused by various factors including restrictions on fluid intake so as not to burden the kidney's work as well as changes in salivary pH that occur in patients with kidney failure undergoing hemodialysis (Karen M. J, 2012 in Aryani A, A 2015).

The results of this study indicate that fluid restriction is often violated by patients with kidney failure undergoing hemodialysis therapy, which can be shown in table VI that 23 respondents consume water> 600ml / day with a percentage value of 63.9%. Fluid restriction is done aimed at preventing edema and cardiovascular complications (Pellicori et al. 2015). Considering that kidney failure sufferers experience progressive and irreversible kidney function disorder where the body's ability to maintain metabolism and fluid balance, electrolytes cause uremia (Nazar, 2013).

This fluid restriction which can cause sufferers to experience complaints of dry mouth. Can be shown from study result in table VII as many as 29 respondents with a percentage value of 80.6% experiencing dry mouth complaints. This is caused by fluid restriction, the most important factor that causes a decrease in salivary secretion because if the body fluids are reduced up to 8% then the salivary flow velocity decreases to zero, this decrease in salivary flow velocity can stimulate dry mouth sensation (Alsakran, 2014).

The behavior of not complying with liquid water can be influenced by the low level of education of the respondents, shown in table III that respondents education levelin Hemodialysis Room public hospitals shows that education level is relatively low, with the highest percentage at junior high level of 36.1%, SD 30.6%, SMA 22.1%, and Higher Education only 11.1%. This shows that respondents lack knowledge of fluid restrictions that must be obeyed, which is shown in the behavior of not complying with fluid diits such as consuming liquids> 600ml / day.

This low-sugar gum can produce more saliva which can increase oral mucosapH. Xylitol is sugar alcohol whose sweetness is the same as sucrose sugar and produces calories in the same amount as sucrose which is 4 cal / gt. Sugar alcohol type gum can actually be used to increase saliva production, however, xylitol is more suitable because sugar content contained in xylitol gum is lower. Chewing gum containing xylitol can increase the quantity of saliva and increasing the pH of oral mucosa higher than non-xylitol gum (Putu et al., 2014).

This can be evidenced in research results that is known low sugar-chewing gum can increase saliva acidity (pH) degree can be shown in description test results in treatment group.Pre-intervention showed an average of 5.1111 and post-intervention result showed 6 ,8333, so there is a change in

saliva acidity (pH) degree 1.7222. It can be shown that there is a 4.10 P_{value}= <0.05 table, so there is a significant difference between pre-intervention and post-intervention.

Chewing gum can stimulate the taste and increase salivary flow. When chewing gum production process, saliva can increase and cause changes in saliva composition which is effect of low sugar-chewing gum (xylitol) on increasing salivary secretion which will increase saliva production (Karami et al. 2012).

Chewing low sugar gum is a stimulus through mechanical factors, chewing gum can stimulate taste and can increase salivary flow. Saliva chewing gum production process can increase and cause changes in saliva composition. The effect of giving low sugar gum to salivary secretion in hemodialysis patients in controlling interdialitic weight gain (idwg) at Malang Hospital, East Java, the result is Pvalue = 0,000 <α = 0.05 which means that it shows a significant difference.

Based on the above explanation reinforced by related researchers it can be concluded that low sugar-chewing gum can change the degree of saliva (pH) in patients with chronic renal failure undergoing hemodialysis who experience acidity (pH) of acid saliva. Giving low-sugar gum is by means of the patient must chew gum peremen as much as 2 points and then chew for 5 minutes. So that administration can stimulate saliva from the movement of the jaw which is mechanically moving and can increase the amount of saliva more, then it can affect saliva acidity (pH). Tasting and mastication reactions in food will produce 90% saliva. Each gland to the total salivary volume contributes 30% from the paratoid gland, 60% from the submandibular gland, 5% from the sublingual and 5% from the minor gland (Baliga et al. 2013). In this process saliva production can increase which can affect the degree of saliva acidity (pH).

Researchers want to show that administration of low-sugar gum is very influential in changing the degree of saliva acidity (pH) compared to respondents who did not chew low-sugar gum. The effect of giving low sugar gum makes the respondent feel his mouth fresher and does not feel bitter on the tongue while running the liquid diet. In addition, there is also a movement in the mouth that is continuously chewing for 5 minutes containing xylitol making saliva secretion thinner so that it affects the changes in saliva.

IV. CONCLUSION

The administration of xylitol / low sugar gum was very influential in decreasing the salivary acidity (pH) level compared to the control group. This is evidenced by the significant influence in the intervention group chewing low-sugar chewing gum before and after with a Pvalue = 0.00 α <0.005. It is hoped that this nonpharmacological therapy can become a nursing intervention for xerostomia in patients with kidney failure undergoing hemodialysis at a public hospital.

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