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INVESTIGATING THE IMPACT OF SUGAR FREE GUM ON THE THIRST AND DRY MOUTH OF PATIENTS UNDERGOING HEMODIALYSIS

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ABSTRACT: Introduction: Thirst and dry mouth are some of the most commonly observed symptoms in patients undergoing hemodialysis which can affect the quality of life of these patients. Finding uncomplicated, non-prescriptive solutions to reduce the dry mouth and irritation of these patients seems quite crucial. Since chewing sugar free gum is likely to alleviate these complications through increasing the flow of saliva, the present study was conducted to investigate the impact of sugar free gum on the thirst and dry mouth of patients undergoing hemodialysis. **Materials and method:** The present quasi-experimental study was performed on 50 patients undergoing hemodialysis who met inclusion criteria. Patients were randomly divided into two groups of sugar free gum chewing and control; the thirst and dry mouth of the patients were evaluated by means of a dialysis thirst quotient instrument (DTI, dry mouth measurement tools (XI), VAS). Patients of intervention group were told to chew sugar free gum for one week when they felt thirsty; however, the control group did not receive any intervention. The thirst and dry mouth of the patients were again measured and analyzed using SPSS version 22 after the intervention. **Findings:** According to the results of the present study, there turned out to be a significant difference between thirst and dry mouth and chewing sugar free gum before and after the intervention ($P < 0.05$). However, the thirst and dry mouth of the patients before and after the intervention did not show any significant difference in the control group ($P > 0.05$). Also, there was no significant difference in the comparison of thirst and dry mouth between the two groups before the intervention ($P > 0.05$); while this difference turned out to be significant after the intervention ($P < 0.05$). **Conclusion:** According to the results of this study, which showed the effect of sugar-free gum in reducing the thirst and dry mouth of hemodialysis patients, and given the low cost and availability of this intervention and that no specific complication was identified for them, therefore, it is possible to use this method in various patients who suffer from dry mouth and thirst for various reasons, including patients undergoing hemodialysis.

INTRODUCTION: Chronic renal failure (CRF) is a progressive and irreversible degeneration of the body, in which the body's ability to keep fuel and the balance of water and electrolyte is eliminated. Although the most commonly used treatment in renal failure in the world is hemodialysis, these patients have a high mortality rate [1].

Both chronic kidney disease and its treatment can cause tissue and systemic disorders and directly affect the flow, concentration and salivary composition [2]. Due to kidney failure in water and sodium excretion [3], urine volume decreases [4], and excess fluid intake leads to edema and overweight in hemodialysis patients [5].

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Recommended guidelines for reducing the intake of fluids include administration of renin converting inhibitors to angiotensin, increased dialysis, sodium intake and reduced protein intake and fluid restriction [6]. Extreme thirst caused by fluid restriction and negative symptoms associated with thirst can lead to a lack of compliance with this regimen and, consequently, an increase in weight between two dialysis [7]. Dry mouth is a common disorder afflicting approximately 10% of people over 50 years of age and 35% of those over 65 years of age. More than 30% of dialysis patients complain of uncontrollable thirst. The triggers for thirst include dry mouth and esophagus, increased angiotensin-2 levels, increased sodium levels, increased anti-urogenital hormone, and osmolality of the plasma [8].

Thirst and oral hiccups are one of the most important and commonly observed symptoms in patients undergoing hemodialysis. 68 - 86% of patients undergoing hemodialysis express an experience of thirst or dry mouth [9], which can affect the quality of life and lead to discomfort and distress in hemodialysis patients. Also, thirst and dry mouth can lead to overweight between two dialyses [10]. There are many ways, mostly supportive, to treat dry mouth and thirst. For example, to relieve the complications and discomfort caused by dry mouth, you can soak the water throughout the day or place ice in the mouth to slowly water. There exist other treatments such as the use of artificial saliva, the administration of parasympathetic mimic drugs, such as pilocarpine hydrochloride, mouthwash, and using non-alcoholic drinks [11].

Children who use sugar-free gum show more saliva than their counterparts. Chewing sugar free gum has become considerably important due to the stimulation of salivary glands, mechanical cleansing of teeth and antimicrobial effects [12]; it also increases the flow of saliva and improves oral dryness. Chewing sugar-free gum stimulate salivary glands 10 to 12 times more than other kinds of gum [13]. Based on the results of a study conducted on cancer patients, chewing gum increased saliva flow and improved dry mouth resulting from radiotherapy. Slicing candy also led to an increase in saliva flow rate by 17 times and it is generally recommended to improve the salivation of the patients [14]. Patients with head and neck cancer undergoing radiotherapy suffer from a decrease in the flow of saliva and dry mouth, improved simply by sucking candy. Since the results of former studies showed the inefficacy of various methods, such as using ice chip, in reducing the intensity of thirst and fluid intake in hemodialysis patients and using sugar-free gum turned out to be an uncomplicated and unproblematic method, the present study was conducted to investigate the impact of sugar free gum on the thirst and dry mouth of patients undergoing hemodialysis in Zabol city.

MATERIALS AND METHODS: The present quasi-experimental study was conducted to investigate the impact of sugar free gum on the thirst and dry mouth of patients undergoing hemodialysis in Zabol city. The sample size was determined to be 50 subjects, using the Cochran formula and based on the study of Mazlum *et al*., [15]. Then, patients who met inclusion criteria were randomly divided into two groups of sugar free gum chewing and control, each including 20 subjects. Aging between 18 to 65 years, being under hemodialysis treatment for a minimum of 6 months and a maximum of 8 years (2 or 3 times each week, each time for 3 to 4 hours), the desire to chew gum, and lack of clear mental disorder and cognitive impairment and emotional mood that prevent effective communication were the inclusion criteria; the thirst and dry mouth of the patients were evaluated by means of a dialysis thirst quotient instrument (DTI, dry mouth measurement tools (XI), VAS) and demographic information questionnaire. Ultimately, the collected was analyzed through descriptive and inferential statistics including Wilcoxon and Kruskal Wallis tests and SPSS version 22.

Findings: The mean age of patients in the chewing gum group was 52.17 and 53.07 years in the control group in the present study. In the chewing gum group, 60% of the research units were female and 40% were men. In the control group, 85% of the samples were women and 15% were men. The range of changes for the first dialysis history was between 1 and 11 years. The lowest number of dialysis per week was 2 times and the highest was 3 times a week.

According to the results of Wilcoxon test analysis, there was statistically significant difference in terms of the duration of thirst of the patients of the chewing gum group before and after the intervention (P = 0.001); however, this difference did not turn out to be significant in the control group (P = 0.17). The mean and standard deviation of the duration of the thirst period in both groups was compared before intervention and after intervention using Kruskal-Wallis test. The results showed that there was no significant difference between the two groups before the intervention (P = 0.62). But the results showed a significant difference between the mean duration of thirst in the two groups after the intervention (P = 0.001). Based on the mean and standard deviation obtained for each group, it can be concluded that the duration of thirst in the gum group is less than the control group; this signifies the effect of sugar-free chewing on reducing the duration of thirst for patients **Table 1**.

TABLE 1: COMPARISON OF MEAN AND STANDARD DEVIATION OF THE DURATION OF THIRST PERIOD IN EACH INDIVIDUAL GROUP BEFORE AND AFTER THE INTERVENTION AND COMPARISON OF MEAN AND STANDARD DEVIATION OF THIRST DURATION IN BOTH GROUPS, BEFORE AND AFTER INTERVENTION

Variable	Group	Before intervention	After intervention	P-value
		Mean ± SD	Mean ± SD	
Duration of thirst time	Gum chewing	20.18 ± 4.04	2.18 ± 11.01	0.001
	Control	8.03 ± 21.08	6.41 ± 21.19	0.17
P-value		0.62	0.001	-

According to the results of Wilcoxon test analysis, there was statistically significant difference in terms of dry mouth of the patients of the chewing gum group before and after the intervention (P = 0.001); however, this difference did not turn out to be significant in the control group (P = 0.44). Mean and standard deviation of dry mouth of patients were compared using Kruskal-Wallis test before and after the intervention. The results showed that there was no significant difference between the two groups before the intervention (P = 0.72). But the results after the intervention showed a significant difference between the mean dry mouth of patients (P = 0.001). Regarding the mean and standard deviation obtained for each group, it can be concluded that the dry mouth has decreased significantly in sugar-free gum chewing group **Table 2**.

TABLE 2: COMPARISON OF MEAN AND STANDARD DEVIATION OF THE DRY MOUTH IN EACH INDIVIDUAL GROUP BEFORE AND AFTER THE INTERVENTION AND COMPARISON OF MEAN AND STANDARD DEVIATION OF THIRST DURATION IN BOTH GROUPS, BEFORE AND AFTER INTERVENTION

Variable	Group	Before intervention	After intervention	P-value
		Mean ± SD	Mean ± SD	
Dry mouth	Gum chewing	9.21 ± 45.12	8.12 ± 20.18	0.001
	Control	6.78 ± 42.82	7.32 ± 46.61	0.44
P-value		0.72	0.001	-

Another index which was analyzed in the present study was the intensity of thirst. Based on the results, there was a significant difference in terms of the severity of thirst in patients of the gum chewing group before and after the intervention (P = 0.02); however, this difference did not turn out to be significant in the control group (P = 0.72). Mean and standard deviation of thirst intensity were compared before and after the intervention using Kruskal-Wallis test in two groups and the results showed that there was no significant difference between the two groups before the intervention (P = 0.58); however, the results after the intervention showed a significant difference between the average thirst intensity of patients (P = 0.02). Regarding the mean and standard deviation obtained for each group, it can be concluded that the intensity of thirst has decreased significantly in sugar-free gum chewing group **Table 3**.

DISCUSSION: The results of the present study showed that the mean decrease in duration and severity of thirst and dry mouth in gum chewing group group was significantly higher than that of the control group, implying that sugar free gum has a significant effect on thirst and dry mouth of the

patients. According to Dr. Azarbabadi *et al*., study (2007), which compared the effect of sugar-free chewing bicarbonate and non-sugared gum on dry mouth and the flow of saliva, both types of chewing gum lead to increased saliva flow and reduced thirst [16]. Based on the results of Maryam Karami Norgorani study (2010), which compared the effect of regular gum with saliva-specific chewing gum, although both types of chewing gum can greatly increase the flow of saliva, using saliva-specific gum can increase the saliva flow by a rate of 12 times [16].

TABLE 3: COMPARISON OF MEAN AND STANDARD DEVIATION OF THE INTENSITY OF THIRST IN EACH INDIVIDUAL GROUP BEFORE AND AFTER THE INTERVENTION AND COMPARISON OF MEAN AND STANDARD DEVIATION OF THIRST DURATION IN BOTH GROUPS, BEFORE AND AFTER INTERVENTION

Variable	Group	Before intervention	After intervention	P-value
		Mean ± SD	Mean ± SD	
Thirst intensity	Gum chewing	22.17 ± 78.24	12.02 ± 43.12	0.02
	Control	14.34 ± 74.31	12.18 ± 76.04	0.72
P-value		0.58	0.02	-

The results of these two studies are consistent with the current study, with regard to confirmation of the effect of non-sugar chewing gum on increasing salivary flow and consequently reducing the dryness and thirst of the mouth. Jang *et al*., in 2013, conducted a study on hemodialysis patients; they found out that thirst and dry mouth are common in patients undergoing hemodialysis, and chewing gum can help reduce thirst and dry mouth [10], which is also consistent with the findings of the present study. Kumar also concluded in 2013 that chewing sugar-free gum in children could lead to an increase in saliva flow and a reduction in acidity, followed by a reduction in thirst and preventing tooth decay [12]. The results of all these studies are consistent with the results of the present study.

Other studies have also been used to reduce thirst and stomach pain in patients. In a study conducted on patients with thyroid carcinoma, it was found that sucking candy can lead to an increase in the flow of saliva and an increase in blood flow to the salivary glands, thereby reducing the damage of salivary glands and oral dryness caused by radiation therapy [17]. However, considering that the periodontal condition of patients undergoing hemodialysis is weak and worsens with the prolongation of dialysis [18], it is difficult to use hard candy for dialysis patients.

Another study, conducted by Yang in 2010, found that acupressure can lead to patients' thirst [20]. Given that acupressure requires training for patients to properly run this method, it takes time to use it; so, there is some limit to the use of chewing gum. Also, Mazloum's study on self-healing effects of ice chip on the reduction of the intensity of thirst of hemodialysis patients showed that the use of ice chips does not have an effect on the thirst of the patients.

To manage dry mouth and reduce salivary gland damage, patients use amphotericin and pilocarpine, which are believed to have severe and varied complications [19]. According to the results of this study, the effect of chewing sugar-free gum on the reduction of thirst and dry mouth in patients with hemodialysis is experimentally approved and this method can be used to remove these disorders. The results of this study have high clinical significance in nursing care, because control and treatment of dry mouth and thirst in patients undergoing hemodialysis without medication is considered an important health care target.

CONCLUSION: According to the results of this study and given the low cost and availability of this intervention, hemodialysis patients and other patients suffering from these complications may be advised to use sugar-free chewing gum.

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