



EFFECTIVENESS OF THIRST INTERVENTION BUNDLE IN TERMS OF THIRST INTENSITY, XEROSTOMIA AND INTERDIALYTIC WEIGHT GAIN AMONG PATIENTS WITH CKD UNDERGOING HEMODIALYSIS

Nursing

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ABSTRACT

Introduction: Kidney failure resulting from CKD is prevented via dialysis or transplantation. More than 1 million people in the world, approximate 120,000 patients in India with CKD continue to live through hemodialysis. Although hemodialysis is an effective therapeutic method for these patients but it has acute and unpleasant effect like thirst distress that leads to xerostomia and ultimately increased intra-dialytic weight gain.

Method: Quantitative Research Approach was used. Quasi Experimental Time Series Design with two post-test observations was employed. The conceptual framework of this study was based on Human Response Model. The study was conducted at Dialysis Unit of ILBS on 60 CKD patients who were undergoing at least three cycles of hemodialysis per week, divided into experimental and Comparison group based on their hemodialysis days. Visual Analogue Scale for thirst was used as a screening tool to select the hemodialysis patients under the study. Data was collected using standardized and structured questionnaires after establishing the validity and reliability. Statistical analysis was done on SPSS Ver 22.0, using the descriptive and inferential statistics.

Results: showed that majority of the participants in both the groups had severe thirst at baseline. Nearly half (E- 46.6%, C- 43.3%) of the participants were 36-50 years of age; more than half (E- 63.3%, C- 66.6%) were males. Study groups were found homogenous in terms of baseline Thirst Intensity, Socio-demographic and clinical variables. The mean difference in Dialysis Thirst Inventory and Xerostomia Inventory Scores was found highly significant between the groups both over time ($p < 0.001$) and across the groups with time ($p < 0.001$). Spearman's correlation between Thirst Intensity and Xerostomia ($r = 0.931$, $p < 0.001$); Thirst Intensity and IDWG ($r = 0.354$, $p = 0.005$); Xerostomia and IDWG ($r = 0.343$, $p = 0.007$) in the experimental group was also found significant.

Conclusion: The Thirst Intervention Bundle was significantly effective in decreasing the Thirst Intensity and Xerostomia of CKD patients undergoing hemodialysis.

KEYWORDS

Hemodialysis; Thirst Intensity; Xerostomia; IDWG; Thirst Intervention Bundle

INTRODUCTION

The burden of the CKD is increasingly growing across the world. Around 8-16 percent of people had been diagnosed with CKD worldwide. CKD has seen a 30 per cent rise in the incidence of CKD in the past decade as the 14th leading cause of death worldwide (WHO, 2016). In India, CKD prevalence ranges from 13-17.5 percent. One in every ten individuals had some form of CKD (Li *et al.*, 2011; Varma, Raman, Ramakrishnan, Singh & Varma, 2010).

Early detection is the safest cure for CKD, as the disease can be slowed or halted. However, CKD development to an advanced stage will eventually lead to kidney failure that is the end-stage kidney disease (ESKD) which can be treated by Kidney Transplant. Until the kidney transplant takes place, the individual are advised to undergo the renal replacement therapy (National Kidney Foundation, 2016; Dialysis Statistics, 2018). Among the different methods of Renal Replacement Therapy, the most common type is hemodialysis. An approximate 120,000 patients in India are on Hemodialysis (Varughese & Abraham, 2018).

Although hemodialysis is an effective therapeutic procedure for CKD patients, it has acute and adverse consequences. Major hemodialysis-related issues affect all patients on hemodialysis. The most common haemodialysis-related problems are thirst and xerostomia (Rathinasamy *et al.*, 2015; Bots *et al.*, 2004). Studies also shown that 86 per cent of patients with chronic haemodialysis complained of increased thirst. (Giovannetti *et al.*, 1994). Xerostomia is a subjective dry mouth sensation. Prevalence of xerostomia in older population range from 10 percent to 38 percent approximately. (Thomson *et al.*, 1999). IDWG is an observable measure of fluid-restricted diet compliance used in the dialysis program to make decisions about how much fluid is collected during a dialysis session. A strong association between thirst, xerostomia, and IDWG in HD patients has been found in some studies. Hemodialysis patients may suffer from fluid accumulation in the body if they do not pay adequate attention to the amount of liquid intake, which could lead to various complications such as hypertension, acute pulmonary edema, congestive heart failure (Dehghanmehr, 1996).

Literature demonstrates a wide variety of thirst control and xerostomia prevention techniques, including minimizing the consumption of salt, using ice chips, chewing sugarless chewing gum, sucking sugar-free candies. Stimulation of the salivary glands by a sugarless chewing gum is 10 to 12 times higher (Jacob, 2004; Dantas, 2015; Zhang, 2013). Sucking candy contributes to a 17-fold increase in saliva flow (Kaae, Stenfeldt, Eriksen, 2016; Mansouri, 2018). Various studies also found that using sugar free chewing gum and sucking ice cubes and sugar-free candies helps in decreasing the thirst intensity and xerostomia (Dehghanmehr, Piri, Roohi, Nooraeeen & Salarzaei, 2017; Bots, 2005; Fan, Zhang, Luo & Niu 2013; Sacrias, Rathinasamy, Elavally & Arjunan, 2015).

Therefore, there is a need for Evidence Based Nursing practices in the form of Thirst Intervention Bundle that will help the CKD patients undergoing hemodialysis for reducing the thirst intensity as well as xerostomia and ultimately the IDWG.

MATERIAL AND METHODS

In this study, the researcher aimed at determining the effectiveness of Thirst Intervention Bundle in terms of Thirst Intensity, Xerostomia and Interdialytic Weight Gain among patients with CKD undergoing hemodialysis. A Quantitative Research approach was opted and a Quasi-Experimental Time Series design was employed in the study. Based on the previously done studies the sample size was calculated as sixty (Venkat, 2006). A sample of 60 CKD patients undergoing hemodialysis at Dialysis Unit of Institute of Liver and Biliary Sciences, New Delhi meeting the designated sampling criteria were included in the study. These patients were allocated into experimental and Comparison group based on their days of hemodialysis by using Purposive Sampling Technique. Participants who were coming on Wednesday, Friday and Monday they were included in experimental group and participants who were coming on Thursday, Saturday and Tuesday were included in comparison group. Wednesday was the first day of experimental group and Thursday for comparison group.

Both groups had undergone a pre-test on the first day of their enrolment in the study followed by introduction of Thirst Intervention Bundle in

the Experimental group and then two post- test were done on the day three and day six. The study included patients who were willing to participate, undergoing at least three cycles of hemodialysis per week, aged between 18-65 years and who had accessibility to refrigerator. Patients who had a score of zero on Visual Analogue Scale for thirst, cognitive dysfunctions, hemodynamic instability, oral surgeries/ lesions/sores and who were already using any of the component of Thirst Intervention Bundle were excluded from the study. The independent variable was Thirst Intervention Bundle, the dependent variables were Thirst Intensity, Xerostomia and Inter dialytic weight gain.

The study tools had five parts i.e. Visual Analogue Scale for thirst used as a screening tool to select the hemodialysis patients under the study, Demographic and Clinical Variables to collect the baseline data, Xerostomia Inventory (XI) for measuring the pre test and post test xerostomia and Dialysis Thirst Inventory (DTI) for measuring the pre test and post test thirst intensity. Tools used in this study were validated by seven experts from different fields such as Medical Surgical Nursing, Senior Residents and Associate Professor of Nephrology department and had the index of validity more than 0.78. Test retest reliability value of Visual Analogue Scale for thirst was 1. The parallel form reliability of Xerostomia Inventory with Oral Health Assessment Tool was 0.79 and Dialysis Thirst Inventory with Thirst Distress Scale was 0.83.

As a part of Interventions, An Instruction Card of Thirst Intervention Bundle was designed with a purpose to reduce the thirst intensity and xerostomia of CKD patients undergoing hemodialysis. Components of Thirst Intervention Bundle contained sucking of ice cubes of five ml each with a maximum allowance of five cubes per day. Mouth gargles with 100 ml of plain cold water for five minutes as desired throughout the day. Chewing of one piece of gum gently as desired throughout the day. Use of sugar free candies, as desired throughout the day. Thirst Intervention Bundle was also validated by seven experts. By using an Instruction Card, the participants of Experimental group were instructed to use any of the components as per their preferences whenever they feel thirsty just after the completion of pre test on the same day. The participants were instructed to maintain the record of the components of Thirst Intervention Bundle used by them in the diary given by principal investigator.

Ethical Consideration: The Institution Review Board clearance was obtained by two processes, Scientific Review Committee (SRC) and Ethics Committee of College of Nursing (CONEC), ILBS, New Delhi. The approval was granted by letter no F15 (2/2.25)/2017/HO (M)/ILBS. Patient's information Sheet was given and an informed written consent was obtained from the patients.

After the tryout of tool and Thirst Intervention Bundle on seven CKD patients who were undergoing hemodialysis, a Pilot study was conducted on six CKD patients undergoing hemodialysis who were admitted in the Nephrology ward of ILBS from 26/08/2019 to 06/09/2019 and it was ensured to exclude these patients from the main study. The main study was conducted in September 2019 to October 2019. The data collection took around 20-30 minutes per participant. Measurement of Weight was done using calibrated instruments, checked constantly on daily basis.

STATISTICAL ANALYSIS

Data obtained was analysed with SPSS Version 22.0 using descriptive statistics such as frequency and percentage and inferential statistics such as Mean, Standard Deviation, Pearson correlation coefficient, one way ANOVA and Repeated Measure ANOVA.

RESULTS

Baseline thirst intensity of hemodialysis patients: In the experimental group, majority (93.24%) of the participants were having severe thirst and 6.6 percent were having moderate thirst. In the comparison group, majority (86.58%) of the participants were having severe thirst while 10 percent were having moderate thirst whereas 3.3 percent were having mild thirst.

Fisher's exact test was computed ($f=1.274$) for thirst intensity depicted that two groups didn't show any statistical difference ($p=0.529$) in terms of their thirst intensity which clearly stated that both the groups were homogeneous and comparable at baseline.

Socio-Demographics of Patient: The data related to patient's socio-demographic variables are given in table 1. Chi square and Fisher exact test computed for the socio demographic variables which clearly stated that both groups were homogeneous and comparable at baseline.

Table 1 Frequency and Percentage Distribution of the experimental and Comparison group based on the selected socio-demographic variables

n ₁ +n ₂ =30+30					
Socio Demographic variables	Experimental group (n ₁) (%)	Comparison group (n ₂) (%)	χ^2/t	df	p value
Age Groups (in years)					
18-35	03(10.0)	05(16.7)	0.577	59	0.749
36-50	14 (46.7)	13(43.3)			
51- 65	13(43.3)	12(40.0)			
Gender					
Male	19(63.3)	20(66.7)	0.787	59	0.073
Female	11 (36.7)	10(33.3)			
Marital status					
Married	28(93.3)	25(83.3)	3.292	59	0.193
Unmarried	02 (06.7)	02(06.7)			
Widow/Widower	00 (00.0)	03(10.0)			
Educational Status					
No formal education	04(13.3)	02(06.7)	7.874	59	0.096
Primary school education	11 (36.7)	03(10.0)			
Secondary education	06(20.0)	10(33.3)			
Graduate	08 (26.7)	14(46.7)			
Post Graduation & above	01(03.3)	01(03.3)			
Occupational Status					
Private Service	02(06.7)	04(13.3)	1.737	59	0.887
Government service	08 (26.7)	05(16.7)			
Self employed	02(06.7)	03(10.0)			
Retired	06(20.0)	06(20.0)			
Unemployed	04(13.3)	05(16.7)			
Homemaker	08 (26.6)	07(23.3)			
Type of Diet					
Vegetarian	09(30.0)	09(30.0)	3.231	59	0.199
Non-Vegetarian	21(70.0)	18(60.0)			
Ovo-Vegetarian	00 (00.0)	03(10.0)			
Smoking Status					
Non-Smoker	26(86.7)	28(93.3)	0.869	59	0.098
Ex-Smoker	04(13.3)	02(06.7)			
History of Alcohol Consumption					
Yes	02(06.7)	00 (00.0)	2.250	59	0.298
No	24(80.0)	27(90.0)			
Ex-Alcoholic	04(13.3)	03(10.0)			

$p>0.05$; Not Significant

Clinical Characteristics: The data related to patient's clinical variables are given in table 2. Chi square and Fisher exact test computed for the clinical variables which clearly stated that both groups were homogeneous and comparable at baseline.

Table 2 Frequency and Percentage Distribution of the Experimental and Comparison group based on the clinical variables

n ₁ +n ₂ =30+30					
Clinical Variables	Experimental group (n ₁) (%)	Comparison group (n ₂) (%)	χ^2/t	df	p value
Presence of any Co-morbidity					
Hypertension	30(100)	26(87.5)	0.131	59	0.718
Diabetes Mellitus	16(53.3)	12(40.0)			
Duration of CKD Diseases (in years)					

<1	14(46.7)	07(23.3)	7.245	59	0.064
1-2	07(23.3)	12(40.0)			
3-4	02(06.7)	07 (23.4)			
>4	07(23.3)	04(13.3)			
On Hemodialysis (in months)					
6-12	19(63.3)	15(50.0)	1.929	59	0.381
13-18	07 (23.4)	12(40.0)			
19-24	04(13.3)	03(10.0)			
Total no of dialysis					
51-150	21(70.0)	18(60.0)	3.231	59	0.199
151-250	09(30.0)	09(30.0)			
251-350	00 (00.0)	03(10.0)			
Use Of Dentures					
No	30(100)	28(93.3)	2.069	59	0.150
Yes	00 (00.0)	02 (06.7)			
History of any xerogenic medications					
Antihypertensive	30(100)	26(87.5)	0.000	59	1.000
Antihistamines	01(03.3)	00 (00.0)			
Antidepressants	01(03.3)	00 (00.0)			
Diuretics	30(100)	26(87.5)			

p>0.05; Not Significant

Comparison of Mean Dialysis Thirst Inventory, Mean Xerostomia Inventory Scores IDWG between Experimental and Comparison group to determine the effectiveness of Thirst Intervention Bundle: The Thirst Intervention Bundle was found effective in reducing the Mean Dialysis Thirst Inventory Score and Mean Xerostomia Inventory Score of CKD patients undergoing hemodialysis in the Experimental group both over time and across the groups with time on the day six as compared to the Comparison group (refer Table 3)

Table 3 Repeated Measure ANOVA of Mean Dialysis Thirst Inventory, Mean Xerostomia Inventory Scores and Mean IDWG between Experimental and Comparison group

n ₁ +n ₂ =30+30				
Group	Mean Dialysis Thirst Inventory Score Mean±SD			p value
	Day 1	Day 3	Day 6	
Experimental	27.37±2.65	25.47±2.51	22.70 ±2.69	<0.001**
Comparison	27.02±2.56	26.80±2.79	27.15 ±2.73	0.43
p value	0.214	0.16	<0.001**	
Mean Xerostomia Inventory Score Mean±SD				
Experimental	40.50±3.61	38.60±3.56	35.83±3.69	<0.001**
Comparison	39.88±3.51	40.22±3.46	39.99±3.63	0.66
p value	0.94	0.05	<0.001**	
IDWG Mean±SD				
Experimental	2.78±0.66	2.60±0.67	3.59±0.89	<0.001**
Comparison	2.58±0.49	2.62±0.48	3.89±0.71	<0.001**
p value	0.18	0.93	0.16	

p<0.01; Highly Significant**

Figure 1 Presents The Mean Dialysis Thirst Inventory Scores between Experimental and Comparison group

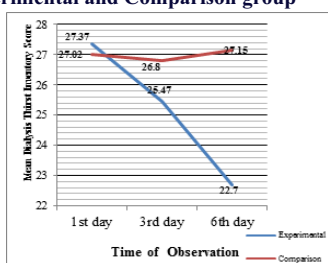


Figure 1.Line Graph depicting the Mean Dialysis Thirst Inventory Score of Experimental and Comparison group over Day one, three and six

Figure 2 Presents The Mean Xerostomia Inventory Scores between Experimental and Comparison group

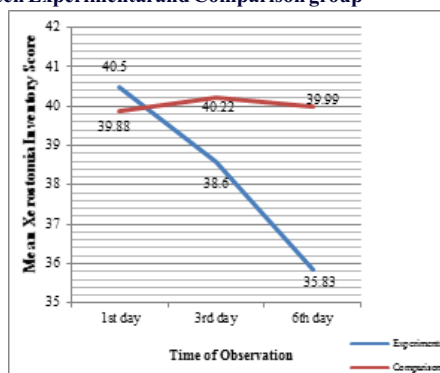


Figure 2.Line Graph showing the mean Xerostomia Inventory Score of Experimental and Comparison group over Day one, three and six

Relationship between Dialysis thirst Inventory, xerostomia Inventory Scores and IDWG: To correlate between Dialysis thirst Inventory, xerostomia Inventory Scores and IDWG of CKD patients undergoing hemodialysis in the Experiment group, the Spearman's Coefficient Correlation was computed (refer table 4).

Table 4 Correlation between Dialysis Thirst Inventory, Xerostomia Inventory Scores and IDWG of CKD patients undergoing hemodialysis in the Experimental group

	Xerostomia Inventory r(p)	Dialysis Thirst Inventory r(p)	Inter Dialytic Weight Gain r(p)
Xerostomia Inventory	1	0.931 (<0.001**)	0.343(0.007**)
Dialysis Thirst Inventory	0.931 (<0.001**)	1	0.354(0.005**)

p<0.01; Highly Significant**

A significant relationship was found between Dialysis Thirst Inventory and Xerostomia Inventory scores and IDWG of participants who received Thirst Intervention Bundle, which showed that with the reduction in thirst intensity, the xerostomia and IDWG of CKD patients undergoing hemodialysis also reduced

Association of Thirst Intensity, Xerostomia and IDWG with Selected Socio-Demographic and clinical Variables :No association was found between Dialysis Thirst Inventory, Xerostomia Inventory Score or IDWG of patient who received Thirst Intervention Bundle with the selected socio- demographic and clinical variables.

DISCUSSION

In the present study, majority of the participants in both the groups were having severe thirst. Similar result were found by Giovannetti *et al.*,1994 which stated that exaggerated thirst was present in 86 percent of the participants in a study of 247 haemodialysis patients. Another study led by Venkat , Kaufmann & Venkat (2006) stated with agreement to the findings of present study that most common problem faced by patients undergoing hemodialysis are thirst distress (95%).

There was a significant decrease in Mean Dialysis Thirst Inventory scores of Experimental group in the present study both within the group overtime (p<0.001) and across the two groups with time (p<0.001) at 0.05 level. These findings were in the agreement with the study done with the sucking of ice cubes and mouthwash as the intervention revealed that thirst significantly decreased in the experimental group than the comparison group at 0.05 level. (Sacrias, Rathinasamy, Elavally and Arjuna, 2015); other studies also stated that thirst intensity significantly (p=0.001) decreased in experimental group after the use of interventions such as Sugar-free Candies

(Dehghanmehr, Piri, Roohi, Nooraen & Salarzaei, 2017); Chewing gum (Bots et al., 2005); Straw to restrict fluid and Chewing gum (Fan, Zhang, Luo, NiuandGu, 2013)

In the present study, there was a significant decrease in Mean Xerostomia Inventory Score of Experimental group both within the group over time ($p < 0.001$) and across the two groups with time ($p < 0.001$) at 0.05 level. Similar results were seen in study conducted by Mansouri, Vahed, Shahdadi, Mehr and Arbabisarjou, 2017 done with sugarless chewing gum and sugarless candy which revealed that the Xerostomia significantly ($p < 0.05$) decreased in the experimental group. Another study done by Dehghanmehr, Piri, Roohi, Nooraen & Salarzaei, 2017 with Sugar-free Candy as an intervention reported similar finding to the present study which revealed that Xerostomia significantly decreased in experimental group than control group ($p = 0.001$).

Mean IDWG decreased in experimental group over time ($p < 0.001$) but no significant difference was found between the experimental and comparison group ($p < 0.16$). These results were in agreement with a similar study led by Bots et al., 2005 stated that after using the interventions like chewing gum and saliva substitute, no significant difference was observed in average mean IDWG. Contrary to these findings, studies done by Sacrias, Rathinasamy, Elavally and Arjuna (2015) with sucking ice cubes and mouthwash revealed that IDWG significantly decreased in the experimental group than the comparison group ($p < 0.01$). This inconsistent finding can be because in our present study only six days of follow up was there and IDWG is a variable which need more time to control. It can also be because of moderate positive correlation between thirst and IDWG.

A strong positive correlation ($r = 0.931$) between Thirst Intensity and Xerostomia was found highly significant ($p < 0.001$). A moderate positive correlation ($r = 0.354$) was found between Thirst Intensity and IDWG which was significant ($p = 0.005$). A moderate positive correlation ($r = 0.343$) also found between Xerostomia and IDWG which was significant ($p = 0.007$) respectively. The result were in line with a similar study led by Bots et al., 2004 which stated a strong positive correlation between thirst and Xerostomia ($r = 0.740$, $p < 0.001$); a moderate positive correlation between thirst and IDWG ($r = 0.329$, $p < 0.001$). Another consistent findings by Fan, Zhang, Luo, NiuandGu, 2013 revealed that there is a moderate positive correlations between thirst and IDWG ($r = 0.391$, $p = 0.010$).

Study findings depicted that no statistical significant relationship of Thirst Intensity, Xerostomia and IDWG with selected demographic and clinical variables were seen. Similar result were found by Fan, Zhang, Luo, Niuand, Gu, 2013 in which no significant interaction of thirst, Xerostomia and IDWG with demographic or clinical variables was seen. These findings were in line with another similar study led by Sacrias, Rathinasamy, Elavally and Arjuna (2015) which found Thirst Distress had no relationship with the demographic or clinical variables. One more study led by Bots et al., 2004 revealed no significant association of dry mouth with xerogenic medications. Inconsistent to the findings of the present study, a study done by Bots et al., 2005 found that IDWG is significantly associated with younger age. This inconsistent finding can be because in our present study only six days of follow up was there.

CONCLUSION

Based on the study findings, it can be concluded that the Thirst Intervention Bundle was highly effective in reducing the Thirst Intensity and Xerostomia of CKD patients undergoing hemodialysis. Thus, the use of Thirst Intervention Bundle not only improves the quality of life but spreads more information regarding the thirst intensity and xerostomia control measures among the patient's family and also the community.

As strength of current study, an easily administered, reliable and validated tools were used, prior to the main study, a pilot study was done on similar sample, dialysis unit was well established in terms of equipments, facilities and care. Instruction Card were simple and easy to understand and validated by the experts. The findings from the present study can be used for the future studies to be conducted in different settings and a Study can also be conducted to compare the effects of Thirst Intervention Bundle on dialysis patients with other interventions

APPLICATION TO NURSING PRACTICE

- Nurses should use Thirst Intervention Bundle as an intervention which can foster self responsibility in the patients for their own care.
- Thirst Intervention Bundle may also be used by the relatives of dialysis patients if someone is in need.
- Thirst Intervention Bundle is completely safe, cost effective and involve no invasive form of nursing intervention for reducing thirst intensity and xerostomia among hemodialysis patients
- Thirst Intervention Bundle should be incorporated in clinical practice as a routine nursing intervention for the patients undergoing hemodialysis. This will promote the use of evidence-based practices in the clinical field by the nurses.
- The Thirst Intervention Bundle for hemodialysis patients can be one of the ways to bridge the existing knowledge deficiencies gap.

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CONFLICT OF INTEREST STATEMENT

The results presented in this article have not been published previously in whole or part. The other authors have no financial interest to declare relevant to this work

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