# THE EFFECT OF A FROZEN SALINE SWAB ON THIRST INTENSITY AND DRY MOUTH AMONG CRITICALLY ILL POST-OPERATIVE PATIENTS AT TANTA UNIVERSITY

**Asmaa Ibrahem Abo Seada**
Critical Care and Emergency Nursing, Faculty of Nursing, Mansoura University, Egypt

**Gehan Abd El-Hakeem Younis**
Critical Care and Emergency Nursing, Faculty of Nursing, Tanta University, Egypt

**Safaa Eid**
Critical Care and Emergency Nursing, Faculty of Nursing, Tanta University, Egypt



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## ABSTRACT

**Background:** Intensive care unit (ICU) patients are exposed to many sources of distress. Thirst is a prevalent, intense, distressing, and underappreciated symptom in intensive care (ICU) patients. Thirst and dry mouth are frequent compelling desire or need to drink water or any fluid. Thirst resulting from the physiological need but also, due to habit, taste, dry mouth or throat and the desire to consume liquids that provide a feeling of warmth or cooling. Different factors can influence the presence and intensity of thirst, including, age, co morbidity, nutrition, anxiety and intubation. Saline is an economic and nontoxic way to provide a moist environment to facilitate the healing of oral wounds and decrease thirst among critically ill patient. There is a need for effective interventions to prevent thirst and dry mouth among critically patients. **Aim:** To evaluate the effect of a frozen saline swab on thirst intensity and dry mouth among critically ill post- operative patients at Tanta university. **Method:** A quasi – experimental design was utilized in this study. The study evaluated the impact of independent variable (a frozen saline swab) on the dependent variables (thirst and oral condition). This study was conducted at Intensive Care Unit, at Tanta University Hospital (surgical intensive care unit). Fifty (50) adult critically ill patients were assigned in two groups randomly (control and intervention) twenty five (25) in each according to inclusion criteria. Data were collected using the demographic and health-relevant characteristics, Thirst Intensity Scale and oral assessment guide. Results: it was observed that the mean age in control and study groups were 41.96±7.84 and 41.36±11.33 respectively and 68% of patients in control group were male while 60% in intervention group. No significant difference was observed in relation to thirst intensity scale among control and study group pre-procedure while a significant difference was found among two groups post procedure with p=0.000. only (16%) and more than one third (36%) of control group who had mild and moderate thirst intensity had mild oral dysfunction post procedure with strong correlation between oral assessment guide and visual analogue scale for thirst intensity where, P=0.000**. While, most of the patients (84.0%) in the study group who didn't had thirst intensity had mild oral dysfunction with strong correlation P=0.000. **Conclusion:** a frozen saline swab was significantly effective in reducing thirst and dry among critically ill post-operative patients in Intensive Care Unit. **Recommendation:** oral health assessment guide should be incorporated as part of routine care of critically ill post-operative in ICU. Continued research regarding safety and efficacy of the comprehensive oral care and its effect on hemodynamic parameters should be applied in ICU.


***Key Words:*** *a frozen saline swab, thirsty intensity, dryness, post-operative patients*

## INDRODUCTION

Thirst and dry mouth are frequent impelling desire or need to drink water or any fluid. Critically ill patients are exposed to many sources of distress. Thirst is rated as the second prevalent symptom among critically ill patients and it being the most neglected stressors during nursing

care in ICU (Arai, Stotts, & Puntillo, 2013). Thirst is poorly recognized in Intensive Care Unit (ICU) practice. Therefore, research has determined that it is one of the most common, severe and less common symptoms in the treatment of ICU patients (Dale, Angus, Sinuff & Mykhalovskiy, 2013; Perlas, Davis, Khan, Mitsakakis, & Chan, 2011). Critically ill patients often experience intense thirst, 70.8% of 171 Intensive Care Unit (ICU) patients rated thirst as having the greatest intensity, and thirst was the second most prevalent symptom (Perlas, Davis, Khan, Mitsakakis & Chan, 2011; Eccles, Plessis, Dommels & Wilkinson, 2013).

Dry mouth or xerostomia refers to a condition in which the salivary glands in mouth don't make enough saliva to keep the mouth wet. It is usually occurs due to the adverse effect of some medications, oxygen therapy and intubation (Dale, Angus, Sinuff & Mykhalovskiy; 2013). Patients in an Intensive Care Unit often report their desire to drink fluids, but most of the time it remains undocumented by nurses, patients feel more distress and discomfort during their stay due to thirst intensity ( Puntillo, Cooper, Stotts & Nelson, 2014).

Most of the nurses do not assess the patients for thirst and dry mouth, which may lead to some severe complications such as increase in intensity of pain and dyspnea. A frozen saline swab is used to prevent thirst intense and dry mouth. It is a simple, inexpensive, safe and easy to use by nurses or patients (Conchon, Nascimento, Fonseca & Aroni, 2015). Using this intervention stimulates sensory cold receptors in the mouth by increasing nerve discharge from cold receptors and helps in reliving of thirst (Aroni, Nascimento, & Fonseca; 2012& Carey, Conchin, & Bloomfield; 2015). Thirst is, therefore, a symptom that is present in clinical practice, but frequently undervalued, often unnoticed by the health team, although always recorded in the reports of individuals who experience it (Fan, Zhang, Luo, Niu & Gu, 2013; Shikha Vinay & Neetu, 2019).

## SIGNIFICANCE OF THE STUDY

Oral fluid intake don't use due to intubation, preoperative fast and fluid restriction in ICU, that might lead to increased mouth dryness and thirst intensity. Nurses and physicians usually carry the perception that nothing can be done to overcome thirst and dry mouth. Also, it remains undocumented by and neglected in critical areas of hospital. As far by now, no permanent assessment strategies are being carried off to assess thirst and dry mouth. This highlights the fact that there is a lack of database interventions in hospitals to reduce the intensity and distress of thirst and dry mouth.

## RESEARCH METHODS

### Aim of the Study

This study aims to evaluate the effect of a frozen saline swab on thirst intensity and dry mouth among critically ill post-operative patients at Tanta University.

### Research hypothesis

Thirst intensity and dry mouth will be expected to be decreased significantly from pre-intervention to post-intervention in critically ill post-operative patients who receive a thirst Intervention compared to those who receive routine hospital care.

### Research Design

A quasi-experimental design was utilized in this study. The study evaluated the impact of independent variable (a frozen saline swab) on the dependent variables (thirst and oral condition).

### Research Setting

This study was conducted at Intensive Care Unit, at Tanta University Hospital (surgical intensive care unit). The Intensive Care unit of surgical provides service for patients with surgical problems transferred from the operating room. ICU consists of three rooms, 5 beds in each room separated by curtains.

### Sample

A purposive sample, both sexes, fifty (50) critically ill post-operative patients were assigned in two groups (control and intervention) twenty five (25) in each. The control group involved patients receiving the routine hospital nursing care while the intervention group involved patients who receiving oral care by using swab with a frozen saline.

### Inclusion Criteria

Post operative patients aged between 21 - 60 years, hospital duration more than 24 hours, ability to communicate and GCS "between" 13-15.

### Exclusion Criteria

Oral surgery and open sores on the mouth or lips.

### Instrument

Two tools were used to collect data to this study as follows:

**Tool I - Patient's Thirst Intense Assessment:** It was included two parts. One of them was developed by the researchers and the other was adopted to assess the severity, strength, or amount of thirst. Part 1 included of age, gender, marital status, past medical history, date of admission and diagnosis. Part II was adopted from Pai, Ghezzi& Ship; (2001). It assessed the severity, strength, or amount of thirst. A visual analogue scale (VAS) was used to measure thirst intensity. A visual analogue scale when 0 indicated to no thirsty and 10 indicated sever thirst (worst). The A visual analogue scores classified as follows: mild (1-3), moderate (4-6) and severe (7-10). According to the study of Kara; (2012).This scale was valid and reliable. The Cronbach's alpha coefficient is 0.81.

**Tool II - Oral Assessment Guide:** This tool adopted from Al Sebaee & Elhadary (2017). This tool aimed to measure changes of oral condition as regards lips, tongue, mucosa and saliva. Total scores range between 4 (oral health) and 12representing sever in all categories. Each item of the oral assessment grade was rated on a 3-point.

### Validity and Reliability

Content of tools were tested for validity by 5 experts in the critical care field. Using Cronbach's Alpha to test the reliability of the tools, it measures the internal consistency of the tools. The reliability of two tools was 0.81 which indicates high reliability.

### Ethical Considerations

Permission was obtained from the intensive care authorities Hospital of Tanta University to conduct the study. Patients were notified about the goal and benefits of the procedure, and the risks of the study. They were informed that participation is voluntary in this study and they have the right to accept or reject participation without penalty. The researchers confirmed that participation in the study was completely voluntary and confidentiality was ensured by coding the data.

### Procedure

**Initial Assessment:** Eligible patients assigned randomly into two groups: "intervention group" (25 patients) and "control group" (25 patients). Patients in both groups assessed for basic information and health relevant data using tool I. Patients in both groups assessed for the degree of thirst by using part two tool I, Tool II used to assess oral condition before intervention.

**Intervention:** Intervention was implemented three times per day for two consecutive days. It was implemented in the beginning of each shift for 15 minutes for each session. Patients in the intervention group will receive a frozen saline swab applied to the patient's mouth. Patients in the control group received the routine mouth care of the unit.

**Evaluation:** Both groups assessed for thirst intense and oral condition by using part two tool I and tool II after the implementation of care for two consecutive days. The effect of a frozen saline swab applied on prevention of thirst and dry mouth assessed.

### Statistical Analysis

The collected data were organized, tabulated and statistically analyzed using SPSS software statistical computer package version 25. For quantitative data, the range, mean and standard deviation were calculated. For qualitative data, comparison was done using Chi-square test ($\chi 2$). For comparison between means of variables for two groups, independent samples T-test were used. For comparison between means for variables pre and post intervention in a group, paired samples T value used. Correlation investigated by using Spearman's correlation coefficient r and then tests of significance was adopted from (Gerstman, (2008).

## RESEARCH RESULTS

Table 1 shows distribution of the studied sample according to their sociodemographic characteristics among both groups. It showed that the mean age in control and study groups were 41.96±7.84 and 41.36±11.33 respectively. In relation to sex, more than two third (68.0%) in control group was male compared to 60% in study group. Also, most of both groups (88%) and (84%) were married respectively. In addition, more than two third (68%) of control group were smoker compared to (72%) of study group and near to half (48.0%) of patients in control group drink coffee compare to (44.0%) of study group. Regarding past medical history, it was noticed that (16.0%) of control group had diabetes mellitus compared to (20.0%) of study group. In

relation to medical diagnosis, it was noticed that nearly half of study group had abdominal surgery (48%) compared to (40%) in control group. No significant differences were observed in relation to demographic characteristics among both groups.

**Table 1: Distribution of the studied sample according to their socio-demographic characteristics**

| Characteristics | The studied sample (n=50) Control group (n=25) N | % | Study group (n=25) N | % | $\chi^2$ P |
|---|---|---|---|---|---|
| **Age (in years)** | | | | | |
| ▪ (20-30) | 2 | 8.0 | 5 | 20.0 | |
| ▪ (31-40) | 9 | 36.0 | 6 | 24.0 | 2.076 |
| ▪ (41-50) | 11 | 44.0 | 10 | 40.0 | 0.557 |
| ▪ (51-60) | 3 | 12.0 | 4 | 16.0 | |
| **Range** | **(23-54)** | | **(21-56)** | | t=0.218 |
| **Mean ± SD** | **41.96±7.84** | | **41.36±11.33** | | P=0.829 |
| **Sex** | | | | | |
| ▪ **Male** | 17 | 68.0 | 15 | 60.0 | FE |
| ▪ **Female** | 8 | 32.0 | 10 | 40.0 | 0.769 |
| **Marital status** | | | | | |
| ▪ Single | 3 | 12.0 | 3 | 12.0 | 1.023 |
| ▪ Married | 22 | 88.0 | 21 | 84.0 | 0.60 |
| ▪ Widow | 0 | 0.0 | 1 | 4.0 | |
| **Smoking** | | | | | |
| ▪ Yes | 17 | 68.0 | 18 | 72.0 | FE |
| ▪ No | 8 | 32.0 | 7 | 28.0 | 1.00 |
| **Coffee intake** | | | | | |
| ▪ Yes | 10 | 40.0 | 13 | 52.0 | FE |
| ▪ No | 15 | 60.0 | 12 | 48.0 | 0.571 |
| **Past medical history** | | | | | |
| ▪ Diabetes mellitus | 4 | 16.0 | 5 | 20.0 | |
| ▪ Hypertension | 2 | 8.0 | 3 | 12.0 | 1.644 |
| ▪ Heart disease | 2 | 8.0 | 1 | 4.0 | 0.801 |
| ▪ Respiratory disease | 1 | 4.0 | 0 | 0.0 | |
| ▪ None | 16 | 64.0 | 16 | 64.0 | |
| **Medical diagnosis** | | | | | |
| Abdominal surgery | 10 | 40.0 | 12 | 48.0 | 2.045 |
| Multiple trauma | 10 | 40.0 | 11 | 44.0 | 0.568 |
| Chest trauma | 5 | 20.0 | 2 | 8.0 | |

Table 2 shows oral assessment guide in both group, more than two third (68.0%) of control group had dry or cracked lips pre intervention and it became (60.0%) after intervention. Also, only (12.0%) of them had ulcerated lips post intervention. No significant difference was observed among control group pre and post intervention. However, most (80.0%) of study group had dry or cracked lips pre intervention and the majority (84.0%) of them had smooth, pink and moist lips post intervention with a significant difference among the study group pre and post intervention with P= 0.000.

Regarding tongue assessment, more than half (52.0%) of control group had loss of papillae pre intervention compared to (68.0%) after intervention with no significant difference among control group. In addition, more than half (60.0%) of study group had Loss of papillae pre procedure and the vast majority (88.0%) of them had Pink and papillae present after intervention with a significant difference with P= 0.000. In relation to mucosa and saliva assessment, no significant difference was observed pre and post intervention among control group. On the other hand, most (88.0%) of the study group had pink and moist mucosa and all of them (100%) had watery saliva after implementation of procedure with a significant difference where P= 0.000.

**Table 2: Distribution of the studied sample according to the Oral assessment guide throughout periods of study**

| Oral Condition assessment checklist | The studied sample (n=50) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Control group (n=25) | | | | | Study group (n=25) | | | | |
| | Pre-intervention | | Post-intervention | | $\chi^2$ P | Pre-intervention | | Post-intervention | | $\chi^2$ P |
| | N | % | N | % | | N | % | N | % | |
| **1. Lips scores** | | | | | | | | | | |
| **Control** | | | | | | | | | | |
| ▪ Smooth, pink and moist | 8 | 32.0 | 7 | 28.0 | 2.721 | 5 | 20.0 | 21 | 84.0 | **FE** |
| ▪ Dry or cracked | 17 | 68.0 | 15 | 60.0 | 0.257 | 20 | 80.0 | 4 | 16.0 | **0.000*** |
| ▪ Ulcerated | 0 | 0.0 | 3 | 12.0 | | 0 | 0.0 | 0 | 0.0 | |
| **2. Tongue scores** | | | | | | | | | | |
| **Control** | | | | | | | | | | |
| ▪ Pink and papillae present | 9 | 36.0 | 5 | 20.0 | 1.676 | 7 | 28.0 | 22 | 88.0 | **18.759** |
| ▪ Loss of papillae | 13 | 52.0 | 17 | 68.0 | 0.433 | 15 | 60.0 | 3 | 12.0 | **0.000*** |
| ▪ Blistered or cracked | 3 | 12.0 | 3 | 12.0 | | 3 | 12.0 | 0 | 0.0 | |
| **3. Mucosa scores** | | | | | | | | | | |
| **Control** | | | | | | | | | | |
| ▪ Pink & moist | 8 | 32.0 | 5 | 20.0 | 0.965 | 8 | 32.0 | 22 | 88.0 | |
| ▪ Red or white coated | 15 | 60.0 | 18 | 72.0 | 0.617 | 16 | 64.0 | 3 | 12.0 | **16.428** |
| ▪ Ulcerated with/without bleeding | 2 | 8.0 | 2 | 8.0 | | 1 | 4.0 | 0 | 0.0 | **0.000*** |
| **4. Saliva scores** | | | | | | | | | | |
| **Control** | | | | | | | | | | |
| ▪ Watery | 8 | 32.0 | 6 | 24.0 | 0.649 | 8 | 32.0 | 25 | 100.0 | **25.758** |
| ▪ Thick | 16 | 64.0 | 17 | 68.0 | 0.723 | 16 | 64.0 | 0 | 0.0 | **0.000*** |
| ▪ Absent | 1 | 4.0 | 2 | 8.0 | | 1 | 4.0 | 0 | 0.0 | |

FE: Fisher's Exact Test * Significant at level P<0.05

Table 3 represents distribution of both group related to the thirst intensity scale, the mean of thirst intensity scale was 4.68±2.61 pre procedure and it was 5.84±2.41 post procedure among control group. Moreover, more than one third (36.0%) of them had moderate thirst intensity and more than one quarter of them (28.0%) had severe thirst intensity pre intervention compared to

(48.0%) of them had severe intensity after routine care with no significant difference was observed among control group.

Regarding study group, it was found that more than one third (40.0%) of them had moderate thirst intensity and near to quarter (24.0%) of the sample had severe thirst intensity pre procedure and the majority (84.0%) of them didn't had thirst after intervention. Also, the mean score of thirst intensity scale was 5.04±2.17 before the procedure and it decreased to 0.28±0.84 after the procedure. A significant difference was found among two groups post procedure with p=0.000*.

**Table 3: Distribution of the studied sample according to the thirst intensity scale throughout periods of study**

| **Visual Analogue Scale** | **The studied sample (n=50)** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **Control group (n=25)** | | | | | **Study group (n=25)** | | | | |
| | **Pre intervention** | | **Post-intervention** | | **$\chi^2$ P** | **Pre-intervention** | | **post-intervention** | | **$\chi^2$ P** |
| | **N** | **%** | **N** | **%** | | **N** | **%** | **N** | **%** | |
| ▪ None (0) | 1 | 4.0 | 0 | 0.0 | | 2 | 8.0 | 21 | 84.0 | |
| ▪ Mild (1-3) | 8 | 32.0 | 4 | 16.0 | 3.649 | 7 | 28.0 | 3 | 12.0 | **14.066** |
| ▪ Moderate (4-6) | 9 | 36.0 | 9 | 36.0 | 0.302 | 10 | 40.0 | 1 | 4.0 | **0.003*** |
| ▪ Sever (7-10) | 7 | 28.0 | 12 | 48.0 | | 6 | 24.0 | 0 | 0.0 | |
| **Range** | **(0-9)** | | **(1-9)** | | t=1.633 | **(0-7)** | | **(0-4)** | | **t=3.781** |
| **Mean ± SD** | **4.68±2.61** | | **5.84±2.41** | | P=0.109 | **2.04±2.17** | | **0.28±0.84** | | **P=0.000*** |
| **Control group VS Study group** | | | | | | | | | | |
| **t** | 2.890 | | **10.89** | | | | | | | |
| **P** | 0.783 | | **0.000*** | | | | | | | |

* Significant at level P<0.05.

Table 4 shows correlation between total level of Oral assessment guide of the studied sample and Visual Analogue Scale. It was observed before procedure that more than one third (36%), near to one third (32%) and only (16%) of the control group that had moderate, mild and severe thirst intensity respectively had also mild oral dysfunction pre procedure. Also, strong correlation was observed among control group in relation to visual analogue scale and total oral assessment guideline with p =0.000**. Also, near to one third (32%), (44%) and only (4%) of the study group that had none, mild, and moderate thirst intensity pre procedure respectively had mild oral dysfunction with strong correlation where r, P =0.720, 0.000**

Also, this table showed that only (16 %) and more than one third (36%) of control group that had mild and moderate thirst intensity had mild oral dysfunction post procedure with strong correlation between OAG and visual analogue scale for thirst intensity where r, P= 0.799 , 0.000**. Also, most of the sample (84.0%) among study group that had no thirst intensity had also, mild oral dysfunction with strong correlation with r, p=0.801, 0.000**.

**Table 4: correlation between total level of Oral assessment guide of the studied sample and Visual Analogue Scale throughout periods of study**

| Visual Analogue Scale | Total OAG level Control group (n=25) Mild 22 N % | Moderate 2 N % | Severe 1 N% | $\chi^2$ P | Study group (n=25) Mild 20 N % | Moderate 5 N % | $\chi^2$ P |
|---|---|---|---|---|---|---|---|
| Pre procedure | | | | | | | |
| ▪ None | 1 4.0 | 0 0.0 | 0 0.0 | | 8 32.0 | 0 0.0 | 20.00 |
| ▪ Mild | 8 32.0 | 0 0.0 | 0 0.0 | 8.766 | 11 44.0 | 0 0.0 | 0.000 |
| ▪ Moderate | 9 36.0 | 0 0.0 | 0 0.0 | 0.187 | 1 4.0 | 4 16.0 | * |
| ▪ Severe | 4 16.0 | 2 8.0 | 1 4.0 | | 0 0.0 | 1 4.0 | |
| R , P | 0.809 , 0.000** | | | | 0.720 , 0.000** | | |
| Post procedure | Mild N= 22 | Moderate N= 1 | Severe N= 2 | | Mild N= 25 | Moderate N= 0 | |
| ▪ None | 0 0.0 | 0 0.0 | 0 0.0 | | 21 84.0 | 0 0.0 | |
| ▪ Mild | 4 16.0 | 0 0.0 | 0 0.0 | 3.693 | 3 12.0 | 0 0.0 | - |
| ▪ Moderate | 9 36.0 | 0 0.0 | 0 0.0 | 0.449 | 1 1.0 | 0 0.0 | |
| ▪ Severe | 9 36.0 | 1 4.0 | 2 8.0 | | 0 0.0 | 0 0.0 | |
| R , P | 0.799 , 0.000** | | | | 0.801 , 0.000** | | |

* Significant at level P<0.05.

** Highly significant at level P<0.01.

Table 5 shows correlation between socio characteristics of the studied groups and both of thirst intensity and oral assessment dysfunction post intervention of study. In this table, there was a strong and positive correlation between thirst intensity and patients' age and coffee intake among study and control group where p= 0.000, 0.000, 0.00 and 023 respectively. Concerning total oral assessment dysfunction, no significant correlation was observed regarding smoking in both control and study group. On the other hand, a strong and positive correlation was observed in relation to age and coffee intake among both group (P= 0.000). Moreover highly significant was observed among study group regarding coffee intake and age ( P= 0.025 & 0.000 respectively).

**Table 5: Correlation between socio characteristics of the studied sample and both of total Visual Analogue score and total score of Oral Condition post intervention of study**

| Characteristics | Total VAS score (thirst intensity ) Control group R | P | Study group R | P | Total Oral Assessment dysfunction Control group R | P | Study group R | P |
|---|---|---|---|---|---|---|---|---|
| **Age (in years)** | **0.849** | **0.000**** | **0.635** | **0.000**** | **0.757** | **0.000**** | **0.639** | **0.001**** |
| **Smoking** | 0.126 | 0.548 | 0.233 | 0.263 | 0.313 | 0.128 | 0.245 | 0.268 |
| **Coffee intake** | **0.766** | **0.000**** | **0.453** | **0.023*** | **0.676** | **0.000**** | **0.559** | **0.025*** |

* Significant at level P<0.05.

** Highly significant at level P<0.01.

## DISCUSSION

Thirst intensity and mouth dryness are the most stressful situation that occurs frequently among intensive care patients. They are being the most neglected stressors during nursing intervention in intensive care unit. Providing effective oral care minimize oral health problems and relieving thirst and dry mouth among ICU patients that impact the patient's well-being (Sebaee & Elhadary, 2017).

Regarding socio-demographic data, more than one third of both groups aged between 41 to 50 years old. Nearly more than two thirds of both groups were male. This finding was in agreement with Elsaay and Ahmed (2016) who reported that the mean age of most the studied patient was in age between 41-50 years and was male and married.

Also the present finding showed that more than two third of both group were smoker and take coffee. This emphasizes the importance of oral care as many studies mentioned that smoking causes gum disease and take coffee increased thirst intensity. In this regard, Welch;(2017) reported that smoking can lead to discoloration of teeth, alteration of taste, dryness of mouth and coated tongue and there is correlation between tobacco smoking and an increased risk of dental caries.

In relation to medical diagnosis, the present result found that nearly half of the studied patients in both groups had abdominal surgery. This indicated that the patients who had abdominal surgery had nothing per mouth for prolonged hours after surgery which increased thirty intensity and increased need for oral care. It supported by Conchon et al. (2015) who reported that patients who had surgery belonging to high risk group for developing thirst.

As regard oral health assessments guide, the present finding showed that more than two third of control groups had dry or cracked and ulcerated lips, red or white coated mucosa and thick saliva secretions, loss of papillae of tongue pre intervention and improved with low percentage after intervention with no significance difference was observed among control group pre and post intervention. On the other hand, there was significant improvement of condition lips in the study group compared to control. Also the vast majority of study group had pink and papillae of tongue, pink and moist mucosa and all of them had watery saliva present after intervention with a significant difference was observed before and after interventions. This might be due to that most of patient in Intensive Care Unit had nothing per mouth and after implementation of intervention; the condition of the mouth in the study group was improved. Similarly, Kumari et al. (2013) stated that a significant improvement of condition of tongue, gingiva, teeth, lips and saliva secretions after implementation of oral care. Also Stillwell & Fineout (2011) stated that poor oral hygiene are frequently associated with dry mucous membranes, inflammation of gums and periodontal disease and emphasized on the importance of oral hygiene in critically ill patients.

Concerning the distribution of the studied patients according to the Visual Analogue Scale, the present results found that above one third of them had moderate thirst intensity and more than one quarter of them had severe thirst intensity pre intervention with increased this percentage after a routine care with no significant difference was observed among control group. Increased thirst intensity may be caused by fluid restriction per mouth, poor oral hygiene and most of

nurse's staff may interpreted that nurses have not adequate time to provide good oral care. Similarly Miranda et al (2016) stated that most nurses provide direct care to critically ill patients concluded that oral care may not taking priority of care and the routine oral care didn't clean deep cavity in mouth.

On the other hand, it was found that more than one third study group had moderate thirst intensity and near to quarter of the sample had severe thirst intensity pre intervention and the majority of them didn't had thirst after intervention. Also, the mean score of thirst intensity was decreased after the intervention. This may be due to implementation of bundle of oral care had improved thirst intensity. This result was agreed with Puntillo et al (2014), they stated that thirsty intensity decreased after implementation intervention regardless of the number of sessions or days in which patients participated. Also they emphasized that using the individual thirst treatments in bundled intervention helped relieve thirst and dry mouth, which cause distress for many ICU patients.

As regard correlation between total level of Oral Condition assessment of the studied groups and Visual Analogue Scale throughout periods of study. The present finding showed that there was a strong correlation between visual analogue scale and total oral assessment guideline among control and study groups pre and post procedure. This indicates that visual analogue scale and total oral assessment guide are efficient methods for assessing mouth dryness and oral dysfunctions. it was supported by Pai et al. (2001) who reported that visual analogue are helpful in detecting salivary dysfunction and thirst intensity. Also American Academy of Pediatric Dentistry (2018) concluded that oral assessment guide provides indicators for mouth assessment and provide guideline for the implementation of a plan of care.

Regarding the present finding showed a strong and positive correlation between thirst intensity and patients' age and coffee intake among control group. This mean that most patients in this study their age range between 40-50 years old and older patients may drink insufficient water following fluid restriction to replenish water deficit. In addition most study and control group in this study drink caffeine which may increase thirst. Similarly, Yin (2014) stated that caffeine can significantly affect cognitive performance and thirst at lower doses, and concluded that patients' age is factors which drive the sensation of thirst in ICU.

Concerning correlation between socio-demographic characteristics of the studied groups and oral assessment dysfunction post intervention, the present study revealed that no significant correlation was observed regarding smoking in both control and study group. This result was online with Sreedevi et al; (2012) concluded that there was no relation between oral health dysfunction and smoking and calculus depositions. On the other hand, a strong and positive correlation was observed in relation to age and coffee intake and oral assessment dysfunction among both groups. This result was supported by Busby et al; (2014) who stated that old age is associated with oral health dysfunction. This result was in contrast with Karadas & Seven (2014) who concluded that no significant correlation was found between oral health dysfunction and coffee intake.

## CONCLUSION

Based on the findings of the current study, it can be concluded that, clinical intervention consisting of more than one intervention is significantly effective in reducing thirst and dry among patients in intensive care unit.

## RECOMMENDATIONS

1. An assessment tool such as the oral health assessment guide should be incorporated as part of routine care of critically ill patients.
2. Continued research regarding safety and efficacy of the comprehensive oral care and its effect on hemodynamic parameters
3. Presence of dental hygienists or dentists into the hospital intensive care units setting should be explored.

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