



Effectiveness of Menthol Ice Cube Application on Thirst Intensity and Oral Condition among Postoperative Patients

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ABSTRACT

Thirst and dry mouth are frequent immediate post-operative discomfort due to prolonged fasting, medications and surgical conditions. Surgical patients are at a high-hazard group for the improvement of thirst due to prolonged fasting, use of anticholinergic and opioid medications, bleeding, among others. Thirst is an exceptional and awkward sensation, which can't be overlooked when water deprivation compromises endurance. It is one of the fundamental inconveniences in the prompt postoperative period or the post-anaesthesia recovery. Menthol and ice have greater efficacy to relieve the thirst. Hence the study was conducted to evaluate the effectiveness of menthol ice cube application on thirst intensity and oral condition among post-operative patients. The pre-experimental research design was adopted to conduct the study with 30 samples who met inclusion criteria were selected by using a convenience sampling technique. Pre-test assessment was done by thirst intensity scale and oral condition assessment tool. Menthol ice cube was administered to the study group. The post-test assessment was observed after one hour and two hours of administration of the menthol ice cube application. There was a statistical significant change in thirst intensity and oral conditions between pre and post intervention within the study group and the level of thirst intensity were statistically associated with age group at the level of $P < 0.05$. The findings of the study concluded that menthol ice cube application is effective in relieving thirst intensity and improve the oral conditions among patients underwent abdominal surgery. It is also a safe, harmless, cost effective, and feasible is feasible to administer.



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INTRODUCTION

Thirst and dry mouth are frequent compelling desire or need to drink water or any fluid (Arai *et al.*, 2013a). Surgical patients are at high-hazard group for the improvement of thirst due to prolonged fasting, use of anticholinergic and opioid medications, bleeding, among others (Arai *et al.*, 2014; Puntillo *et al.*, 2010). Thirst is an exceptional and awkward sensation, which can't be overlooked when water deprivation compromises endurance (Conchon *et al.*, 2015). It is one of the fundamental inconveniences in the prompt postoperative period or the post-anaesthesia recovery. It is described by high pervasiveness and stress in the patient, due not

exclusively to the craving for water consumption, yet in addition to fringe attributes like the mouth, lips and dry throat, thick tongue and salivation, helpless judgment regarding the mouth and a requirement for water. The attributes identified with the dry mouth, lips and throat increment, exponentially, the uneasiness produced by thirst (Martins *et al.*, 2017; Gebremedhn and Nagaratnam, 2014). Feelings, for example, dread, uneasiness and stress trigger physiological responses, among them, the hindrance of salivary creation, causing dryness of the oropharyngeal cavity (Martins *et al.*, 2017). Preoperative fasting contributes to the increased incidence and intensity of thirst, because, while it is recommended patients forego clear liquids for two hours, however, it may be extended depends on the clinical condition. On the off chance that fasting time is drawn out and liquid ingestion is limited, changes in the electrolyte balance start to happen (Zimmerman *et al.*, 2017). Patients going through stomach medical procedure encounters an extraordinary thirst in the perioperative period because of the explicitness of the strategy, with fasting time over the suggested by logical proof and limitation of water admission of huge volumes during the postoperative period (Cho *et al.*, 2010). The prevalence of thirst in post anaesthetic recovery is approximately from 43.8 to 75% (Conchon and Fonseca, 2018; Pavani *et al.*, 2016; Aroni *et al.*, 2012) and even so, it is undervalued, not being identified, measured and treated by the health care team members.

This outcome is an exponential increment for the patient's anxiety, which favors the event of complications of a treatable side effect (Silva *et al.*, 2016). Incomprehensibly, there are no standard perioperative rules for tolerant consideration to keep difficulties from this side effect (Conchon and Fonseca, 2018). Thirst is a longing or wants to drink water, not produced by a physiological need, yet in addition set off by propensity, taste, dry mouth or throat and the ready to devour liquids that give an impression of warming or cooling (Arai *et al.*, 2013b; Leiper *et al.*, 2005). Studies assessing cold-temperature help systems - including early ingestion of ice chips, swishing with cold water, and solidified bandage - indicated comparative measures to ease thirst (Garcia *et al.*, 2016; Puntillo *et al.*, 2014a; Suchicital *et al.*, 2011). The menthol biting gum acts to increment salivary pH and salivary course through a blend of gustatory and mechanical incitement of the salivary organs, diminishing dryness of the mouth and its related sick impacts (Oyakawa *et al.*, 2006). Ice has more prominent viability in calming thirst since it invigorates oropharyngeal receptors, ice in little volumes and menthol-related sub-

stances can diminish the power of thirst, notwithstanding empowering the improvement of oral conditions, for example, dry mouth and lips (Puntillo *et al.*, 2014b; Conchon and Fonseca, 2014). Saline is an answer which has the disintegrating salt emissions and microorganisms decrease impact (Cawley and Benson, 2005), and advancing salivation discharge (Humphrey and Williamson, 2001). Menthol has been appeared to stimulate cold receptors in the mouth and nose (Puntillo *et al.*, 2014a; Conchon and Fonseca, 2014). Considering the associated medications, anesthetic techniques, clinical conditions, safety protocol of thirst management and findings of the studies on ice with menthol application, the investigators perceived to conduct the study with the hypothesis of thirst relieve and maintain good oral hygiene after the administration of menthol ice cube application among patients underwent abdominal surgery.

MATERIALS AND METHODS

The pre-experimental research design was adopted to conduct the study at Saveetha Medical College and Hospital after obtaining authorized setting permission. The study proposal was reviewed and approved by the institutional human ethical committee. A total of 30 samples which met the inclusion criteria were selected by using a convenience sampling method. The inclusion criteria were both male and female with age ranged between 20-60 years, underwent abdominal surgery under either general or spinal anesthesia, recovered from anesthesia, and had the ability to communicate 2 to 3 hours of after surgery. Patients had malignancy or liver, kidney, respiratory or heart failure, mouth breather, who had intake or swallowing restrictions, and developed complications during surgery, and/or the period of recovery from anaesthesia were excluded from the study. The investigator introduced him and explained the purpose of the study to the participants after selecting the sample. Informed consent was obtained after assuring confidence. Each participant was assessed on the bedside. The participants were placed in a comfortable position. The demographic variables are collected by using multiple choice questionnaires.

Pre-test assessment of thirst and oral condition was observed by using the thirst intensity scale and oral condition assessment scale. Thirst intensity scale ranged from 0-10 and interpreted as no thirst (0), mild thirst (1-3), moderate thirst (4-6), severe thirst (7-9), and worst possible thirst (10). Oral assessment tool assessed the conditions of lips, tongue, mucosa, and nature of the saliva and its condi-

tion ranges from 1-3 for each. Menthol ice cube was applied over the participant's lip and waited to dissolve completely. Menthol ice cube was prepared under strict aseptic technique by using normal saline 3 ml with menthol 2 drops. Post-test level of thirst intensity and oral condition was assessed 1 hour and 2 hours after the administration of menthol ice cube application. The data were tabulated and analyzed by descriptive and inferential statistics. All the values were expressed as the mean \pm standard deviation. The difference between the two groups was compared using paired t-test and within the group by ANOVA (Analysis of Variance). A probability of 0.05 or less was taken as statistically significant.

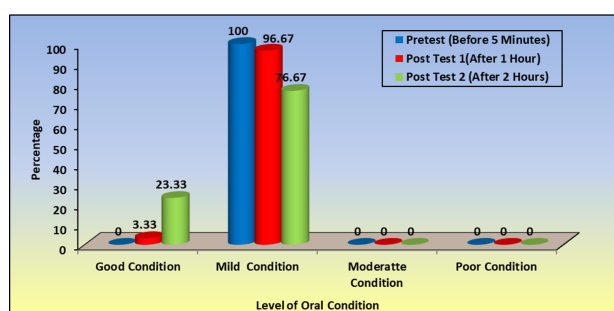


Figure 1: Percentage distribution of pre-test and post-test level of the oral condition among patients underwent abdominal surgery

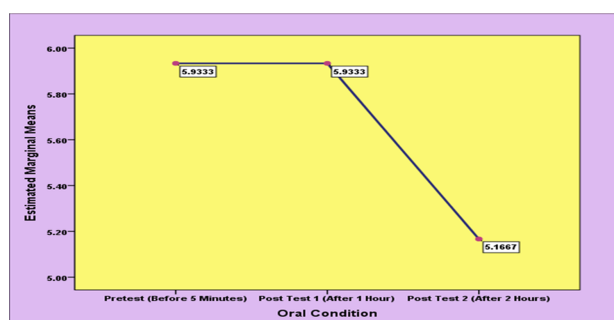


Figure 2: Trend graph showing the comparison of pre-test and post-test level of the oral condition among underwent abdominal surgery

Table 1 reveals that most of them 10(33.3%) were in the age group of 51 – 60 years, 20(66.7%) were male, 26(86.7%) had underwent elective surgery under general anesthesia and 12(40%) were in 30 minutes of post-operative hours.

Table 2 depicts that in the pre-test, 17(56.67%) had severe thirst, 12(40%) had the worst possible thirst and only one had a moderate thirst. In post-test 1, after one hour of administration of menthol ice cube application, 15(50.0%) had severe thirst, 10(33.33%) had a moderate thirst and 5(16.67%) had a worst possible thirst. Whereas in post-test

2 after two hours of administration of menthol ice cube application, 13(43.33%) had moderate thirst, nine (30%) had moderate thirst, five (16.67%) had a severe thirst and only three (10%) had a worst possible thirst.

Figure 1 portrays that in pre-test 5 minutes prior to the administration of menthol ice cube application, 30(100%) were in mild oral condition. In post-test 1 (after one hour of the administration of menthol ice cube application) 29(96.67%) were in mild condition and only one was in good condition. Whereas in 2 hours after the administration of menthol ice cube application in the post-test 2, 23(76.67%) were in mild oral condition and 7(23.33%) were in good oral condition.

Table 3 shows that the mean and standard deviation of thirst intensity of pre-test, post-test 1 and post-test 2 was 8.37 ± 1.47 , 7.03 ± 1.92 and 4.63 ± 2.65 , respectively. The calculated Repeated Measures ANOVA value of $F=24.464$ was found to be statistically highly significant at $p < 0.001$ level which infers that there is a significant improvement in the level of thirst intensity after the administration of menthol ice cube application among patients underwent abdominal surgery.

Figure 2 shows that the trends in the mean value of oral condition of pre-test, post-test 1 and post-test 2 were 5.93, 5.93 and 5.16, respectively. The calculated Repeated Measures ANOVA value of $F=8.761$ was found to be a statistically highly significant improvement in the level of oral conditions after the administration of menthol ice cube application at $p < 0.001$ level.

Table 4 shows that the pretest mean score of thirst intensity was 8.37 ± 1.47 , post-test 1 mean score was 7.03 ± 1.92 and post-test 2 mean score was 4.63 ± 2.65 . The mean difference score was pretest (1.33, 13.3%), post-test 1 (2.40, 24%) and post-test 2 (3.73, 37.3%). The calculated paired 't' test value of $t=2.749$ between pretest and post-test 1 was found to be statistically significant at $p < 0.05$ level. The calculated paired 't' test value of $t=4.013$ between post-test 1 and post-test 2 was found to be statistically significant at $p < 0.001$ level. The calculated paired 't' test value of $t=6.994$ between pretest and post-test 2 was found to be statistically significant at $p < 0.001$ level. The above finding infers that the menthol ice cube application administered to patients underwent abdominal surgery was found to be effective in improving the level of thirst intensity from the baseline pretest to the level of post-test 1 and post-test 2.

The Table 5 shows that the pre-test mean score of oral condition was 5.93 ± 0.87 , post-test 1 mean

Table 1: Frequency and percentage distribution of demographic variables of patients underwent abdominal surgery.

| Demographic Variables | Frequency (n) | Percentage (%) |
|---------------------------------------|---------------|----------------|
| Age in years | | |
| 20 – 30 | 7 | 23.3 |
| 31 – 40 | 5 | 16.7 |
| 41 – 50 | 8 | 26.7 |
| 51 – 60 | 10 | 33.3 |
| Type of Surgery | | |
| Elective | 26 | 86.7 |
| Emergency | 4 | 13.3 |
| Gender | | |
| Male | 20 | 66.7 |
| Female | 10 | 33.3 |
| Mode of Anesthesia | | |
| General anesthesia | 24 | 80.0 |
| Regional anesthesia | 6 | 20.0 |
| Number of post-operative hours | | |
| 15 minutes | 7 | 23.3 |
| 30 minutes | 12 | 40.0 |
| 45 minutes | 11 | 36.7 |
| 1 hour | - | - |

Table 2: Frequency and percentage distribution of pre-test and post-test level of thirst intensity among patients underwent abdominal surgery.

| Thirst Intensity | No Thirst | | Mild Thirst | | Moderate Thirst | | Severe Thirst | | Worst Possible Thirst | |
|--------------------------------|-----------|---|-------------|-------|-----------------|-------|---------------|-------|-----------------------|-------|
| | No. | % | No. | % | No. | % | No. | % | No. | % |
| Pretest (5 minutes before) | 0 | 0 | 0 | 0 | 1 | 3.33 | 17 | 56.67 | 12 | 40.0 |
| Post Test 1 (After 1 hour) | 0 | 0 | 0 | 0 | 10 | 33.33 | 15 | 50.0 | 5 | 16.67 |
| Post Test 2 (After 2 hours) | 0 | 0 | 13 | 43.33 | 9 | 30.0 | 5 | 16.67 | 3 | 10.0 |

Table 3: Comparison of pretest and post-test level of thirst intensity among patients underwent abdominal surgery

| Thirst Intensity | Mean | S.D | Repeated Measures ANOVA |
|-----------------------------|------|------|-------------------------|
| Pretest (Before 5 minutes) | 8.37 | 1.47 | F = 24.464 |
| Post Test 1 (After 1 hour) | 7.03 | 1.92 | P = 0.001 |
| Post Test 2 (After 2 hours) | 4.63 | 2.65 | S*** |

***p<0.001, S – Significant

Table 4: Comparison of the level of thirst intensity between pretest, post-test 1 and post-test 2 among patients underwent abdominal surgery within the study group.

| Thirst Intensity | Mean | S.D | Mean Difference | Paired "t-Test |
|-----------------------------|------|------|-----------------|--------------------|
| Pretest (Before 5 minutes) | 8.37 | 1.47 | 1.33 | t = 2.749 |
| Post Test 1 (After 1 hour) | 7.03 | 1.92 | (13.3%) | P = 0.010 S* |
| Post Test 1 (After 1 hour) | 7.03 | 1.92 | 2.40 | t = 4.013 |
| Post Test 2 (After 2 hours) | 4.63 | 2.65 | (24%) | P = 0.0001 S*** |
| Pretest (Before 5 minutes) | 8.37 | 1.47 | 3.73 | t = 6.994 |
| Post Test 2 (After 2 hours) | 4.63 | 2.65 | (37.3%) | P = 0.0001 S*** |

***p<0.001,*p<0.05, S - Significant

Table 5: Comparison of pretest, post-test 1 and post-test 2 level of oral condition among patients underwent abdominal surgery within the study group.

| Oral Condition | Mean | S.D | Mean Difference | Paired "t-Test |
|-----------------------------|------|------|-----------------|-------------------|
| Pretest (Before 5 minutes) | 5.93 | 0.87 | 0.00 | t = 0.000 |
| Post Test 1 (After 1 hour) | 5.93 | 0.94 | (0%) | P = 1.000 N.S |
| Post Test 1 (After 1 hour) | 5.93 | 0.94 | 0.76 | t = 3.915 |
| Post Test 2 (After 2 hours) | 5.17 | 0.83 | (6.33%) | P = 0.001 S*** |
| Pretest (Before 5 minutes) | 5.93 | 0.87 | 0.76 | t = 3.915 |
| Post Test 2 (After 2 hours) | 5.17 | 0.83 | (6.33%) | P = 0.001 S*** |

***p<0.001,S - Significant, N.S - Not Significant

Table 6: Association between post-test 2 level of thirst intensity and selected demographic variables of patients underwent abdominal surgery

| Demographic Variables | Mild Thirst | | Moderate Thirst | | Severe Thirst | | Worst Possible Thirst | | Chi-Square Value |
|-----------------------|-------------|------|-----------------|------|---------------|------|-----------------------|-----|------------------|
| | No. | % | No. | % | No. | % | No. | % | |
| Age in Years | | | | | | | | | |
| 20 - 30 | 1 | 3.3 | 3 | 10.0 | 3 | 10.0 | 0 | 0 | $\chi^2=19.117$ |
| 31 - 40 | 0 | 0 | 2 | 6.7 | 1 | 3.3 | 2 | 6.7 | d.f=9 |
| 41 - 50 | 7 | 23.3 | 1 | 3.3 | 0 | 0 | 0 | 0 | p = 0.024 |
| 51 - 60 | 5 | 16.7 | 3 | 10.0 | 1 | 3.3 | 1 | 3.3 | S* |

*p<0.05,S - Significant, N.S - Not Significant

score was 5.93 ± 0.94 and post-test 2 means the score was 5.17 ± 0.83 . The mean difference score was pretest & post-test 1 (0, 0%), post-test 1 & post-test 2 (0.76, 6.33%) and pretest & post-test 2 (0.76, 6.33%). The calculated paired 't' test value of $t=0.000$ between pretest and post-test 1 was not found to be statistically significant. This infers that there was no significant difference in the level of oral condition between pretest and post-test 1.

The calculated paired 't' test value of $t=3.915$ between post-test 1 and post-test 2 and pre-test and post-test 2 was found to be statistically significant at $p<0.001$ level. These findings reveal that the menthol ice cube application administered to patients underwent abdominal surgery was found to be effective in improving the level of oral condition from the baseline pretest to the level of post-test 1 and post-test 2.

Table 6 shows that the demographic variable of age had shown statistically significant association with post-test two levels of thirst intensity among patients underwent abdominal surgery at $p < 0.05$ level.

DISCUSSION

Nurses play a significant role in managing client during the perioperative period for their quick recovery. Regular protests during postoperative include nausea, vomiting, surgical pain, sore throat, headache, drowsiness, dizziness, peripheral nerve injury, and superficial thrombosis (Jenkins and Baker, 2003). Thirst is the most common immediate postoperative discomfort experienced by the client as continued fasting or nothing per mouth as per the ailments too specialist guidelines. Thirst is a significant stressor from the patients' viewpoint in the postoperative period and it was delegated the fifth among 34 stressors (Aroni et al., 2012; Gois and Dantas, 2004). The current study was conducted to relieve thirst intensity by applying the ice menthol application during immediate postoperative period. In the present study, most of the participants 26(86.7%) had underwent elective abdominal surgery under general anesthesia. It were male with the age group between 51-60 years and they experienced mild thirst to worst possible thirst during the immediate post-operative period. This current study intensively analyzed the effectiveness of ice cube menthol application on thirst intensity and oral condition and found significant relieve worst possible thirst and improved oral condition among patient underwent abdominal surgery. This finding is supported by another study conducted by Hanan Ahmed Al Sebaee et al (2017) who observed that utilizing ice normal cold saline with menthol was fundamentally alleviation thirst force and improved tongue and salivation among prompt post-operative patients who have gone through abdominal surgeries (Sebaee and Elhadary, 2017).

In another study by AlineKorki et al., (2019) who proved that menthol chewing gum was powerful in diminishing the force and uneasiness of pre-operative thirst and finished up and suggested that chewing gum can't be offered to the surgical patients (Garcia et al., 2019). However, this study analyzed the gastric juice secretion and salivary pH. Viviane Moreira Serato et al. (2019) evaluated the effectiveness of the menthol ice popsicles on thirst intensity. They found a significant decrease in intensity and dry mouth and improvement in the hydration and taste in the mouth (Serato et al., 2019). The current study also has shown

the significant improvement in oral conditions in terms of the condition of the lips, tongue, mucosa and salivary secretion. However, did not analyze the salivary pH. The findings of the study by Yoon et al., (2011) reported that cold water swishing could be a valuable nursing intercession for lightening thirst and improving oral condition for patients with the muscular medical procedure after general sedation (Yoon et al., 2011) be it may be there is a chance of aspiration of water while gargling. In the study by HananAwad et al (2018), who demonstrated the impact of solidified saline on post-usable thirst among ladies going through a gynecological medical procedure and observed that utilized frozen saline express less thirsty (Elmashad and Gouda, 2018). Similarly, the study conducted by Yang hee et al., (2015) to contrast the impact between the wet bandage and ordinary cold saline and wet cloth with cold water on thirst, oral depression condition, and salivation pH among postoperative patients and presumed that medical attendants can apply the wet dressing with cold typical saline to lessen thirst and saliva acidity, and to improve the oral cavity condition for postoperative patients (Moon et al., 2015).

Hence the present study accepted the hypothesis by considering the present study finding and the above mentioned supportive studies. The strength of the study was prepared the ice cubes using both normal saline and menthol as menthol has been shown to stimulate cold receptors in the mouth and nose by (Eccles, 2000). There is a certain limitation of the study was lacks in keeping control group and observing the salivary pH, osmolality and gastric juice secretion. Hence the current study recommended observing the other parameters such as the salivary pH, osmolality to design and strengthen the protocol for thirst management.

CONCLUSIONS

The study findings reveal that there is a significant change in the level of thirst intensity and oral condition after menthol ice cube application in the study group among patients who underwent abdominal surgery. This intervention is also safe, feasible to administer, cost effective, harmless and further study may be conducted to strengthen the protocol for thirst management.

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Conflict of interest

The authors declare that they have no conflict of interest for this study.

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