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Package of menthol measures for thirst relief: a randomized clinical study

Pacote de medidas mentoladas para o alívio da sede: estudo clínico randomizado

Paquete de medidas mentoladas para el alivio de lased: estudio clínico aleatorizado

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ABSTRACT

Objective: To evaluate the effectiveness of the menthol package (lip hydration and ice popsicles) compared to a package of non-menthol measures (lip hydration and ice popsicles) as a way to relieve thirst in patients in the Anesthetic Recovery Room. **Method:** Randomized and parallel trial study, with 120 patients randomized patients in an experimental group - menthol measurements (n=59) and control group - measures without menthol (n = 61). **Results:** There was a significant (p<0.05) decrease in intensity, hydration, dryness and taste in the oral cavity between the three moments of assessment/intervention in the two groups. The difference was significant in the experimental group for thirst intensity at the second assessment/intervention point (p<0.05) after a single administration of the menthol package. **Conclusion:** There was a reduction in thirst intensity in both groups. Patients who received menthol packages showed a significant decrease in intensity after a single evaluation/intervention time. NCT: 02869139.

Descriptors: Thirst; Menthol; Perioperative Nursing; Low temperature; Ice.

RESUMO

Objetivo: Avaliar a efetividade do pacote de medidas mentoladas (hidratação labial e picolé de gelo) comparado a um pacote de medidas não mentoladas (hidratação labial e picolé de gelo) como método de alívio da sede em pacientes na Sala de Recuperação Anestésica. **Método:** Ensaio clínico randomizado, paralelo, 120 pacientes aleatorizados em grupo experimental - medidas mentoladas (n=59) e grupo controle - medidas sem o mentol (n=61). **Resultados:** Houve diminuição significativa (p<0,05) sobre a intensidade, hidratação, secura e gosto na cavidade oral entre os três momentos de avaliação/intervenção nos dois grupos indistintamente. A diferença foi significativa no grupo experimental para intensidade da sede no segundo momento de avaliação/intervenção (p<0,05) após uma única administração do pacote de medidas mentoladas. **Conclusão:** Houve redução da intensidade da sede nos dois grupos. Os pacientes que receberam as medidas mentoladas apresentaram diminuição significativa da intensidade após um único momento de avaliação/intervenção. A NCT: 02869139.

Descritores: Sede; Mentol; Enfermagem Perioperatória; Temperatura baixa; Gelo.

RESUMEN

Objetivo: Evaluar la efectividad del paquete de medidas mentoladas (hidratación labial y picolé de hielo) comparado a un paquete de medidas no mentoladas (hidratación labial y picolé de hielo) como un método de alivio de la sed en pacientes en la Sala de Recuperación Post-Anestésica. **Método:** En un ensayo clínico aleatorizado, paralelo, 120 pacientes aleatorizados en un grupo experimental - medidas mentoladas (n=59) y un grupo control - medidas sin el mentol (n=61). **Resultados:** Hubo una disminución significativa (p<0,05) sobre la intensidad, hidratación, sequedad y gusto en la cavidad oral entre los tres momentos de evaluación/intervención en los dos grupos, indistintamente. La diferencia fue significativa en el grupo experimental para la intensidad de la sed en el segundo momento de la evaluación/intervención (p<0,05) después de una única administración del paquete de medidas mentoladas. **Conclusión:** Se encontró una reducción de la intensidad de la sed en los dos grupos. Los pacientes que recibieron las medidas mentoladas presentaron una disminución significativa de la intensidad después de un único momento de evaluación/intervención. NCT: 02869139.

Descriptores: Sed; Mentol; Enfermería Perioperatoria; Baja temperatura; Hielo.

INTRODUCTION

Thirst is an intense and uncomfortable sensation, which cannot be ignored when water deprivation threatens survival[1]. It is one of the main discomforts in the Immediate Postoperative Period (IPP), in the Post-Anesthesia Recovery (PAR). It is characterized by high prevalence and stress in the patient, due not only to the desire for water intake, but also to peripheral attributes like the mouth, lips and dry throat, thick tongue and saliva, poor taste in the mouth and a need for water[2]. The perception of surgical patients and their reaction to thirst are multifactorial and influenced by personal and cultural issues related to the health-disease binomial[1,3-4].

Surgical patients integrate a high-risk group for the development of thirst due to a confluence of factors, such as prolonged fasting, use of anticholinergic and opioid medications, bleeding, among others[1,5-6]. Patients, especially those undergoing bariatric surgery present an intense thirst in the perioperative period due to the specificity of the procedure, with fasting time above the recommended by scientific evidence and restriction of water intake of large volumes during the postoperative period[7].

The prevalence of thirst in PAR is roughly 75%, and even so, it is undervalued by the team[8-10], not being identified, measured and treated. This result is an exponential increase for patient's anxiety, which favors the occurrence of complications of a treatable symptom[3.8]. Paradoxically, there are no standard perioperative guidelines for patient care with a view to prevent complications from this symptom[8].

To raise awareness about the thirst symptom on the perioperative period, the Thirst Study and Research Group (GPS), from the *Universidade Estadual de Londrina*, conducted research based on four main pillars, called Management of the Perioperative Thirst: Identification, Measurement, Security Assessment and Strategy Management. This study focuses on the last step, proposing the evaluation of an innovative strategy: the use of a menthol package that included popsicles and mentholated lip balm.

Studies evaluating cold-temperature relief strategies - including early ingestion of ice chips, gargling with cold water, and frozen gauze - showed similar measures to relieve thirst[7,11-13]. However, they had small numbers of participants, without the standardization of strategies and evaluation of the study's impact, and were not performed in the PAR. The use of an ice popsicle compared to room temperature water and a package of menthol interventions with patients in the Intensive Care Unit (ICU) were shown to be more effective on the thirst intensity and discomfort in randomized controlled trials[8.12].

The positive effect of these strategies, using low temperatures over thirst, can be attributed to the presence of temperature receivers. It is the Transient Receptor Potential Melastatin 8 (TRPM8), which are calcium channels activated by the cold and also by the menthol, located throughout the oral cavity, at the sensitive terminations of the trigeminal and glossopharyngeal nerves[14-16].

Nonetheless, no clinical studies have been found evaluating whether the association of ice and menthol is superior to the isolated use of cold temperature strategies to reduce thirst and its discomfort given water restriction. The evaluation of a strategy that uses minimal volumes of fluid and yet is effective for thirst relief has the potential to impact clinical practice for patients undergoing anesthetic recovery.

The hypothesis of this study considered the application of a package of menthol measures in the IPP of patients submitted to elective bariatric surgeries by videolaparoscopy in the PAR as more effective than the use of non-menthol measures as a thirst relief method for intensity, lip hydration, dryness and taste of the oral cavity.

OBJECTIVE

To assess the effectiveness of the menthol package (lip hydration and ice popsicles) compared to a package of non-menthol measures (lip hydration and ice popsicles) as a method of relief of thirst in patients undergoing elective bariatric surgeries by videolaparoscopy in the Anesthetic Recovery Room.

METHODS

Ethical aspects

This study was approved by the Research Ethics Committee of the *Universidade Estadual de Londrina*, complying with Resolution 466/12 of the National Health Council and was registered on the ClinicalTrials.gov of the US National Institutes of Health under the identification number NCT 02869139.

Study design, place and period

A controlled randomized study, parallel, with two groups: the experimental group (EG), in which a package of menthol measurements was offered through lip hydration and ice popsicle; and the control group (CG), in which lip hydration and ice popsicle did not have menthol. The study did not present blinding because of the fragrance characteristic of the menthol offered to the EG. The recommendations of the Consolidated Standard Protocol Items were taken into account: Recommendations for Interventional Trials (SPIRIT)[17] for the research protocol, and the Consolidated Standards of Reporting Trials (CONSORT) for drawing up the study design[18].

The study was performed in the PAR of a private tertiary hospital located in the countryside of the state of Paraná with adult patients, submitted to elective bariatric surgeries by videolaparoscopy. Data collection occurred from July to November 2015.

A pilot test was conducted with 12 participants to assess the acceptability of two different concentrations of menthol (0.5 and 1%) by means of an instrument with ten Likert-type questions.

Sample, inclusion and exclusion criteria

The sample size was estimated by comparison by t-test for independent samples. Data from an earlier study were used for the Standard Deviation of the difference in thirst intensity variations[7]. The value of 1.5 was considered for the average of the difference of these variations between groups. A significance level of 0.05 and test power of 80% were assumed, and 56 individuals per group was the number determined[19]. To make up for possible losses, the sample was increased by approximately 10%.

The simple, balanced randomization of groups was performed through the GraphPad Online Software. In order to conceal the allocation, individual opaque and sealed envelopes were used, containing the definition of the group given by the random allocation, performed by a researcher who did not participate in data collection.

Inclusion criteria were patients of both sexes, aged between 18 and 65 years, fasting for more than four hours, with spontaneous thirst verbalization or, when questioned, with intensity greater than or equal to three in Numerical Verbal Scale (NVS), having received intraoperative opioids or anticholinergics, with anesthesia duration of more than one hour, assisted in the PAR and with approval in the evaluation of the Security Protocol on Thirst Management (PSMS)[20]. Patients with allergy to menthol, with continuity lesion in the oral mucosa or whose anesthetic recovery did not occur in the PAR were excluded.

Study protocol

The intervention group received a package of menthol measures which was made of a 10 ml popsicle (ultrafiltered water and 0.05% menthol) and lip moisturizing (with 1% menthol). The control group received a package of non-menthol measures, composed of ultrafiltered water-based and hydrating popsicle with the same formulation as the experimental group without the addition of menthol[21].

The clinical outcome of primary interest was the variation between the final moment compared to the initial one, on the perception of thirst intensity, lip hydration, dryness and taste of the oral cavity between the EG and CG. The clinical outcome of secondary interest was the need for intervention at moment three, based on satiety reach (zero intensity), according to the assessed attributes.

The instrument elaborated for data collection contained clinical and identification data, EG or CG allocation, and the three moments of patient evaluation using PSMS and NVS in the four attributes of thirst. This instrument was submitted to an apparent validation by five judges, three nurses who were teaching doctors in the area of Perioperative Nursing, and two master nurses, members of the Thirst Study and Research Group (GPS).

In the preoperative period, patients who met the eligibility criteria were invited to participate in the study and signed the Informed Consent Form. In the PAR, patients who continued having inclusion criteria were randomly assigned to the EG or CG.

In the immediate postoperative period, in the PAR, patients were assessed for safety for strategy management through PSMS, which assesses the level of consciousness, protection of the airways and absence of nausea and vomiting. When approved by PSMS[20], the research protocol was initiated.

All the evaluation/intervention moments, denominated M1, M2, M3, consisted of approval in PSMS[20], evaluation of the four attributes through NVS – perception of thirst intensity (zero= no thirst, and ten= very thirsty (zero= hydrated, and ten= very dehydrated), perception of dryness of the oral cavity (zero= moist, and ten= very dry), perception of taste in the oral cavity (zero= normal, and ten= very poor) – and strategy management according to the CG or EG allocation. A 30-minute interval was established between M1, M2, M3. Interventions and evaluations were carried out by the same researcher.

Results analysis and statistics

Quantitative variables were described by mean and Standard Deviation; categorical variables, by absolute and relative frequencies. The quantitative data analyzed by the Kolmogorov-Smirnov test did not present normal distribution, using, therefore, non-parametric tests. Mann-Whitney tests were performed for the comparisons between the groups, in relation to the quantitative variables. For categorical variables, Fisher's exact test was used. The Linear Regression model with mixed effects (random and fixed effects) was used to compare the intensity of thirst, lip hydration, dryness and taste of the oral cavity between groups over time. For the comparison between groups, the analysis of covariance (ANCOVA) was proposed for variations in thirst intensity, lip hydration, dryness and taste of the oral cavity. All models were adjusted for covariates (possible confounding factors), chosen for having presented a *p* value under 0.20 in the comparisons for the dependent variables[19].

As for analyzing satiety point, lip hydration, cessation of lip dryness and normal taste sensation in M3, comparisons were made for the four outcomes between the two groups and the respective *Odds Ratio* were estimated by using the Simple Logistic Regression method. For all comparisons, a significance level of 5% was adopted, with a confidence interval of 95%[19]. The analyzes were performed by using the statistical software SAS/STAT® 9.0.

RESULTS

Of the total of 127 adult patients submitted to elective bariatric surgeries by videolaparoscopy during the investigation period, seven were excluded because: three did not undergo through PAR care; because they did not report thirst symptoms after surgery; and one was not approved in the PSMS. Thus, 120 patients participated in the study, divided into two groups: 59 in the EG and 61 in the CG. There was no loss after randomization.

Table 1 - Distribution of demographic and clinical characteristics according to experimental group and control. Londrina, PR, Brazil, 2016

Variable	Group		*P* value *
	Experimental mean (± SD)	Control mean (± SD)	
Age	37.4 (11.0)	39.5 (11.8)	0.34
Duration of anesthesia (hours)	3.2 (0.9)	3.0 (0.9)	0.07
Duration of the procedure (hours)	2.1 (0.7)	2.0 (0.8)	0.24
Duration of PAR (hours)	3.0 (0.6)	3.0 (0.8)	0.90
Duration of solids fasting (hours)	68.4 (4.0)	67.5 (4.4)	0.16
Duration of fluid fasting (hours)	18.4 (3.5)	18.0 (4.0)	0.55
Thirst intensity (M1)	7.6 (1.6)	7.4 (1.7)	0.38
Lip Hydration (M1)	3.7 (2.6)	3.7 (2.2)	0.71
Dryness of the oral cavity (M1)	7.8 (2.1)	7.0 (2.3)	0.06
Taste in the oral cavity (M1)	2.9 (2.1)	3.0 (2.2)	0.78

*Note: *Mann-Whitney test.*

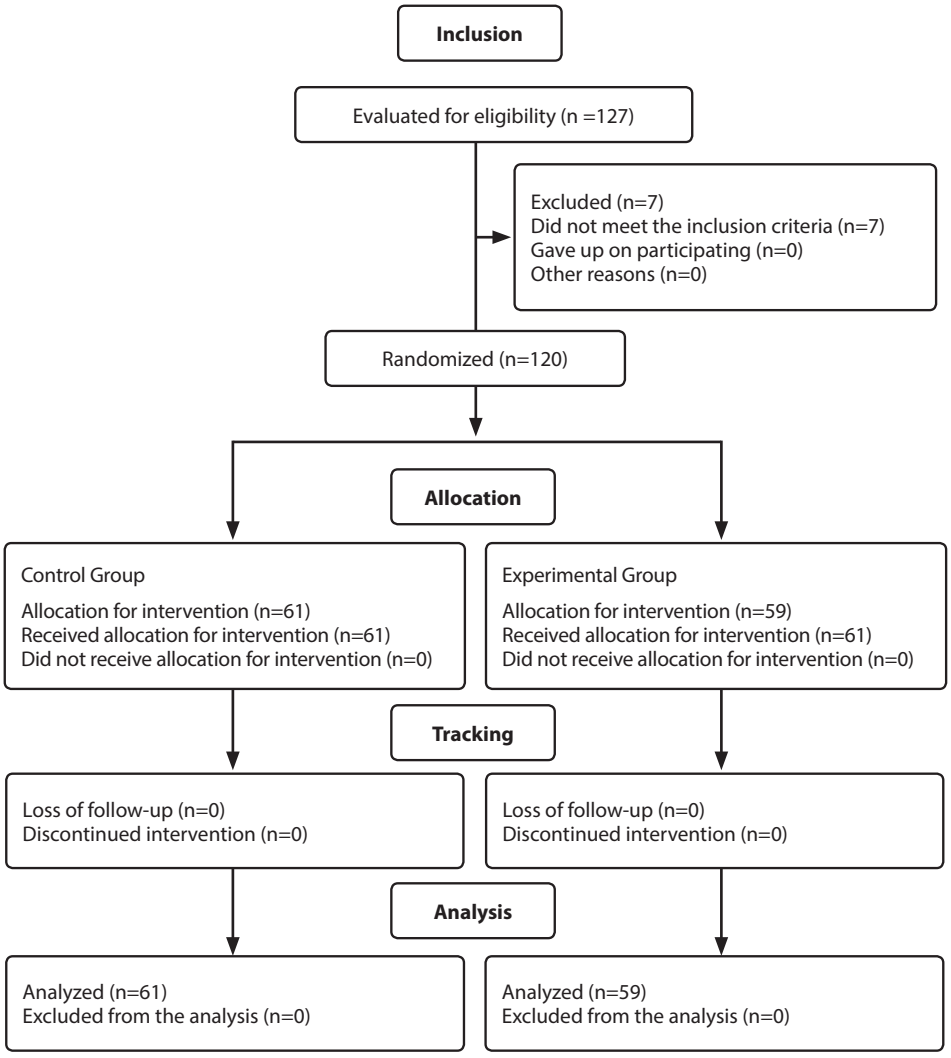

Figure 1 - Sampling and Randomization Diagram. Londrina, PR, Brazil, 2016**.**

Considering the totality of participants, an average age of 38.4 years old (SD=11.4) was found, and the means of the four attributes at the initial moment were 7.5 (SD=1.6) for thirst intensity; 3.7 (SD=2.4) for lip hydration; 7.4 (SD=2.2) for dryness of oral cavity; and 2.9 (SD=2.2) for taste in the oral cavity. There was no significant difference in the other variables analyzed between the groups (Table 1).

The total sample in both groups was composed of a predominantly female population, who presented ASA II, and used a Guedel cannula on entering the PAR. The most used surgical technique was gastric sleeve and the highest percentage of patients used opioids and anticholinergics during the anesthetic-surgical procedure. In addition, most patients voiced their thirst only after questioning it, and reported that it started postoperatively. The variables analyzed in the study showed that the groups were homogeneous (p>0.05) and could be compared.

The difference found for the four attributes (intensity, hydration, dryness and taste) was significant (p<0.05) in the three evaluated moments, both in the EG and CG. However, when comparing EG and CG at the three moments, the difference found was significant for the intensity of the thirst in M2 (p=0.04) after a single application of the menthol package, according to Table 2.

In Table 3, it is possible to verify a decrease in thirst intensity, improvement of lip hydration, dryness and taste of the oral cavity between the moments in the EG and CG groups.

Table 4 presents the number and percentage of patients who reached satiety - verbalisation by the patient of intensity equal to zero in the four evaluated attributes (intensity, lip hydration, dryness and taste) in M3.

Table 2 - Evaluation of thirst attributes (intensity, hydration, dryness and taste) at different moments, according to experimental and control groups. Londrina, PR, Brazil, 2016

Groups / Moments	Attributes analyzed in the study							
	Intensity		Hydration		Secura		Taste	
	DF*	*P* value **	DF*	*P* value **	DF*	*P* value **	DF*	*P* value **
Experimental (M2 - M1)	3.5	<0.01	2.64	<0.01	3.48	<0.01	2.04	<0.01
Control (M2 - M1)	2.76	<0.01	2.59	<0.01	2.54	<0.01	1.58	<0.01
Experimental (M3 - M1)	4.85	<0.01	3.39	<0.01	4.67	<0.01	2.28	<0.01
Control (M3 - M1)	4.74	<0.01	3.45	<0.01	4.05	<0.01	2.1	<0.01
Experimental (M3 - M2)	1.35	<0.01	0.75	<0.01	1.19	<0.01	0.24	0.28
Control (M3 - M2)	1.98	<0.01	0.86	<0.01	1.51	<0.01	0.52	0.01
M1 (Experimental-Control)	0.22	0.38	0.12	0.71	0.70	0.06	0.08	0.78
M2 (Experimental-Control)	0.51	0.04	0.06	0.84	0.24	0.51	0.38	0.18
M3 (Experimental-Control)	0.12	0.65	0.17	0.58	0.08	0.82	0.1	0.71

*Note: *DF = difference found **Linear Regression with mixed effects.*

Table 3 – Evaluation of thirst attributes (intensity, hydration, dryness and taste) at different moments, according to experimental and control groups. Londrina, PR, Brazil, 2016

Attributes	Moments of Evaluation			DF*	*P* value **
	Moment 1 mean (± SD)	Moment 2 mean (± SD)	Moment 3 mean (± SD)		
Thirst Intensity				0.32	0.32
Experimental	7.6 (1.6)	4.0 (1.9)	1.6 (1.9)		
Control	7.4 (1.7)	4.54 (1.7)	1.7 (1.6)		
Lip Hydration				0.00	0.99
Experimental	3.7 (2.6)	1.1 (1.5)	0.3 (1.3)		
Control	3.7 (2.2)	1.1 (1.6)	0.2 (0.5)		
Dryness of the oral cavity				0.78	0.05
Experimental	7.8 (2.1)	4.2 (2.4)	2.3 (2.4)		
Control	7.0 (2.3)	4.4 (2.2)	2.3 (2.0)		
Taste in the oral cavity				0.36	0.28
Experimental	2.9 (2.1)	0.9 (1.3)	0.5 (0.8)		
Control	3.0 (2.2)	1.4 (1.5)	0.8 (1.1)		

*Note: *DF = difference found **Analysis of covariance (ANCOVA).*

Table 4 – Distribution of the satiety reach of the thirst attributes (intensity, lip hydration, dryness and normal taste of the oral cavity) in M3, according to the experimental and control groups. Londrina, PR, Brazil, 2016

Attributes Distribution of satiety reach in M3						
Thirst intensity in M3						
Group	Reach of satiety		OR*	RI (95%)**		*P* value***
	Yes	No				
Experimental	31 (52.5%)	28 (47.5%)	1.71	0.83	3.52	0.15
Control	24 (39.3%)	37 (60.7%)	1	-		
Lip Hydration in M3						
Group	Reach of satiety		OR *	RI (95%)**		*P* value***
	Yes	No				
Experimental	52 (88.1%)	7 (11.9%)	1.29	0.44	3.71	0.64
Control	52 (85.2%)	9 (14.8%)	1	-		
Dryness of the oral cavity in M3						
Group	Reach of satiety		OR *	RI (95%)**		*P* value***
	Yes	No				
Experimental	22 (39.3%)	37 (62.7%)	1.67	0.77	3.64	0.19
Control	16 (26.2%)	45 (73.8%)	1	-		
Taste in the oral cavity in M3						
Group	Reach of satiety		OR *	RI (95%)**		*P* value***
	Yes	No				
Experimental	38 (64.4%)	21 (35.6%)	1.34	0.64	2.81	
Control	35 (57.4%)	26 (42.6%)	1	-		0.43

*Nota: *OR: OddsRatio ** IC: Intervalo de Confiança ***Regressão Logística Simples.*

DISCUSSION

This study evaluated an innovative strategy to relieve the surgical patient's thirst during anesthesia recovery, verifying if the use of menthol added to the cold would be more effective to relieve thirst in relation to the cold used isolated.

Although literature presents studies using cold to relieve postoperative thirst, the use of menthol as a strategy was reported in a study with patients in the ICU, but without specifying the concentration of menthol used in lip hydration[12]. The present study also identified, in addition to aspects related to thirst intensity, improvement of other attributes commonly related to it, such as dry mouth, lip hydration and poor taste in the mouth. A survey carried out in the immediate postoperative period of gastrointestinal surgeries evaluated that a package of measures comprising chilled saline solution with menthol relieved thirst intensity significantly, as well as the oral condition of tongue and saliva[22]. However, there was no detail of the composition of the menthol solution used[22], which makes comparison with the present study difficult.

The context of this study evaluates the action of the menthol package on a population very susceptible to this symptom. The thirst in patients in post-operative care of bariatric surgery is intense.

Therefore, an initial mean intensity of 7.6 was found for EVN in M1 assessment and intervention. The prevalence was also high, given that out of 120 patients, 97.6% were thirsty, a rate even higher than that found in another PAR study, which found a rate of 75% in general surgeries[10].

It was observed that both EG and CG, analyzed independently, had behaved in a sufficiently similar way, presenting a reduction

of the discomforts in relation to the attributes. It was found that in both groups, separately, a significant difference (p<0,01) in the reduction of the average thirst intensity, improvement of labial hydration, dryness and taste of the oral cavity. This corresponds to the analysis in between the moments of evaluation and intervention (M1 and M2, M2 and M3) and in the total difference found between M3 and M1.

Nevertheless, the hypothesis that there would be a significant difference in the attributes analyzed in the study, between both applied strategies, when comparing the final variation minus the initial after one hour; this is because the two groups behaved in a similar way. As indicated by recent findings, the thermoreceptors are activated by both the cold and the menthol, and it can be inferred from present data that the effect in the groups was similar, due to a probable activation of the same receptor[12-14, 23-24].

In addition to intensity, a study evaluated: the subjective sensation of thirst, water pleasantness, dry mouth and poor mouth taste after 24 hours of water deprivation, and found that, during rehydration, the perception of these attributes returned to initial levels after five minutes of free water intake[25]. These results are consistent with a close correlation of these subjective assessments with the will of drinking water.

In the present study, however, with no free water intake, there was an expressive reduction in the attributes of thirst intensity, providing lip hydration, improvement of dryness and taste of the oral cavity with the administration of the menthol package. This is particularly interesting in the period of anesthetical recovery, when there is water restriction for the patient's safety. In this sense, both the menthol package and the non-menthol package were considered viable alternatives for the improvement of discomforts caused by thirst.

Recent discoveries in sensory physiology may explain this improvement in the sensation of thirst. TRPM8 are activated by the action of both cold temperatures and menthol products. Their stimulation open the ion channels in the sensory nerve endings and consequent non-selective influx of calcium ions, by triggering the activation and generation of action potentials, and nerve impulses[14,16]. These reflexes, initiated in the trigeminal and glossopharyngeal free nerve endings, are projected through three neurons of the temperature pathway to Brodmann's area 3, 1 and 2, located in the cingulate cortex, activated when thirst is satiated[15,24].

Thus, the satiety reached through activating this region is related to the pre-absorptive satiety and associated with a sensation of pleasure, denominated aliases[23-25]. The cold provided by the use of menthol and non-menthol packages activates this region, thus giving a sensation of pleasantness to patients, with a consequent decrease in the perception of thirst intensity, which was shown in the study. The perception of refreshment is directly linked to physiological factors of satiety[23].

The sensation of pleasure or displeasure in relation to the cold in the skin may indicate a threat to body temperature homeostasis, but cooling the mouth with cold water, for example, is identified as pleasant in the same environment if the person is thirsty. This happens because the cooling of the mouth signals water intake, and this will tend to restore the body's water homeostasis[1]. The production of salivary flow is stimulated by cold temperatures, resulting in a hydrated mucosa, with a consequent decrease in the perception of thirst[5].

Several studies have demonstrated the superiority of strategies with cold temperatures to lessen thirst in surgical patients[11]. The outcomes evaluated include: thirst intensity, oral cavity conditions, saliva pH and sore throat after cold saline gauze interventions[26]. This study showed that, with an increasing number of gauze application with a cold saline solution, the intensity reduction was greater in the GE (p=0.009)[7].

The evaluation of a regimen released from an early ingestion of liquids (ice chips and water) in the IPO of cardiac surgeries detected a lower tendency to report high levels of thirst[28]. The use of ice chips in PAR patients demonstrated the superiority of the low temperature strategy for reducing, in four times, the initial thirst intensity, although not statistically significant given its small sample. For greater effectiveness of the intervention, the size of the ice chips could be increased[10].

The use of moist gauze and gargle with cold water in the postoperative period with orthopedic surgery patients showed that the intensity of thirst was reduced, and oral cavity conditions were better in EG[28]. In patients undergoing cholecystectomy, the use of frozen gauze with saline solution or ice has improved the conditions of the tongue, saliva, oral mucosa and gums[7].

In a single randomized clinical trial with PAR patients, the efficacy of ice popsicles compared to water at room temperature was assessed by the patients. The ice popsicle was more effective than the water as for the variation of the initial thirst intensity when compared to the final one. The intensity of thirst and the number of interventions needed to achieve satiety were different for both groups, from the second moment onwards (p <0.05)[8].

Nevertheless, when comparing the behavior of one group in relation to the other at different moments, the EG presented greater and significant efficacy only between M1 and M2 regarding thirst intensity. In relation to the other attributes, there was no statistical difference in the behavior of both groups after administering twice the interventions. It is argued that menthol activates both thermoreceptors and taste buds, hence its popularity in the use of various food products.

Therefore, in addition to TRPM8, menthol also stimulated taste buds[23, 29]. There was also a residual effect of menthol when evaluating M2 and M3, justifying the marked improvement in the oral cavity taste for the EG.

The possibility of repeated exposures to menthol desensitizing TRPM8 was also considered. This aspect was reported by one of the authors who described the functioning mechanism of the receptor through the role played by a second lipid messenger in both the activation and desensitization of TRPM8[30]. Most sensory modalities undergo adaptations or desensitizations, that is, they reduce activity, despite the continuous presence of the stimulus. This fact also seems to be true for TRPM8, which may demonstrate decreased activity during the activation by the cold or menthol products, in the presence of extracellular Ca^{2+}, with consequent lipid depletion, which would limit its activity. Further studies are needed to clarify how and under which conditions the desensitization of cold receptors in clinical practice would occur[31].

In the evaluation conducted after 30 minutes (M2) of the first intervention, the perception of the EG regarding the action of

the menthol package on the improvement in intensity, dryness and, especially, taste in the oral cavity was higher than that of the CG. After a new administration was performed, the patient's perception was not clear in relation to changes in the intensities of these attributes. It is assumed that, after the second administration of the mentholate popsicle and hydrating agent, a residual menthol effect has occurred, with the desensitization of temperature receptors, as well as in the taste buds of the oral cavity. A single application of menthol may be of interest when the patient is undergoing absolute fluid restriction, such as in the preoperative period, allowing a sensation of pleasantness through a single administration of menthol and moisturizing menthol, decreasing thirst discomfort by pre-absorption satiety.

In the present study, the RR assessment for not achieving satiety after one hour of evaluation and intervention demonstrated risk values lower than 1 for all attributes assessed, indicating that it is a protection factor. However, when assessing the confidence interval, it exceeded 1, which may indicate association by chance. It is argued that a larger sample size could confirm the protective factor of the menthol package. Similarly, when evaluating the efficacy of the RRR and RAR, no significant results were found[19].

We did not find studies that evaluated the use of cold associated with menthol products in comparison to the cold itself. To deepen the discussion with the results of the present study, further research is needed, with the same methodological design and the elucidation on the concentrations of the menthol associated with the cold.

This study raises new questions about the action of menthol over control centers responsible for thirst management. There is a need for research that evaluates its action at room temperature compared to strategies that use only cold temperatures.

In bariatric surgery cases, water restriction is with patients not only in the anesthetic recovery, but also during the immediate and mediate postoperative period, which presupposes the extension of the results of this study for the periods mentioned.

Study limitations

The scarcity of studies using similar methods limited the comparison and discussion of the results found in this study. Moreover, the effectiveness of the methods that made up the package of measures was not assessed separately. New investigations should be conducted in order to produce knowledge regarding the effectiveness of the combination of perioperative thirst relief strategies.

Contributions to the field

Surgical patients and, more especially, bariatric patients, are part of a high-risk group that could develop thirst by intubation, blood loss, osmotic imbalance, and prolonged fasting. These factors for this group of patients are even longer in the postoperative period.

Finding a thirst relief method that can be effective and safe during the recovery period is a challenge for Nursing. The results indicate that cold and menthol strategies are effective in relieving thirst with small volumes, which is a highly desirable situation for patients recovering from this type of surgery.

The relevance of this clinical trial is to prove the effectiveness of two packages of measures to reduce postoperative surgical patient's thirst. These strategies are easy to use, have a low cost and a high patient acceptability, representing viable alternatives to care in clinical practice.

CONCLUSION

The use of a menthol package was not more effective than a package of non-menthol measures, regarding decreased thirst intensity, improved lip hydration, dryness and oral cavity taste over an hour with patients undergoing surgery by videolaparoscopy in PAR. There was a significant difference in thirst intensity after a single administration of the menthol package, raising the hypothesis that there may be a desensitization of the cold temperature thermoreceptors in the oropharyngeal, as well as of the taste buds after the continuous stimulation by menthol. There was no difference in the extent of satiety between the groups.

Although menthol products were no more effective than non-mentholated ones, the results confirm that cold strategies associated with menthol may benefit perioperative patients as for the intensity, hydration, dryness and taste in the oral cavity. The menthol strategy proved to be effective after a single administration, which makes it interesting for patients under anesthetic recovery.

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