Effects of Cold and Hot Beverage on Oral Temperature

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Abstract: *Body temperature is one of the four major vital signs which must be monitored by healthcare providers to establish safe and effective care. Therefore, it's crucial for healthcare provider to choose and use the most appropriate technique to ensure the accuracy of the measured temperature.This study designed to assess the effects of cold and hot beverage on body temperature in students of King Faisal University. This study was an experimental, repeated-measures. The experiment was performed for 30 min. Out of the 127 students approached, 80 completed the study, representing a response rate of 63%. Participation was voluntary. The temperature were taken with oral and tympanic route. After five minutes body temperature of participants from both groups are statistically significantly different (p value <0.0001). After thirty minutes body temperature of participants from both groups are not significantly different (p value = 0.5538). On the average, the body temperature of those who drank cold beverage drop by 0.03 degrees. On the other hand, the body temperature of those who drank hot beverage elevated by 0.04 degrees. The range of body temperatures in healthy adults is wide and the baseline temperature is altered due to drinking hot or cold beverages.*

Key Words: *Oral temperature, cold beverage, hot beverage*

I. Introduction:

Body temperature is all about the balance between heat produced and heat lost from the body. It is measured in heat units called degrees, and it ranges between 36 C and 37.5 C. In fact, we can divide the body temperature into two types which they are core body temperature and surface body temperature. Core body temperature reflects the temperature of the deep tissues of the body which is relatively constant, such as abdominal cavity and pelvic cavity, whereas surface body temperature reflects the temperature of the skin, subcutaneous tissue and fat which is changeable between rising and falling in response to the environment. The human body is continually producing heat as a by-product of metabolic processes, and the person is considered in heat balance when the amount of heat produced by the body equals the amount of heat lost. In addition, body temperature deviates from the normal depending on some factors. These factors include age, diurnal variation, hormones, exercise and environment (Berman & Kozier, 2008).

Body temperature is one of the four major vital signs which must be monitored by healthcare providers to establish safe and effective care. It is important for healthcare provider to choose and use the most appropriate technique and mean to ensure the accuracy of measured temperature. There is verity of invasive and non-invasive sites can be found for measuring temperature. Non-invasive means include rectum, oral cavity, axilla, temporal artery (forehead) and external auditory canal. These sites are accessible and highly believed to provide the best estimation of the core body temperature (Godfrey et al., 2018).

One common site of non-invasive means is oral cavity. The oral cavity temperature is done by placing the thermometer posteriorly into the sublingual pocket (Hamilton and Price, 2007). The reason behind this technique is that this landmark is very close to the sublingual arteries which tracks changes in the core body temperature (Dougherty and Lister, 2011). In this site, temperature can be taken by using either the classic glass thermometer, or the more modern digital thermometers that use an electronic probe to measure body temperature (Urmc.rochester.edu, 2018). Additionally, this site has some advantages and disadvantages. Accessibility and convenience are considered some of the advantages. The disadvantages include that thermometers can break if bitten, inaccurate temperature if person has ingested food or fluid or smoked therefore we should wait 30 minutes before taking the temperature orally to ensure the accuracy, also it could injure the mouth following oral surgery (Berman & Kozier, 2008).

The aim of this study

This study designed to assess the effects of cold and hot beverage on body temperature in students of King Faisal University. This study was an experimental, repeated-measures. The experiment was performed for 30 min.

II. Study Design And Methods

Setting
The study was conducted at the department of Nursing, College of Applied Medical Sciences, King Faisal University.

Study participants
All second level students were contacted, counseled, and their verbal consent was obtained after thorough explanation of the purpose and procedure of the study. Out of the 127 students approached, 80 completed the study, representing a response rate of 63%. Participation was voluntary.
The study was approved by Research Committee of College of Applied Medical Sciences, King Faisal University.

Tools
Tool used in the study were developed by the researchers after reviewing of the current local and international related literatures using books, articles and scientific magazines. This helped them to be acquainted with the problem and guided them in the process of tools' designing. Tool was reviewed by jury of 3 expertise's in the field of the study to test its contents and face validly.

Intervention
One hundred and twenty seven volunteer students were exposed to each of the two stimuli, 80 completed the study. The Participants were then taken the body temperature (orally and tympanic). The first time to chick the temperature was before drinking as a basic body temperature. Oral temperatures, were taken immediately after exposure, and at various times until 30 minutes.
In the skills lab (SL) the temperature is 17°C and all participants' were taken cold or hot drink in two days. Core temperature of the participants were noted with the use of oral and tympanic thermometer. A brief statement of the study objectives was read aloud in Arabic to inform consent. Moreover, the students were assured that their participation would be voluntary and that they would be free to leave the study at any time if they wished. Informed consent procedures were adhered to. The procedure took place at a location and times convenient for the participants.
The participants were then randomly divided into two groups. Randomization was carried out by sealed envelope technique.
- Group 1 Participants received cold mint drink 10°C
- Group 2 Participants received hot mint drink 55°C.

I. Results

Table (1) General characteristics of the participants
Table one showed that the number of the participant whom drank cold drinking was 45 and 35 for hot drink.
The mean age of the participant was 20.5 years in cold drinking group and 20.2 in hot drinking group.
In relation to Body Mass Index, the group who drink cold had 21.2 mean BMI, and 21.5 for the second group.

Table (1)

Age	Number	Mean
Cold	45	20.5
Hot	35	20.2
BMI		
Cold	45	21.2
Hot	35	21.5

Table (2) Two-sample t test with equal variances (Temperature without correction with baseline)
After five minutes body temperature of participants from both groups are statistically significantly different (p value <0.0001).
After ten minutes body temperature of participants from both groups are significantly different (p value = 0.0039).
After fifteen minutes body temperature of participants from both groups are significantly different (p value = 0.0145).
After twenty minutes body temperature of participants from both groups are not significantly different (p value = 0.2743).
After thirty minutes body temperature of participants from both groups are not significantly different (p value = 0.5538).

After 5 minutes	Mean	Std. Err.	Std. Dev.	P value
Cold	36.27	.0709167	.4757239	<0.0001*
Hot	36.77	.0654764	.3873635	
After 10 minutes				
Cold	36.37	.0679539	.4558486	= 0.0039*
Hot	36.65	.0583198	.3450247	
After 15 minutes				
Cold	36.45111	.0672416	.4510704	= 0.0145*
Hot	36.68	.0573651	.3393768	
After 20 minutes				
Cold	36.5	.0703526	.4719398	= 0.2743
Hot	36.60571	.060522	.3580528	
After 30 minutes				
Cold	36.51778	.0797906	.5352519	= 0.5538
Hot	36.58286	.0697518	.412657	

* Significant "P value"

Table (3) Two-sample t test with equal variances (Temperature with correction with baseline)

After five minutes body temperature of participants from both groups are statistically significantly different (p value <0.0001). On the average, the body temperature of those who drank cold beverage drop by 0.28 degrees. On the other hand, the body temperature of those who drank hot beverage elevated by 0.23 degrees. After ten minutes body temperature of participants from both groups are significantly different (p value = 0.0032). On the average, the body temperature of those who drank cold beverage drop by 0.18 degrees. However, the body temperature of those who drank hot beverage elevated by 0.11 degrees. After fifteen minutes body temperature of participants from both groups are significantly different (p value = 0.0097). On the average, the body temperature of those who drank cold beverage drop by 0.11 degrees. Conversely, the body temperature of those who drank hot beverage elevated by 0.14 degrees. After twenty minutes body temperature of participants from both groups are not significantly different (p value = 0.2098). On the average, the body temperature of those who drank cold beverage drop by 0.05 degrees. On the other hand, the body temperature of those who drank hot beverage elevated by 0.06 degrees. After thirty minutes body temperature of participants from both groups are not significantly different (p value = 0.4171). On the average, the body temperature of those who drank cold beverage drop by 0.03 degrees. On the other hand, the body temperature of those who drank hot beverage elevated by 0.04 degrees.

After 5 minutes	Mean	Std. Dev.	P value
Cold	-.2755557	.5104166	<0.0001
Hot	.2371429	.3850789	
After 10 minutes			
Cold	-.1777777	.4606758	= 0.0032
Hot	.1114287	.3636186	
After 15 minutes			
Cold	-.1022221	.4764875	= 0.0097
Hot	.1399999	.2881994	
After 20 minutes			
Cold	-.0533335	.4760633	= 0.2098
Hot	.065714	.3271471	
After 30 minutes			
Cold	-.0355559	.4622845	= 0.4171
Hot	.0428573	.3751752	

II. Discussion

In our study we tested the effect of cold and hot beverage in the body temperature. Considering a small elevation in body temperature may mark a person as infected patient and vice versa as lowering body temperature may lead to consider a person as healthy when he is in reality a sick patient.

We involved in our study both hot and cold beverages as they have the same significant value in diagnosing a patient. In this study it is clear that there was a significant change in the oral temperature for both hot and cold beverage for up to 15 minutes. However the body temperature at 20 minutes showed no significant change for both hot and cold beverage.

this results in the same line with Doyle F. study, they conclude that individuals demonstrated wide variability in their temperature responses. Tympanic and oral temperatures taken within the first 20 minutes after exposure to outdoor temperature extremes may fail to accurately reflect the patient's true temperature.

Dickinson E. T mentioned that there is poor correlation between tympanic and oral temperature determinations in the EIR setting. Oral temperature determinations may be preferable to tympanic temperature determination in the EIR setting.

We hint that a little delay in recovery of the temperature is may be related to the vascular changes that need to be reversed not the direct effect as with cold beverage vasoconstriction would occurred resulting in decrease of blood follow which reflects in decrease of the temperature added to the effect of direct conduction.

in Newman B. H. study they found that the drinking of a hot beverage caused an immediate mean temperature elevation of 2.6 degrees F which would lead to deferral for 7 of 10 subjects. A cold beverage lowered the temperature; the temperature in 6 subjects returned to baseline by 10 minutes and that in 4 did so by 30 minutes.

In our study we standardized the ambient temperature. However in colder or hotter condition the results of tympanic membrane will also be altered making it a challenging to make an accurate reading of its actual core temperature.

III. Limitation Of The Study

Keeping that in mind further testing need to be conducted considering the effect of extreme weather on oral temperature and after how much time it will recover, our limitation was that the other choice to standardized the test would be measuring rectal temperature which is not suitable to be done in our institution.

IV. Conclusion

After thirty minutes body temperature of participants from both groups are not significantly different.

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