Short communication

Intake of hot water after each meal as a weight reduction strategy – a prospective randomized controlled trial

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ABSTRACT

Introduction and Aim: Intake of water before meal is associated with weight loss. There is a paucity of literature with comparative evaluation of taking warm water or regular water after meals on weight and BMI. Hence, we designed a randomized controlled trial with regular and warm water after meals to investigate the comparative efficacy of warm and regular water intake after meals on weight and BMI in overweight adults.

Methodology: Fifty participants were randomized into two groups, with Group H instructed to drink 200-250 ml of warm water after each meal and Group C to drink the same amount of regular water.

Results: The demographic data prior to the study in both the groups were similar. Compliance was high in both groups, and after three months, the warm water group experienced a significant reduction in weight and BMI compared to the regular water group (p=0.000). In Group H, weight and BMI came down from 76 to 73 and 29 to 27 respectively.

Conclusion: The study concluded that warm water intake after meals may contribute to weight loss without major side effects. This is the first attempt to investigate the influence of warm water on weight reduction.

Keywords: Water; warm; meal; weight loss.

INTRODUCTION

Water is the most essential beverage of life. Water makes up most of the human body, accounting for roughly 60% of the total. The portion of water in the body varies slightly depending on age, gender, and the level of hydration. Whereas the mean percentage of water in human (1) is around 60%, it can range between 45 and 75%. There are many described benefits of drinking water before meals every day, but the scientific literature is lacking. Drinking plenty of water and staying hydrated can help one's skin, muscles, and joints. Water aids in the absorption of nutrients and the fight against infections in human cells. Consuming a few glasses of warm water each day may provide additional benefits.

Water is used for a variety of purposes, including the ones listed below.

- Control of body temperature
- Transports nutrients and oxygen to cells
- Joint lubricant
- By flushing out waste products, it reduces the burden on the kidneys and liver.
- Aids in the dissolution of minerals and nutrients, making them available to your body.

Even though there has been little academic research on the benefits of consuming hot water, alternative health proponents say that drinking hot water is a simple way of improving one's health (2). Although there are numerous stories in folk medical literature about how hot water can boost health, scientists have only recently begun to investigate the benefits of consuming hot water. According to a study published recently in May 2021, India is rapidly transitioning from an underweight to an overweight/obese population. Obesity was found to be prevalent in 40.3 percent of Indians (3). This assumes alarming proportions in view of the already existing high incidence of obesity related disorders like diabetes mellitus. In this context, we designed a trial to compare drinking a cup of hot water after every meal to drinking regular water in terms of weight loss in otherwise healthy overweight adults over a three-month period.

METHODS

Fifty overweight adults of both sexes with no other major morbid illness were selected for the study. The inclusion criteria were overweight adults with no other illness like diabetes, thyroid which can influence the weight over a period. The exclusion criteria included children, pregnancy and on drugs with influences on weight like steroids. The study was done over a period of one year from April 2021 to March 2022. The study was approved by the institutional ethics committee (Number - IRBSTH 102/2021). The research was carried out in accordance with the principles outlined in the Helsinki Declaration. All patients were

informed about the study and signed an informed consent form. The baseline data of age, sex, height, and weight were collected. The (Body Mass Index) BMI calculated was named as BMI 1. Using a sealed envelope technique, the subjects were divided and randomized into two groups, with everyone having an equal chance of being in either group. Group H was instructed to drink 200 – 250 ml of warm water/hot water acceptable to their oropharyngeal tract, after each meal. Subjects in Group C drank the same amount of regular water. The patients in either group can drink regular water in between if they wanted. Every week, a telephonic conversation was held with each patient to ensure that they were compliant with the study's design. All the subjects were informed that drinking water either warm or normal is likely to improve digestion. They were not informed about weight loss so that the patient bias stands decreased. The concept of blinding is difficult in such studies as the intervention must be done by patients. A compliance rate of more than 75% was deemed acceptable. This means that out of every 100 meals, at least 75 should be followed by a glass of warm water. Standardized scales were used to assess the subjects' height and weight. The weight was measured using an established digital scale that gives values to one decimal place. In the interim, any patient who did not follow the protocol was excluded. Any patient who needs to travel abroad and stay outside with irregular feeds was also further barred from participating. The appearance of any new disease or hospitalization was not automatically followed up. For those who reported low compliance, we addressed constraints and ways to overcome them to improve adherence. The adherence is self-reported. Throughout the 12-week intervention, weekly phone messages were sent as a reminder. The sample size was determined by the primary outcome measure of a decrease in BMI of more than 0.5. According to an expected population of 5% overweight patients in a target population of 400, an alpha error of 95 % and a beta error of 0.05. The compliance rate of more than 75 % was deemed acceptable but the percentages were difficult to calculate and analyze. All the subjects were asked to report for routine monthly visits and the weight was measured only after the 12-week interval. The BMI was calculated and named as BMI 2. All data were collected in excel sheet and subjected to SPSS software for statistics 20.0. Repeated measures ANOVA was used to assess group and time differences for subjects completing the 3-month intervention; analysis of covariance was used to adjust for baseline differences when present.

RESULTS

The study was completed in the three months' time interval. A compliance of more than 75 % was achieved in all the fifty cases. The baseline characteristics were similar in both the groups. The results are mentioned in Table 1 and 2.

Table 1: Baseline characteristics of age, gender and height

	Warm water group (n=25)	**Normal water group (n=25)**	**P value**
Age	41.6 (11.89)	41.56 (10.91)	0.99
Gender (M/F)	17/8	17/8	1.00
Height (cm)	161.64 (7.32)	161.28 (7.85)	0.86

Data are presented as mean (SD) or *n*

Table 2: Baseline characteristics of weight and BMI

	Warm water group (n=25)		**Normal water group (n=25)**		**P value**
	Baseline	**3 months**	**Baseline**	**3 months**	
Weight (kg)	76.29 (9.56)	73.37 (9.65)	77.90 (9.42)	77.34 (9.22)	0.000
BMI (kg/m^2)	29.12 (2.45)	27.98 (2.41)	30.11 (4.31)	29.88 (4.23)	0.000

Data are presented as mean (SD)

There were no other complications. Regarding the primary outcome measure the reduction of BMI of more than 0.5 was not achieved in the normal water group while it was achieved in the warm water group.

DISCUSSION

Dennis *et al., (*4) found that drinking 500 ml of water before each main meal, when combined with a hypocaloric diet, results in enhanced weight reduction than a low - calorie diet alone in middle-aged and older adults. This could be due in part to an abrupt decrease in meal quantity following water ingestion. This looks logical that partly filling the stomach can decrease calorie intake. In our study, we tried water that took around half of the amount described with satisfactory results. Davy *et al.,* (5) discovered the same weight loss with premeal water consumption. They also stated that the percentage reduction in meal energy intake after the water preload was unrelated to gender, age, BMI, or habitual daily water consumption. In metabolic studies (6), the effect of water on energy expenditure and fuel utilisation should be recognised as a significant confounding factor. Indeed, water

consumption-induced thermogenesis is a significant and underappreciated component of daily energy expenditure. If confirmed in future studies, this free intervention could be a useful adjunctive treatment in overweight and obese people to increase energy expenditure. The water induced thermogenesis was overcome in our study in that we used warm water to get weight reduction. In our results, even though drinking regular water reduced weight, drinking warm water lowered weight more significantly. Stookey *et al.,* (7) in their observations had stated that independent of covariates, relative and absolute increases in drinking water were accompanied by significant loss of body weight and fat over time. They have studied waist circumference and weight but we did not measure the waist and we had both sexes as samples. Ren *et al.,* stated in their work on water intake that cold water could raise LES resting pressure, prolong esophageal body contraction duration, and aggravate achalasia symptoms. Hot water may lessen LES resting pressure, aid LES relaxation, shorten esophageal body contraction duration, and relieve symptoms. This study is one of the pioneering studies of warm water on the gut; yet it did not study the role of weight reduction. Quinlan *et al.,* (9) concluded that drinking hot caffeinated beverages activates physiological processes more quickly than previously described, primarily through the influence of hot water and caffeine, but with drink type and milk also playing important modulatory roles. They have concluded that there is an impact of hot water and the whole digestive process. Drinking warm water appears to improve growth performance and intestinal microbiota in rabbits during the initial post weaning stage in winter. This is one of the few studies which expresses the impact of warm water on the digestive system (10). Ours is the first study on the impact of warm water on weight reduction with a controlled study on regular water. We theorize that warm water improves digestion. This improved supply of needed substrate may lessen the intake of total calorie intake in the subsequent feeds. In our study, we did not look at the quantity of food. So far, no such comparative studies have been described in the literature, and this is the first study on the role of warm water in weight loss. The most important aspect of our study is that water is consumed after food, and the role of physical reduction is diminished to consider physiological actions. The most significant limitation of our study is that, despite being a randomised study, patients were allowed to comply with at least 75 percent of the time to take water after food; in the real world, 100 percent compliance is not possible for three months. The other limitations were that there is no other data collected like waist circumference because the sample included both sexes. This trial was completed in three months and further follow up was not there.

CONCLUSION

To conclude, intake of 200 to 250 ml of warm water after each meal decreased weight over a period of three months. This reduction was significantly more than the intake of regular water. Further studies on the temperature and its influence on digestion needs to be worked out. Yet this is the first such attempt to know the influence of warm/hot water on weight reduction.

CONFLICT OF INTEREST

Authors have no conflicts of interest.

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