

The Effect of Consuming Food With “Warm” or “Cold” Temperaments on Students’ Mental Health and Aggression

Mojtaba Kianmehr¹; Jahanshir Tavakolizadeh^{2,*}; Ali Akbari³; Seyed Taghi Heydari⁴; Mohamad Masoumzadeh⁵; Hamid Rasekhi⁶; Abbasali Abbasnezhad⁷; Alireza Ebrahimzadeh-Bideskan⁸; Hassan Irani⁹; Reza Ghiasi¹⁰; Mohammad Reza Mansourian⁹; Zahra Hossaini¹¹

¹Department of Medical Physics, Faculty of Medicine, Gonabad University of Medical Sciences, Gonabad, IR Iran

²Department of Basic Sciences, Faculty of Medicine, Gonabad University of Medical Sciences, Gonabad, IR Iran

³Department of Psychiatry, Faculty of Medicine, Gonabad University of Medical Sciences, Gonabad, IR Iran

⁴Department of Biostatistics, Jahrom University of Medical Sciences, Jahrom, IR Iran

⁵Department of Anesthesia, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, IR Iran

⁶Nutrition and Metabolic Diseases Research Center, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, IR Iran

⁷Department of Medical Physiology, Mashhad University of Medical Sciences, Mashhad, IR Iran

⁸Department of Anatomy and Cell Biology, Mashhad University of Medical Sciences, Mashhad, IR Iran

⁹Faculty of Nursing and Midwifery, Gonabad University of Medical Sciences, Gonabad, IR Iran

¹⁰Department of English and Linguistics, Payam Noor University, Gonabad, IR Iran

¹¹Department of Nutrition, Gonabad University of Medical Sciences, Gonabad, IR Iran

*Corresponding Author: Jahanshir Tavakolizadeh, Department of Basic Sciences, Faculty of Medicine, Gonabad University of Medical Sciences, Gonabad, IR Iran. Tel: +98-5337225027, E-mail: drtavakolizadehj@yahoo.com

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Background: Aggression is a complex behavior affected by different psychological, genetic, and biological factors. Nutrition is an important factor affecting aggressive behavior.

Objectives: The aim of the present research was to study the effect of cold and hot nature food on students’ mental health and aggressive behavior.

Materials and Methods: In a quasi-experimental study, we recruited 61 normal students in Gonabad University of Medical Sciences during summer semester. The students were randomly allocated into three groups for three weeks, of which one group was served with food of normal nature, the second with hot food and the third group with food of cold nature. Students’ mental health and aggressive behavior were measured by General Health Questionnaire (GHQ-28) and Buss and Perry Aggression Questionnaire before and after intervention.

Results: There were no significant differences in demographic characteristics and physical examination among students of three groups ($P > 0.05$). There was no significant difference regarding mental health and its components after serving the students with normal, hot, or cold nature food ($P > 0.05$). No significant differences in aggressive behavior and associated factors were found among three groups of students before and after intervention ($P > 0.05$).

Conclusions: The findings of this study showed that cold and hot nature of food had no effect on students’ mental health and aggressive behavior.

Keywords: Mental health; Aggression; Food; Students

1. Background

The World Health Organization (WHO) defines health as “the state of owning complete physical, social, and psychological welfare” and does not confine the concept being disease-free (1). Mental health not only includes an absence of mental disorders but also defines aspects of promotion of health and improvement of mental health. Psychological health promotion indexes have been studied extensively (2).

Ryff et al. first proposed a multidimensional definition for psychological welfare. They included the following components that aim to reflect the degree of appropriate psychological functioning: self-acceptance, positive

interaction with others, autonomy, dominance over one’s environment, purposefulness, and personal development (2); among these components, the ability to control and dominate negative excitations such as depression, anxiety, and aggression has a significant importance. Psychologist defines aggression as behaviors that lead to harming oneself or others either physically or verbally. This concept has also been defined as behaviors aimed to harm others physically/verbally, or to destroy others’ belongings (3). Aggressive behavior stems from several causes. These behaviors are sometimes provoked in response to a state of insecurity. They sometimes have

Implication for health policy/practice/research/medical education:

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root in lack of learning opportunity (4). In fact, different opinions have been suggested to explain these behaviors. According to psychodynamic viewpoint, aggression has an instinctive origin and Freud evaluated this phenomenon in accordance with the death instinct, defined as the human's innate inclination towards self-destruction and destroying others. It is believed that this instinct acts primarily towards self-destruction and later changes attention to the outside world and transfigures itself as aggressive behaviors. Some other experts believe that aggressive behaviors are not controlled merely by instinct and that learning (mainly through observation) plays a very important role in their manifestation (5). Undoubtedly, biological factors play a part in inducing aggression although their role has not been fully understood. Studies in this field have proven that brain, hormones, and heredity take part in this process (5).

Although numerous studies have been conducted on aggression, many of its aspects remains unclear. Recent investigations have suggested endocrine and neurophysiologic factors as underlying mechanisms. Testosterone has been regarded as an important inducer of aggression and its accession. It has been also demonstrated that vasopressin and dopamine play an important role in mediating aggression. In the society, aggression is often manifest by desire to gain access to limited resources such as food (6).

Food can be classified based on some of their properties including their nutritious value, the amount of calories, and warm or cold temperament. Concepts such as "cold" or "warm" temperaments are well-known in traditional medicine all over the world and Persian traditional medicine is no exception. Regardless of their origin, most traditional medicines divided people into four groups according to their temperaments. These include warm and dry, warm and moist, cold and dry, cold and moist, with cold and warm being the two main temperaments (7, 8).

The following is a text, about food temperaments, written by Jorjani, the famous Persian physician: "When a doctor says honey and pepper are warm, it is not comparable to the temperament felt by normal senses. Instead, it means that the food increases the body's heat when consumed and invokes a certain condition inside the body which is created by reciprocal interaction between consumer's heat and food." In other words, the warmth of honey is a potential property that cannot be felt by normal senses (9).

Anthropologists consider the concept of warm and cold temperaments as one of the important and worldwide notions in the medical sciences. In this context, it is believed that health is a state of equilibrium between the cold and warm elements inside the body and whenever this equilibrium is disturbed, diseases are formed. This equilibrium can be restored by food therapy (10). Understanding the scientific basis of temperaments may help modern medicine to diagnose and treat diseases by providing the aforementioned equilibrium by traditional medicine.

Food temperaments have always been a cornerstone in the history of medical sciences and have been the focus of attention by the people. However, nowadays neither the Europeans nor Iranians who are the rightful beneficiary of the ancient medicine have studied the association between psychological conditions of the consumers and food temperament. Indeed, some studies have already been conducted on the effects of alimentation and certain types of foods on psychological hygiene. Several investigations have demonstrated the association between some vitamin deficiencies such as vitamin C and B12 and specific diseases, certain alimentary disorders, and depression (11, 12). Additional food temperament-related conditions include lack of thiamine and agoraphobia (13), vitamin B6 shortage and anxiety (14), excess cholesterol and triglyceride levels and psychotic disorders (15), artificial flavors with alleviation in attention deficit hyperactivity disorder (ADHD) (16) and aggression (17).

In a cohort study carried out on 780 pregnant women in Brazil in 2010 by Nunes et al. it was confirmed that the alimentary conditions of women before and during pregnancy had important consequences on maternal and infantile hygiene. Eating habits during pregnancy might induce mood changes, especially depression, and can increase the risk of postpartum depression (18).

The effect of social and cultural parameters on eating habits and personal hygiene should be taken into account. In a qualitative study in 2011, Chapman et al. investigated the meanings of food, eating, health, and welfare in 39 members of 12 Punjabi families, aged from 13 and 70 years, residing in Vancouver, Canada. The results demonstrated that the participants held two distinct opinions on how eating habits might influence physical hygiene. One belief was based on the scientific approach towards food elements such as fat, cholesterol, and vitamins in addition to their role in preventing or predisposing to certain chronic conditions. The other viewpoint included some ideas derived from traditional medicine. Food choice and women's attention towards family members' food preferences was also found to affect family members' psychological welfare (19).

2. Objectives

The aim of the present study was to investigate the effects of food with warm and cold temperaments on general health, aggressive behavior, and psychological hygiene in students of Gonabad University of Medical Sciences.

3. Materials and Methods

This quasi-experimental study was performed on 61 healthy male students in Gonabad University of Medical Sciences during the summer of 2009. The study comprised subjects with no previous history of tobacco or drug abuse, food or drug allergy, and lacking medical and family history of congenital disability, mental retardation, thyroid

disorders, metabolic diseases such as diabetes mellitus, hypertension, hyperlipidemia, and genetic or psychiatric disorders. The study was approved by Ethic Committee of Gonabad University of Medical Sciences. After signing the written informed consent, the participants were randomly allocated in three groups of having warm food diet ($n=20$), cold food diet ($n=20$), and normal diet ($n=21$) for three weeks. The participants filled the General Health Questionnaire (GHQ-28) and Buss and Perry Aggression Questionnaire at the beginning and at the end of three weeks.

The psychological health status of the students was evaluated using GHQ-28, which is a conventional screening tool in psychiatry. This questionnaire is comprised of 28 items and is prepared according to the original design introduced by Goldberg and Hillier in 1979. It consisted of four seven-question scales of somatization, anxiety, social dysfunction, and depression (20). GHQ-28 is used in many cases for screening psychiatric patients or for estimating the prevalence of psychiatric disorders in different populations. In the present as well as some previous studies, this questionnaire was used for general evaluation of psychological health. Studies using GHQ-28 are all indicative of its high validity and reliability. In a meta-analysis including 43 studies, Goldberg et al. estimated the average sensitivity and specificity of the GHQ-28 at about 84% and 82%, respectively (21). In a study by Yaghoobi, sensitivity, specificity, and reliability of this questionnaire at the best cut-off point were estimated at 86.5%, 82%, and 88%, respectively (22).

Buss and Perry Aggression Questionnaire was used to measure the participants' aggression (23). This questionnaire consisted of 29 multiple-choice questions with five choices scored from one to five (5 = exactly like me; and 1 = completely different from me). The questionnaire was used to investigate physical aggression (nine questions), verbal aggression (five questions), anger (seven questions), and hostility (eight questions). The internal consistency of the questionnaire was estimated by Buss and Perry at around 89%; the intercorrelation of subscales of this questionnaire and the whole scale ranged from 25% to 45% that demonstrated its acceptable validity (23). Mohammadi et al. estimated the reliability of this questionnaire using Cronbach's alpha, test-retest, and split-half methods at around 89, 78, and 73, respectively. The questionnaire validity was also studied using convergent and concurrent validity indexes and factor analysis. Convergent validity was confirmed after calculating correlation coefficient of the subscales with one another as well as with the entire questionnaire. The coefficients ranged from 37% to 78%. Concurrent validity measured by General Psychological Harm Scale and revealed a significant correlation coefficient (34%; $P < 0.01$). The results of factor analysis using main components and Varimax rotation methods demonstrated that this questionnaire entails more than 46% of the total variance (24). After arranging the students into three groups, each group was settled in

a separate dormitory and fed with their specified diets. The food used for the group with normal diet included wheat bread, vegetable, egg, partridge meat, porridge, sugar leaf, coffee, jujube and a balanced combination of cold and warm food. The group with warm food diet were fed with saffron, walnut, date, grape juice, honey, banana, apricot, flixweed, garlic, onions, shallot, mint, confectionery, cookies, raisins, coconut, melon, pear, ginger, pepper, mutton, cocoa, eggs, pea, butter, cream, fig, almond, pistachio, dark olives, hazelnut, peanut, mango, tea, ostrich meat. The group with cold foods diet was served with rice, yogurt, milk, cucumber, tomato, cherry, peach, watermelon, potato, beef, fish, starch, oat bread, duck egg, rice milk soup, rhubarb, vinegar, pomegranate, beans, lentice, corn, etc. There were variations in the amount and type of food and the average macronutrients and calories consumed each day were similar for the three groups, and calculated by Food Processor II software (ESHA Research, Salem, OR, USA).

3.1. Statistical Analysis

All data entered in SPSS version 16 (SPSS Inc., Chicago, IL, USA) for statistical analysis. Paired samples t test was applied to comparison before and after three weeks changes. Analysis of variance was used to compare physical examination and psychological health score among the study groups. In all tests, P value less than 0.05 was considered as statistically significant.

4. Results

The participants in this study were healthy male students and the data of their basic characteristics and physical examination at the beginning of the study are presented in Table 1. As demonstrated in Table 1, no significant difference was found among participants of the three groups regarding basic characteristics and physical examination findings at the beginning of the study ($P > 0.05$). According to Table 2, there was no statistically significant difference in psychological health of students before and after intervention ($P > 0.05$). It could be deduced with 95% confidence that consuming warm or cold food had no effect on psychological health and thus, the first hypothesis of the study was rejected. Furthermore, the second hypothesis is also ruled out as no significant difference was found among the study groups in psychological health components such as somatization, anxiety, social dysfunction, and depression ($P > 0.05$). The third hypothesis is also dismissed because the corresponding data showed no significant differences among the three groups before and after intervention ($P > 0.05$). We can say that there is no difference in physical aggression, verbal aggression, anger and hostility before and after intervention ($P > 0.05$). It could be deduced that food with cold or warm temperaments had no effect on aggression parameters; hence, our fourth hypothesis is rejected too.

Table 1. Basic Characteristics and Physical Examination Findings of the Participants Before Commencement of the Study^a

Basic Characteristics and Physical Examination	Group	Mean ± SD	P Value
Age, y	Normal diet	20.62 ± 1.32	0.786
	Warm diet	20.85 ± 1.49	
	Cold diet	20.55 ± 1.46	
BMI, kg/m ²	Normal diet	22.18 ± 3.09	0.918
	Warm diet	21.81 ± 2.74	
	Cold diet	22.05 ± 2.93	
Systolic Blood Pressure, mm Hg	Normal diet	115.10 ± 8.61	0.075
	Warm diet	119.30 ± 7.65	
	Cold diet	113.25 ± 8.92	
Diastolic Blood Pressure, mmHg	Normal diet	75.95 ± 5.83	0.126
	Warm diet	78.00 ± 5.29	
	Cold diet	74.45 ± 5.14	
Body Temperature, °C	Normal diet	36.89 ± 0.17	0.336
	Warm diet	36.75 ± 0.39	
	Cold diet	36.86 ± 0.34	
Heart Rate, beats/ min	Normal diet	71.52 ± 6.83	0.187
	Warm diet	70.25 ± 5.04	
	Cold diet	73.95 ± 11.60	
Respiratory Rate, breathing/min	Normal diet	18.05 ± 1.85	0.786
	Warm diet	17.70 ± 1.30	
	Cold diet	17.80 ± 1.73	

^a Abbreviation: BMI, body mass index.

Table 2. Comparison of Psychological Health Score and Its Parameters Among the Study Groups

Mental Health	Group	Before Intervention	After Intervention	P Value
Somatization	Normal diet	4.47 ± 3.69	3.95 ± 3.59	0.486
	Warm diet	4.05 ± 1.79	3.70 ± 2.36	0.349
	Cold diet	3.95 ± 2.45	4.45 ± 1.93	0.460
Anxiety	Normal diet	5.14 ± 4.39	5.14 ± 4.39	0.775
	Warm diet	3.60 ± 2.25	3.60 ± 2.25	0.204
	Cold diet	3.85 ± 3.18	3.85 ± 3.18	0.657
Depression	Normal diet	3.47 ± 4.35	3.47 ± 4.35	0.611
	Warm diet	2.65 ± 3.77	2.65 ± 3.77	0.142
	Cold diet	2.15 ± 2.27	2.15 ± 2.27	0.566
Social dysfunction	Normal diet	6.85 ± 3.00	6.85 ± 3.00	0.451
	Warm diet	6.60 ± 2.47	6.60 ± 2.47	0.353
	Cold diet	7.20 ± 2.33	7.20 ± 2.33	0.628
General mental health	Normal diet	19.95 ± 13.15	19.95 ± 13.15	0.923
	Warm diet	16.90 ± 6.84	16.90 ± 6.84	0.018
	Cold diet	17.15 ± 6.93	17.15 ± 6.93	0.889

5. Discussion

The findings of this study rejected our first hypothesis (i.e. foods with different temperaments affect psychological health) as well as the second one (i.e. foods with

different temperaments affect psychological health components including somatization, anxiety, depression, and social dysfunction). The results of the statistical analysis (Table 2) showed that consuming food with

cold or warm temperaments do not result in significant differences in psychological health and its components among the participants. These results are not consistent with those of previous studies on the effects of nutritional conditions on mood changes in women, especially depression (18). According to the study by Asadullahi et al. on the association of depression with food temperaments, cold foods tend to aggravate epilepsy, depression, obsessive-compulsive disorder, and enuresis while warm food alleviate these conditions (25). This inconsistency can be attributed to inadequate researches in this field, different evaluation tools, study type, studied populations especially in terms of gender and age, and time of intervention. As mentioned earlier, studies in this field are not sufficient to achieve a universal consensus. Most of the similar studies have not considered food temperaments and instead, have focused on food elements. The measurement tool is also an important issue. For example, GHQ-28 is mainly a screening tool for psychiatric disorders and it is less accurate regarding specific conditions such as agoraphobia or anxiety. Type of study is another important matter. The present study was interventional, whereas most related investigations are correlative. We should also mention that unlike other studies, which had mainly focused on general population, our study was conducted on male students. In addition, it seems that other factors such as the time of intervention and the degree of warmness and coldness of food might affect the results. Different results might be expected if the study had been extended to more than three weeks or

the food temperaments had been chosen with regards to a quantitative index. These results rejected our third hypothesis (ie, effect of food temperaments on aggression) and the fourth one (effect of food temperament on aggression components including physical aggression, verbal aggression, anger, and hostility; Table 3). Our findings showed that consuming food with different temperaments did not lead to any significant difference in the level of aggression and its related factors, which was inconsistent with the results of previous studies on the effect of food supplements on ADHD (16) and aggression (17). In this regard, it must be noted that both psychological health and emotions are affected by numerous parameters like biological, psychological, and social factors and the food temperaments are a sole contributor. Psychodynamic factors and learning play important roles in mediating human aggression. Some experts believe that humans aggressive behaviors are not solely controlled by instinct and that learning, especially through observation, are contributing in this behavior as well (4). It seems that this concept gains even more importance in students with more elaborate cognitive features. Taking all aspects into consideration, it seems that the food temperaments do not affect general health and aggressive behavior in students. Indeed, this study had its own flaws including the limited sample, using self-report tools as information resources, a short intervention period, and lack of quantitative measurement of warmness and coldness of food. Resolving these issues may help in achieving a more reliable judgment in this field.

Table 3. Aggression Score and Its Associated Factors Among the study Groups

Aggression	Group	Before Intervention	After intervention	P Value
Physical aggression	Normal diet	21.00 ± 6.68	19.71 ± 6.63	0.335
	Warm diet	21.35 ± 4.95	18.90 ± 5.06	0.031
	Cold diet	20.50 ± 5.18	18.30 ± 5.59	0.129
Verbal aggression	Normal diet	12.85 ± 4.02	12.66 ± 3.16	0.841
	Warm diet	12.60 ± 2.96	11.85 ± 3.29	0.385
	Cold diet	12.65 ± 2.71	11.30 ± 2.29	0.057
Anger	Normal diet	15.23 ± 4.63	15.57 ± 4.64	0.666
	Warm diet	16.90 ± 4.26	15.80 ± 3.12	0.297
	Cold diet	16.35 ± 3.18	15.35 ± 3.36	0.329
Hostility	Normal diet	19.28 ± 5.69	17.95 ± 6.11	0.265
	Warm diet	19.00 ± 4.31	17.25 ± 4.28	0.059
	Cold diet	17.75 ± 4.22	17.05 ± 4.41	0.551
General aggression	Normal diet	68.38 ± 17.36	65.90 ± 18.20	0.439
	Warm diet	69.85 ± 12.11	63.70 ± 12.86	0.044
	Cold diet	67.25 ± 10.21	62.00 ± 11.41	0.121

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Authors' Contribution

All authors had contributed equally in the study.

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