Journal of Nutrition and Food Security
Shahid Sadoughi University of Medical Sciences
School of Public Health
Department of Nutrition
Nutrition & Food Security Research Center

eISSN: 2476-7425 pISSN: 2476-7417 JNFS 2022; 7(1): 30-36 Website: jnfs.ssu.ac.ir

The Effect of Lower Dietary Fat and Higher Fruit Intakes on Reducing Aggressive Behaviors in Young Males

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ARTICLE INFO

ORIGINAL ARTICLE

Article history:
Received: 10 Jan 2021
Revised: 26 Jun 2021
Accepted: 26 Jun 2021

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ABSTRACT

Background: Trait anger is associated with numerous physiological and psychological problems and is a social health problem. The current study aimed to evaluate the socio-demographic and nutritional determinants of trait anger in young males. **Methods:** In the current study, 150 young males aged between 14-44 years were randomly selected. General information was obtained and anthropometric assessments were performed. Trait anger was measured by the state-trait anger expression inventory, and affective control scale (ACS) was used for assessing affective disorders, including four subscales of anger, depressive mood, anxiety, and positive emotion. Dietary intakes were assessed using a semi-quantitative food-frequency questionnaire (FFQ). **Results:** According to the findings of the current study, trait anger score was higher among young male subjects who were illiterate or had low educational attainment, unemployed, single, and had no physical activity. Similarly, among affective disorder subscales, the subjects who were illiterate or had lower educational attainment and were single, had higher scores of anger, positive emotion, depressive mood, and anxiety. Among dietary intakes, trait anger score was positively associated with dietary fat intake and negatively associated with fruit intake (P = 0.04). **Conclusion:** The current study highlighted the effects of education, marital status, physical activity, and fruit intake in the attenuation and suppression of trait anger and affective disorders. The preventive strategies for trait anger can be focused to promote these healthy habits and modify life style into a physically active healthy diet pattern.

Keywords: *Trait anger; Diet; Affective disorder*

Introduction

Anger, as a social emotion, is defined as an emotional response, or internal feeling which is caused by physiological excitation, cognition, and malice thoughts (Suchday S and Larkin KT, 2004) and is characterized by a complex construct, including hostility, irritability,

This paper should be cited as: Asgharzade A, Abbasalizad Farhangi M, Mahmudiono T, Ghanbari M, Azizova F. ***The Effect of Lower Dietary Fat and Higher Fruit Intakes on Reducing Aggressive Behaviors in Young Males.*** *Journal of Nutrition and Food Security (JNFS)*, 2022; 7 (1): 30-36.

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[DOR: 20.1001.1.24767417.2022.7.1.3.2]
[DOI: 10.18502/jnfs.v7i1.8533]

and aggressive behavior (Mick E *et al.*, 2014). Trait anger has numerous destructive effects on people's health and their environments; anger increases the risk of coronary heart disease (CHD), diabetes, bulimic behavior, bulimia nervosa, and increased road accidents (Chida Y and Steptoe A, 2009, Engel SG *et al.*, 2007, Sullman MJM *et al.*, 2007, Vella E and Friedman BH, 2009). Anger and hostility increase the risk of morbidity and mortality from CHD not only in CHD patients but also in healthy population. The effects of anger and hostility in CHD events was greater in men compared to women suggesting that men are more responsive to anger and hostility factors in relation to coronary events (Chida Y and Steptoe A, 2009). Moreover, in the study by Golden SH (Golden SH *et al.*, 2006), The risk of developing diabetes was 34% higher in people with the highest levels of trait anger score than in those with the lowest levels.

Considering the unhealthy effects of anger and hostility, it is very important to evaluate the possible determinants of anger and to manage or prevent its side effects. Among these determinants genetics, socio-demographic factors, and nutritional status are probably the important determinants of trait anger; however, there are limited studies in this field (Werbach MR, 1992). Especially the role of nutrition in trait anger behavior has been neglected in previous researches. Previous studies have mostly focused on the effects of nutrition on mood, depressive mood, and anxiety and have found that decreased fast food intake, increased Mediterranean dietary habits, and magnesium supplementation reduce the risk of depression, anxiety, and disruptive mood (Abbasi B *et al.*, 2013, Bakhtiyari M *et al.*, 2011, Olveira C *et al.*, 2014, Stoll AL *et al.*, 1999). In the study by Kalantari *et al.* (Kalantari N *et al.*, 2016), trait anger was negatively associated with dairy intakes even after adjusting for confounders. Due to lack of clear study about demographic and nutritional determinants of anger and aggressive behaviors among Iranian population, it is necessary to evaluate such a relationship. Moreover, men experience anger and its unhealthy side effects more often than women by presenting behaviors of anger, hostility, anger attacks, and aggression (Martin LA *et al.*, 2013). Males more frequently experience anger attacks (sudden spells of anger and aggression with physical features similar to panic attacks), lower impulse control, exhibit greater substance use, and experience more hyperactive behavior compared to females (Winkler D *et al.*, 2005). Therefore, the current study aimed to assess the demographic, social, and nutritional determinants of trait anger and affective control subscales, including anger, positive emotion, anxiety, and depressive mood among young males.

Materials and Methods

Participants: The current study was conducted among a sample of one hundred and fifty young males aged between 14-44 years randomly selected from co-educational centers of Tabriz in northwest of Iran from February 2016 to November 2016.

General information: A semi-structured questionnaire was used for evaluating socio-demographic characteristics, information about smoking status, physical activity, disease history, and family history of disease.

Anthropometric measurements: Weight was measured using balance beam scale to the nearest 0.5 kg and height to the nearest 0.5 cm with a wall-mounted stadiometer while the subjects were wearing light clothes and no shoes. Body mass index (BMI) was calculated as weight (kg) divided by height m^2. BMI of more than 30 kg/m^2 was defined as obesity (Farhangi MA *et al.*, 2013).

Trait anger measurements: Trait anger was measured by the state-trait anger expression inventory as a self-report measure that is used to assess anger and anger expression at each of the follow-up assessments. In the current study, the trait anger scales (10 items) were used (Spielberger C, 1988). The questionnaire was validated to be used in Iranian population

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(Barabadi A and Heydarinasab L, 2013). The responses were based on a 4-point Likert scale, including "never", "sometimes", "often" and "almost always" scoring as 1, 2, 3, and 4, respectively. Trait anger section, with the phrases of "I usually feel …. " involved 10 items to measure trait anger and had two subscales of angry state and angry reaction (Kalantari N *et al.*, 2016).

Affective control measurements: Affective control scale (ACS) was used first designed by Williams et al. (Williams KE and Chambless DL, 1992) containing 42 items and 4 subscales, including anger, depressive mood, anxiety, and positive emotion. Each item was responded based on a 7-point Likert scale (very strongly disagree to very strongly agree) and some scores should be reversed before computing the mean total or subscale scores. Cranach's alpha coefficient of this test was 0.94 and 0.72 to 0.91 for its subscales in the study of Williams et al. The reliability coefficient of ACS was estimated as 0.84 by Ghaderi et al. (Ghaderi Z *et al*., 2010).

Dietary intake: Dietary intakes were assessed using a semi-quantitative food-frequency questionnaire (FFQ) adapted to the Iranian society (Mirmiran P *et al.*, 2009). Since the efficiency of the FFQ is related to the culture and ethnic background of the study population, the validity and reliability should be conducted in different populations. The FFQ included 168 food items with specified serving sizes commonly consumed by Iranians. The participants reported their mean frequency of intake of each food item in terms of the number of specified serving sizes consumed per day/week/month/year, or never. The reported frequency of consumed foods and portion sizes for each food item were converted to a daily intake.

Data analysis: Statistical analysis was performed with Statistical Package for Social Science (SPSS 18 for windows, SPSS Inc® headquarter, Chicago, USA). Normality of data was analyzed by Kolmogorov-Smirnov test. Chi-square and independent sample *t*-test were performed for comparing discrete and continuous variables between two groups, respectively. Analysis of variance (ANOVA) followed by Tukey's *post-hoc* test and analysis of covariance (ANCOVA) with adjustment for confounder variables were performed for comparing continuous variables between more than two groups. P-values less than 0.05 were considered statistically significant.

Results

Mean age of the participants was 29.03 ± 6.45 years. Comparison of the trait anger score and affective control subscales among different classes of demographic characteristics are presented in **Table 1**. As shown in this Table, young male participants who were illiterate, unemployed, single, and had no physical activity had higher trait anger scores compared to others ($P < 0.05$ in all of parameters). Similarly, among affective disorder subscales, individuals who were illiterate or had lower educational attainment and were single had higher scores of anger, positive emotion, and depressive mood. Higher anxiety scores were also associated with low educational attainment, unemployment, being single, and having no physical activity. In multivariate linear regression model, trait anger score was positively associated with dietary fat intake, while negatively associated with fruit intake ($P = 0.04$). Moreover, trait anger was positively associated with dietary fat and negatively associated with fruit intake (**Table 2**).

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Table 1. Mean scores of trait-anger and affective control subscales in different categorizes of anthropometric and demographic parameters; N= 150 .

Variables	Trait-anger	Affective control subscales			
		Anger	Positive affect	Depressive mood	Anxiety
Body mass index (kg/m^2)					
Normal	22.22±5.05	4.01±0.88	3.55±0.87	3.63±0.89	3.52±0.89
Overweight or obese	23.27±5.05	3.99±0.67	3.60±0.84	3.67±0.87	3.62±0.74
P-value	0.21	0.88	0.71	0.78	0.49
Educational attainment					
Illiterate or low educational attainment	24.80±3.85	4.14±0.62	3.79±0.82	3.85±0.75	3.85±0.71
Academic education	21.48±3.35	3.90±0.84	3.34±0.84	3.52± 0.97	3.39±0.81
P-value	< 0.001	0.04	0.012	0.02	< 0.001
Occupation					
Unemployed	24.72±3.10	4.34±0.84	3.92±0.74	3.87±0.87	3.75±0.58
Skilled labor	22.91±5.12	3.93±0.82	3.40±0.92	3.60±0.96	3.49±0.88
Professional worker	21.23±5.67	3.88±0.84	3.52±0.74	3.44±0.81	3.49±0.84
P-value	0.36	0.41	0.71	0.48	0.47
Marital status					
Single	23.13 ± 5.16	4.14±0.70	3.79±0.76	3.82±0.83	3.73±0.77
Married	22.49±5.00	3.86±0.80	3.37±0.90	3.49±0.94	3.42±0.82
P-value	0.44	0.025	0.003	0.03	0.02
Physical activity					
No activity	24.34±4.44	4.14±0.75	3.69±0.75	3.79±0.77	3.80±0.64
Regular activity	23.36±4.57	4.04±0.77	3.46± 0.84	3.41±0.94	3.42 ±0.86
Irregular activity	21.52±5.37	3.88± 0.76	3.55±0.92	3.65±0.96	3.40±0.85
P -value	0.008	0.18	0.55	0.20	0.04

Table 2. The correlation between trait-anger and nutritional parameters in participants.

Variables	B coefficient	Beta	t	P-value
Energy (kcal/d)	-0.001	-0.143	-0.34	0.73
Carbohydrate (g/d)	-0.003	-0.07	-0.27	0.78
Fat (g/d)	0.045	0.41	1.84	0.04
Protein (g/d)	0.015	0.08	0.55	0.58
Food groups				
Grains and cereals (g/d)	-0.001	-0.06	-0.72	0.47
Fruits (g/d)	-0.006	-0.18	-1.92	0.04
Vegetables (g/d)	0.00	-0.01	-0.13	0.89
Dairy products (g/d)	0.002	0.07	0.88	0.37
Meats (g/d)	-0.002	-0.03	-0.43	0.69
Fats and oils (g/d)	0.027	0.22	2.51	0.01
Simple sugars (g/d)	0.006	0.12	1.51	0.13

Discussion

In the current study, low educational attainment, unemployment, being single, and having no physical activity were potent determinants of anger and affective control as a tool for measuring emotional growth, organizing behavior, and having negative excitement. Anger trait and its control is an important social and individual health problem affecting both physiological and psychological health of human. Anger and anxiety behaviors are associated with higher emotional problems and suicide attempts among youth (Daniel SS *et al.*, 2009); having low literacy is associated with feeling frustrated and dissatisfied. Illiterate

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individuals have lower problem-solving skills and lower anger management (Canada). Similar to the findings of the present study, the study by Baylon et al. (Boylan JM and Ryff CD, 2013) reported that higher educational attainment was positively associated with higher anger control and anger management among a subsample of US population. Moreover, higher educated subjects had also a high sense of control and were more cognitively flexible with regard to anger provoking situations, more likely to communicate with the target of anger and more likely to use active problem solving when they are angry. Social factors are potent predictors of trait anger and anxiety. Trait anger was negatively associated with quality of life and aggressive behaviors were common among subjects in lower socioeconomic levels (Sharma MK *et al.*, 2012). In the study by Shen BJ et al. hostility, aggressive behaviors, and type A behavior were all negatively associated with blood glucose control and poor glycemic control determinants and these associations were only significant for single males (Shen BJ *et al.*, 2008). Accordingly, less trait anger and less affective control scores were also found in married males.

The salutary health benefits of marriage have been well documented. Marriage is a primary source of support for men (Ikeda A *et al.*, 2007) and may help ameliorate the impact of stress and protect against excessive neurohormonal arousal (Kamarck TW *et al.*, 1997). Single males may also be less likely to monitor their health and more likely to engage in unhealthy habits, such as overeating and smoking (Ikeda A *et al.*, 2007), thus rendering them at higher risk of illness. Moreover, married males benefited from their spouses, who helped them maintain a healthier lifestyle and curtail detrimental habits.

The role of nutrition and nutrients in the trait anger behavior and its control has not been fully studied. Previous studied have mostly focused on the association of trait anger with single nutrients and dietary habits or food groups have not been fully investigated. In the present study, trait anger was positively associated with fat intake and negatively associated with fruit intake. The negative effects of dietary fat on anger and hostility behavior have been reported in the study by Musante L (Musante L *et al.*, 1992). Hostility was negatively associated with fiber intake and positively associated with fat and cholesterol intake in both genders. This finding was also approved by Wascher R (Wascher R, 2013), indicating that high fat diet decreases metabolism and increases hostility and trait anger. The study further linked Mediterranean-type diet, low in saturated fat, to other potential health benefits, including greater levels of physical activity, a higher metabolic rate, and less angry and hostile moods. Fruits are rich sources of vitamins and minerals and vitamin deficiency is approved to be associated with aggressive behaviors and irritability. Some of these vitamins and minerals include niacin, pantothenic acid, thiamine, vitamin B6 and vitamin C, iron, magnesium, and tryptophan (Werbach MR, 1992). The best way to compensate for deficiencies is to modify dietary patterns and increase the fruits and vegetables intake.

The findings of the current study highlighted the positive effects of being physically active and eating more fruits on attenuating the trait anger. However, the negative effects of being single, unemployment, and eating more dietary fat intake on enhancing trait anger behavior were also approved. The preventive strategies of trait anger can be focused on promoting healthy eating and improving physical activity in young males.

Acknowledgment

We are thankful of those who participated in this work and Nutrition Research Center of Tabriz University of Medical Science for financial support of the work.

Authors' contributions

Asgharzade A was involved in hypothesis generation and idea development, he provided the validated questionnaires; Abbasalizade-Farhangi M was involved in supervision and data analysis and revision of the paper; Mahmudiono T and

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Azizova F were involved in manuscript drafting, providing the original questionnaires, English editing and data analysis; Ghanbari M was involved in data collection.

Conflict of interest

The authors declare no conflict of interest.

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