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# Association between Dietary Pattern and Mental Health among Military Personnel

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## Abstract

Background: Recently, the importance of psychological health has increased among military personnel worldwide. The association between diet and mental health has been demonstrated in previous studies. Therefore, the current survey conducted to study this association among military personnel. Methods: The original cross-sectional study was designed and conducted from July 2017 to January 2018. 258 male personnel were selected through convenience random sampling method. A semi-quantitative food frequency (FFQ) questionnaire used to evaluate dietary intake. The Depression Anxiety Stress Scale (DASS) questionnaire was used to evaluate depression, anxiety, and stress. *Rosenberg* Self-Esteem Scale was to evaluate self-esteem condition. Results: The Western, Mediterranean and traditional dietary patterns were extracted. Multi-nominal regression was shown that higher adherence to a traditional dietary pattern led to mild depression score (P= 0.007, β= -1.89). There were no statistically significant differences between dietary patterns and anxiety score. Our statistical analyses found a significant association between the lowest tertile of western dietary pattern and moderate stress (P=0.06, β=0.93). In regression models, after adjusting for potential confounders, the results unchanged related to adherence between western dietary pattern and moderate stress (P=0.09). There was no statistically significant association between the major dietary patterns with the risk of anxiety score in the crude and adjusted models. Conclusions: The findings from this study indicate that adherence to a Mediterranean and western dietary patterns led to a reduction and an increase in mean depression and stress scores respectively.

**Keywords:** Diet, Mental Disorders, Depression, Military Personnel, Anxiety.

## Introduction

In the recent years, the importance of psychological health has increased among military personnel worldwide (Chou et al.,2014; Hepner et al.,2015). Regarding this importance, different systems provide high-quality care and progress outcomes for individuals with psychological health conditions (Martsolf et al., 2016). The psychological health of military persons varies as a result of different political, cultural and administrative factors (Chou et al., 2014). So, as one of the life quality factors, dietary approaches play an important role in mental health (Dash et al., 2016; Larson et al., 2017; Tajik et al., 2017). The unhealthy diet is associated with brain function and mental disorder through inflammation, oxidative stress processes and the stress-response system (Jacka et al.,2011). Due to increased levels of physical activity and stress condition among military personnel (Armenta et al.,2018) the importance of dietary approaches in this population is more considerable.

The association between dietary ingredients such as fruits (Smith & Rogers, 2014) and vegetables (McMartin et al., 2013) and also macro and micronutrient such vitamins A (Lerner et al.,2018), E (Jamilian et al., 2018) and C (Plotnick et al.,2017) and mental health has demonstrated in previous studies (Abazarfard et al.,2016). Although it is useful to examine the relationship between diet component and nutrients and mental health, but Willet M et al. stated that "epidemiologic analyses based on foods, as opposed to nutrients, are most generally directly relate to dietary recommendations, because individuals and institutions ultimately modify their nutrient intakes primarily by their choice of foods" (Willett,2012). Therefore, some studies conducted to examine the association between dietary pattern

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and mental health condition (Mesgarani et al.,2016; Bonaccio et al.,2018).
So, regarding increased levels of physical activity and stress condition among military personnel and augmented risk of mental disorders in this population, the current survey conducted to study the association between depression, anxiety and stress with dietary patterns in military personnel.

## Material and Methods

*Participants*

The original cross-sectional study was designed to investigate the association between dietary patterns and mental health among military personnel and conducted from July 2017 to January 2018. All 258 male personnel were selected through convenience random sampling method from military personnel. They were excluded if they consumed a specific diet or if consumed mental health-related drugs. All participants completed written informed consent. The study is approved by the ethics committee of the Baqiyatallah University of Medical Sciences.

*Dietary assessment*

A semi-quantitative food frequency questionnaire (FFQ) used to evaluate dietary intake. This questionnaire comprised of 147 items including foods and beverages (with standard serving sizes) usually consumed by Iranians. Respondents diet was based on their past year intake.  Validity and reproducibility of this FFQ have been shown in previous studies (Mirmiran et al.,2010). The frequency of each given serving consumption was reported by Respondents. The frequency of servings was categorized into nine categories: less than once a month, 1-3 times monthly, once a week, 2-4 times weekly, 5-6 times a week, once a day, 2-3 times daily, 3-5 times daily and 6 or more times daily. For each food item, the portion size was classified into three categories: small, medium and large, and was converted to grams (Azar & Sarkisian,1980). Then to determine the intake of each food item in grams the portion size of the daily intake frequency was multiplied. For seasonal food consumption, the period of the year that these foods were available was considered. To estimated total energy intake, the energy value of each food was added in the FFQ. The Nutrients Composition of Iranian Foods (Azar & Sarkisian,1980) and the USDA Food Composition Data (Mirmiran et al.,2011)  were used to determine the value of food energy. The 147 food items were classified into 25 food groups regarding their similarity of nutrient content to identify dietary patterns.

*Mental health assessment*

The Depression Anxiety Stress Scale (DASS) questionnaire was used to evaluate depression, anxiety and stress among participants and divided them into 3 groups of low, medium and high for DASS score. DASS has a 42-items form and a validated (Moreira et al.,2014) short form that includes 21-items which were used in the current study. The validated (Adebamowo et al.,2015) Rosenberg Self-Esteem Scale was to evaluate self-esteem condition among participants. They get a score between -10 to 10 according to the questionnaire and then divided into 3 groups, high (lower than 6) medium (2-6) and low (less than 2).

*Statistical analyses*

First, for evaluation normal distribution of quantitative variables Kolmogorov–Smirnov test was conducted. Dietary patterns were derived using factor analysis (principal component). To reduce the complexity of data, 147 food items were categorized into 21 groups. In general, food grouping was based on food and nutrient composition similarity. The factors were rotated via an orthogonal transformation (the Varimax rotation) to obtain a simpler structure with greater interpretable. We found three numbers of factors for best results and inspection of scree plot. All subjects had each dietary pattern score by weighing their intake of each food contributing to that pattern by the relative contribution of those foods. The differences between tertiles of dietary pattern and anthropometric-mental disorders were assessed by one-way ANOVA test and re-analyzed by ANCOVA to adjust for the confounders effect, including age, BMI, and physical activity. To found relationship between dietary pattern and mental disorders by Multi-nominal regression, we consider psychological disorders as a dependent variable and dietary pattern as covariates and fix-factor to measure the P real and P trend in the Multi-nominal regression model. The level of significance was set at a probability of $< 0{\cdot}05$ for all tests. Statistical analysis was performed using SPSS version 22.0 171 (SPSS).

## Results

*Basal characteristic of participants*

A total of 258 military personnel were enrolled in the study. The anthropometric and psychological characteristics of participants are presented in Table 1. The mean ±SD age, weight, height, hip circumferences(HC), waist circumferences(WC) and body mass index

(BMI) of the study participants were 34.74 (SD 8.21) years, 75.47 (SD 12.71) kg, 171.56 (SD 9.60) cm, 102.47 (SD 8.82) cm, 91.07 (SD 10,34) cm and 25.55 (SD 3.20) kg/m2, respectively (Table 1). Our analyses found 50.4% of personnel were suffering from mild depression, while 55.3% were affected by moderate anxiety and more than half of the participants (57.2%) are in normal conditions in terms of stress and 56.4% of the personnel found with an average self-esteem score.

*Dietary pattern extraction*

Factor loading and variance of each dietary pattern is shown in Table 2. Factor 1 was loaded on a high consumption of olive, fruits, vegetables, nuts, low-fat dairy, and dried fruits. Therefore, factor 1 was designated the Mediterranean pattern. Factor 2 was labeled as the western dietary pattern because it was loaded by a high consumption of sweet and dessert, sugar, flavor, oils and butter, snack, caffeinate, process meat, fruit juice, and egg. Factor 3 was heavily loaded with legumes, grain, pickles, red meat, high-fat dairy, white meat. Therefore; we considered this factor as the traditional dietary pattern (Table 2). The scree plot dropped after the third factor, factor 1 (Eigenvalue 3.3) explaining 12.56% of the variance, factor 2 (Eigenvalue 2.1) explaining 11.88%, and factor 3 (Eigenvalue 1.5) explaining 10.96%.

*Anthropometric characteristic according to dietary patterns*

Anthropometric characterizations of participants at baseline study are presented in Table3 according to tertiles of each food pattern. We found participants in the highest tertile of Western dietary pattern, showed slightly higher weight (P=0.075), WC (P=0.063) and BMI (P=0.088). Recent relationships were found between participants in the highest tertile of traditional dietary pattern and weight (P=0.003), height (P=0.03), WC (P=0.002), HC (P=0.016). After adjusting for age, BMI and physical activity using ANCOVA test showed, participants in the lowest tertile of the Mediterranean dietary pattern had higher WC (P=0.041) and there found men in higher tertile of the western pattern had higher HC (P=0.002).

*The relationship between dietary pattern and psychological disorders*

In the next step, the association between dietary pattern and psychological disorders was examined by multi-nominal regression model in the crude and adjusted model for age, BMI, and physical activity. The results demonstrated that all dietary patterns were associated with higher depression, maybe due to a few participants in this group. Our analyses showed the significant relationship between the second tertile of traditional dietary pattern with mild depression (P=0.007, β=-1.89) (Table4). However, in the crude and adjusted model of the Multi-nominal regression model, there was no significant correlation between the dietary pattern and anxiety (Table 6). Multi-nominal regression showed a marginally significant association between lowest tertile of Western dietary pattern and moderate stress (P=0.06, β=0.93), and adjusted P-trend was 0.06 and remained unchanged after adjustment (P=0.09) (Table 6). There was no significant association between self-esteem and each of dietary patterns (Table 7).

## Discussion

The findings from this study indicate more than half of the participants were suffering from a mental disorder such as; depression, anxiety, and stress. We found participants in the highest tertile of western and traditional dietary patterns, showed higher weight, height, WC and HC. By regression analyses, we found that all dietary patterns were associated with high depression. Our analyses showed the significant inverse association between the second tertile of traditional dietary pattern with mild depression, and a significant association was found between the lowest tertile of the Western dietary pattern and moderate stress.

The Mediterranean dietary pattern had an inverse relationship with WC in Iranian military personnel after controlling for the confounding factors. Previous studies have also found an inverse association between Mediterranean diet and anthropometrics measurements such as WC. Similarly, in a study on Brazilian adults aged 20 to 50, consumption of Western dietary pattern was directly associated with WC (Vilela et al.,2014). In the recent study was done by Moreira et al on reported that moderate and high adherence to the Mediterranean pattern has the protective effect on elderly subjects aged 60 or older central obesity (WC) (Moreira et al.,2014). Our study found a direct relationship between western dietary pattern and HC, it is clear that this diet has a higher percentage of saturated fatty acids and glucose than the Mediterranean diet, which can justify WC (Adebamowo et al.,2015).

Results from previous studies demonstrated that diet modification may play an important role in the treatment of anxiety disorder (Aucoin & Bhardwaj,2016). Hypoglycemia (Aucoin & Bhardwaj,2016), high-fat diet (Gainey et al.,2016) and low protein diet (Crossland et al.,2017) have shown as effective factors in relation to diet-induced anxiety. In contrast with our study, Bakhtiyari et al (Bakhtiyari et al.,2013) study which conducted on 1872 young adults age 18-35 showed that high consumption of processed meat which is one of the components of western diet in our study was associated with anxiety.

Although there is a lack of investigations on dietary pattern and mental stress in military persons there are some surveys those have studied the association between diet and mental stress. Tonacio et al. (Tonacio et al.,2006) showed that calorie reduction and weight loss may impact sympathetic nerve and neurovascular control during psychological stress in the obese individual.

Our results showed more adherence to the western diet which is rich in sweet and dessert, sugar, flavor, oils and butter, snack, caffeinate, process meat, fruit juice and egg is associated to depression in participants. Since the importance of depression treatment and prevention in military personnel is shown in previous studies (Byers et al.,2014; Hepner et al.,2016) assessment of dietary components and its association with depression is considered as one of the important issues among these population. In agreement with the current study, Kim et al. (Kim et al.,2015) study showed that a high consumption of fast foods including hamburger, ramen noodles, fried food, pizza and other processed foods is associated with increased risk of depression. Moreover, we did not find any significant association between Mediterranean diet and depression. In contrast with our study Sanchez et al. (Sanchez-Villegas et al.,2009) showed that this diet which included high consumption of fruit and nuts, vegetables, cereal, legumes and fish and lower consumption of meat product and whole fat dairy products had beneficial effects on depression prevention.
This study has the limitation of being cross-sectional, thus limiting inference on the time sequence of the associations, but also has several strengths, including its large sample size, the validated FFQ, an important one was about our participants group who were from military personnel, that we know they are across to hard mental situation. Moreover, as far as our knowledge this is first study which investigate association between dietary pattern and mental health among military personnel.

## Conclusion

In conclusion, the present evidence indicates that the significant inverse association between the second tertile of traditional dietary pattern with mild depression, and a significant association was found between lowest tertile of western dietary pattern and moderate stress.

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## Conflict of Interest

The authors declared, that there was no conflict of interest.

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Table 1- Descriptive characteristics of participants

| | Mean | Std. Deviation | Minimum | Maximum |
|---|---|---|---|---|
| **Anthropometric Characteristic** | | | | |
| Age (year) | 34.74 | 8.21 | 18 | 47 |
| Weight (kg) | 75.47 | 12.71 | 50.70 | 100.50 |
| Height (cm) | 171.56 | 9.60 | 160.00 | 193.00 |
| HC (cm) | 102.47 | 8.82 | 79.00 | 144.00 |
| WC (cm) | 91.07 | 10.34 | 67.00 | 124.00 |
| BMI (kg/m$^2$) | 25.55 | 3.20 | 17.86 | 36.13 |
| **Psychological Characteristics** | | | | |
| Depression | 12.88 | 2.93 | 6 | 2 |
| Self-esteem | 4.9 | 2.42 | 0 | 9 |
| Stress | 14.19 | 3.60 | 9 | 28 |
| Anxiety | 9.81 | 1.75 | 5 | 15 |
| **Nutritional parameters** | | | | |
| Energy (Kcal/day) | 2383.37 | 453.90 | 1824.25 | 3789.48 |
| Carbohydrate(g/day) | 323.80 | 87.97 | 114.57 | 567.32 |
| Protein (g/day) | 81.93 | 24.08 | 21.35 | 151.83 |
| Fat (g/day) | 70.11 | 24.94 | 21.15 | 174.72 |

Table 2- Factor loadings matrix for three dietary patterns identified from the Food Frequency Questionnaire (147 items, divided into 25 food groups).

| | Component | | |
|---|---|---|---|
| | 1 ( Mediterranean ) | 2 (Western) | 3 (Traditional) |
| **Olive** | 0.658 | - | - |
| **Fruits** | 0.626 | - | - |
| **vegetables** | 0.605 | - | - |
| **Nuts** | 0.508 | - | - |
| **Low-fat dairy** | 0.484 | - | - |
| **Dried fruits** | 0.458 | - | - |
| **Sweet & Dessert** | - | 0.687 | - |
| **Sugar** | - | 0.669 | - |
| **Flavor** | - | 0.598 | - |
| **Oils & Butter** | - | 0.542 | - |
| **Snack** | - | 0.511 | - |
| **Caffeinate** | - | 0.445 | - |
| **Process meat** | | 0.412 | - |
| **Fruit Juice** | - | 0.341 | - |
| **Egg** | - | 0.322 | - |
| **Legumes** | - | - | 0.712 |
| **Grain** | - | - | 0.556 |
| **Pickles** | - | - | 0.509 |
| **Red meat** | - | - | 0.443 |
| **High-fat dairy** | - | - | 0.335 |
| **White meat** | - | - | 0.324 |
| **Variability% (Eigen value)** | 12.56 (3.3) | 11.88 (2.1) | 10.96 (1.5) |

Number of factors; 3.
Food groups with absolute values <0.30 are not shown for simplicity.
The Varimax rotation.
Total variability is 35.41 %.

Table 3- Anthropometry characteristics of study participants across tertiles of dietary pattern

| | T1 | T2 | T3 | P | P* |
|---|---|---|---|---|---|
| | **Mean± SD** | **Mean± SD** | **Mean± SD** | | |
| **Mediterranean Dietary Pattern** | | | | | |

| Age (year) | 34.88±8.00 | 34±7.94 | 34.84±8.85 | 0.73 | 0.21 |
|---|---|---|---|---|---|
| Weight (kg) | 75.12±13.25 | 76.85±12.88 | 74.52±12.21 | 0.47 | 0.20 |
| Height (cm) | 172.06±9.77 | 172.99±10.12 | 169.89±8.98 | 0.10 | 0.032 |
| WC (cm) | 91.89±10.60 | 90.66±10.73 | 90.35±9.84 | 0.91 | 0.041* |
| HC (cm) | 101.02±9.32 | 102.86±8.24 | 103.23±8.59 | 0.22 | 0.22 |
| BMI (kg/m$^2$) | 25.22±2.93 | 25.61±3.38 | 25.72±3.22 | 0.56 | 0.64 |
| **Western Dietary Pattern** | | | | | |
| Age (year) | 36.61±7.99 | 33.02±8.31 | 31.09±8.12 | 0.014* | 0.70 |
| Weight (kg) | 75.7±12.92 | 73.20±12.79 | 77.66±12.37 | 0.075* | 0.80 |
| Height (cm) | 171.54±9.68 | 170.91±9.47 | 172.57±9.97 | 0.53 | 0.43 |
| WC (cm) | 91.81±10.98 | 88.77±9.55 | 92.28±10.25 | 0.063* | 0.31 |
| HC (cm) | 103.68±9.47 | 101.21±8.46 | 104.23±8.57 | 0.19 | 0.002* |
| BMI (kg/m$^2$) | 25.66±3.52 | 24.92±2.90 | 25.52±3.18 | 0.088* | 0.70 |
| **Traditional Dietary Pattern** | | | | | |
| Age (year) | 35.29±7.98 | 34.92±8.37 | 33.49±8.37 | 0.32 | 0.23 |
| Weight (kg) | 73.51±12.20 | 73.75±13.59 | 79.38±11.73 | 0.003* | 0.10 |
| Height (cm) | 170.07±9.47 | 171.13±9.48 | 173.83±9.85 | 0.03* | 0.31 |
| WC (cm) | 90.22±9.80 | 88.69±10.48 | 94.12±10.10 | 0.002* | 0.21 |
| HC (cm) | 101.99±8.27 | 100.69±9.26 | 104.52±8.31 | 0.016* | 0.81 |
| BMI (kg/m$^2$) | 25.30±3.06 | 25.06±3.40 | 26.22±2.97 | 0.044* | 0.04* |
| P<0.05, P*, P adjusted for BMI, age and **p**hysical activity | | | | | |

Table 4- The association between dietary pattern and Depression

| **Crude Model** | | Mediterranean Pattern | | | Western Pattern | | | Traditional Pattern | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Depression** | | β±SE | P* | P** | β±SE | P* | P** | β±SE | P* | P** |
| **Low** | T1 | -0.38±0.53 | 0.47 | 0.41 | -0.46±0.56 | 0.41 | 0.43 | -1.02±0.72 | 0.15 | 0.20 |
| | T2 | 0.38±0.62 | 0.53 | | -0.07±0.55 | 0.89 | | -1.79±0.67 | 0.008* | |
| | T3 | - | - | | - | - | | - | - | |
| **Medium** | T1 | 1.66±0.41 | 0.20 | 0.18 | 0.16±0.56 | 0.77 | 0.73 | -0.75±0.73 | 0.30 | 0.44 |
| | T2 | 0.33±0.63 | 0.59 | | -0.26±0.57 | 0.64 | | -1.34±0.68 | 0.04* | |
| | T3 | - | - | | - | - | | - | - | |
| **High** | T1 | 1.1±1.09 | <0.0001* | 0.58 | 1.92±1.5 | <0.0001* | 0.46 | -1.95±1.03 | <0.0001* | 0.58 |
| | T2 | 1.9±0.23 | <0.0001* | | 1.73±1.23 | <0.0001* | | 1.69±0.92 | <0.0001* | |
| | T3 | - | - | | - | - | | - | - | |
| **Adjusted Model** | | β±SE | P* | P** | β±SE | P* | P** | β±SE | P* | P** |
| **Low** | T1 | -0.40±0.53 | 0.44 | 0.39 | -0.55±0.58 | 0.34 | 0.36 | -1.13±0.73 | 0.12 | 0.17 |
| | T2 | 0.45±0.62 | 0.46 | | -0.03±0.56 | 0.94 | | -1.89±0.7 | 0.007* | |
| | T3 | - | - | | - | - | | - | - | |
| **Medium** | T1 | -0.61±0.57 | 0.28 | 0.25 | 0.34±0.61 | 0.57 | 0.57 | -0.45±0.76 | 0.55 | 0.84 |
| | T2 | 0.38±0.65 | 0.56 | | 0.08±0.60 | 0.89 | | -0.96±0.72 | 0.18 | |
| | T3 | - | - | | - | - | | - | - | |
| **High** | T1 | 1.96 | <0.0001* | 0.33 | 1.78±1.59 | <0.0001* | 0.57 | 1.71±1.6 | <0.0001* | 0.47 |
| | T2 | 0.23 | 0.05* | | 1.23±0.36 | <0.0001* | | 1.59±1.23 | <0.0001* | |
| | T3 | - | - | | - | - | | - | - | |
| T, Tertile of the dietary pattern; SE, standard error; P*, real P; P**, P trend; adjusted by age, BMI and Mets. | | | | | | | | | | |

Table 5- The association between dietary pattern and Anxiety

| **Crude Model** | | Mediterranean Pattern | | | Western Pattern | | | Traditional Pattern | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Anxiety** | | **β±SE** | **P*** | **P**** | **β±SE** | **P*** | **P**** | **β±SE** | **P*** | **P**** |
| **Low** | T1 | 0.72±0.57 | 0.20 | 0.18 | 0.17±0.56 | 0.75 | 0.76 | 0.59±0.57 | 0.30 | 0.31 |
| | T2 | 0.23±0.58 | 0.69 | | 0.43±0.60 | 0.47 | | 0.84±0.59 | 0.15 | |
| | T3 | - | - | | - | - | | - | - | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Medium** | T1 | 0.44±0.55 | 0.42 | 0.39 | - 0.10±0.54 | 0.84 | 0.85 | 0.14±0.54 | 0.78 | 0.76 |
| | T2 | 0.73±0.55 | 0.18 | | 0.24±0.57 | 0.66 | | 0.30±0.56 | 0.59 | |
| | T3 | - | - | | - | - | | - | - | |
| **High** | T1 | 0.51±0.73 | 0.73 | 0.67 | 1.27±1.5 | 1 | 1.000 | - 0.84±1.26 | 0.42 | 0.36 |
| | T2 | 1.20±1.32 | 0.36 | | 0.98±1.33 | 0.46 | | -1.94±0.9 | 0.32 | |
| | T3 | - | - | | - | - | | - | - | |
| | | | | | | | | | | |
| **Adjusted Model** | | **β±SE** | **P*** | **P**** | **β±SE** | **P*** | **P**** | **β±SE** | **P*** | **P**** |
| **Low** | T1 | 0.94±0.60 | 0.12 | 0.10 | 0.15±0.59 | 0.79 | 0.80 | 0.56±0.60 | 0.34 | 0.38 |
| | T2 | 0.38±0.60 | 0.52 | | 0.78±0.64 | 0.22 | | 0.90±0.63 | 0.15 | |
| | T3 | - | - | | - | - | | - | - | |
| **Medium** | T1 | 0.81±0.61 | 0.18 | 0.16 | 0.03±0.58 | 0.94 | 0.93 | 0.34±0.59 | 0.55 | 0.57 |
| | T2 | 0.99±0.58 | 0.09 | | 0.87±0.63 | 0.17 | | 0.66±0.62 | 0.28 | |
| | T3 | - | - | | - | - | | - | - | |
| **High** | T1 | 0.76±1.52 | 0.61 | 0.54 | - 0.17±1.53 | 0.91 | 0.90 | - 0.98±1.28 | 0.44 | 0.31 |
| | T2 | 1.49±1.35 | 0.26 | | 1.39±1.38 | 0.31 | | - 1.93±0.67 | 0.59 | |
| | T3 | - | - | | - | - | | - | - | |
| T, Tertile of the dietary pattern; SE, standard error; P*, real P; P**, P trend; adjusted by age, BMI and Mets. | | | | | | | | | | |

Table 6- The association between dietary pattern and stress

| **Crude Model** | | Mediterranean Pattern | | | Western Pattern | | | Traditional Pattern | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Stress** | | **β±SE** | **P*** | **P**** | **β±SE** | **P*** | **P**** | **β±SE** | **P*** | **P**** |
| **Low** | T1 | -0.28±0.35 | 0.41 | 0.40 | -0.025±0.35 | 0.94 | 0.93 | -0.15±0.35 | 0.66 | 0.62 |
| | T2 | -0.14±0.35 | 0.67 | | -0.10±0.35 | 0.76 | | -0.43±0.36 | 0.23 | |
| | T3 | - | - | | - | - | | - | - | |
| **Medium** | T1 | -0.26±0.50 | 0.59 | 0.58 | 0.93±0.49 | 0.06* | 0.06* | 0.20±0.51 | 0.68 | 0.57 |
| | T2 | 0.44±0.45 | 0.32 | | 0.55±0.51 | 0.27 | | 0.49±0.48 | 0.31 | |
| | T3 | - | - | | - | - | | - | - | |
| **High** | T1 | -2.1±1.42 | 0.33 | 0.06* | -0.59±1.24 | 0.63 | 0.65 | 1.12±1.20 | 0.34 | 0.59 |
| | T2 | -1.40 | 1.13 | | 0.02±1.02 | 0.98 | | -1.87±0.7 | 0.2 | |
| | T3 | - | - | | - | - | | - | - | |
| | | | | | | | | | | |
| **Adjusted Model** | | **β±SE** | **P*** | **P**** | **β±SE** | **P*** | **P**** | **β±SE** | **P*** | **P**** |
| **Low** | T1 | -0.29±0.35 | 0.40 | 0.39 | -0.01±0.36 | 0.96 | 0.95 | -0.15±0.35 | 0.66 | 0.65 |
| | T2 | -0.18±0.36 | 0.60 | | -0.13±0.35 | 0.71 | | -0.43±0.36 | 0.23 | |
| | T3 | - | - | | - | - | | - | - | |
| **Medium** | T1 | -0.31±0.50 | 0.53 | 0.52 | 0.82±0.50 | 0.10 | 0.09* | 0.20±0.51 | 0.68 | 0.75 |
| | T2 | 0.46±0.45 | 0.31 | | 0.48±0.52 | 0.35 | | 0.49±0.48 | 0.31 | |
| | T3 | - | - | | - | - | | - | - | |
| **High** | T1 | -1.9±0.23 | 0.7 | 0.09* | 0.13±1.43 | 0.92 | 0.90 | 1.12±1.20 | 0.34 | 0.23 |
| | T2 | -1.17 | 0.31 | | 0.65±1.25 | 0.60 | | -1.87±0.34 | 0.57 | |
| | T3 | - | - | | - | - | | - | - | |
| T, Tertile of dietary pattern; SE, standard error; P*, real P; P**, P trend; adjusted by age, BMI and Mets. | | | | | | | | | | |

Table 7- The association between dietary pattern and self-esteem

| **Crude Model** | | Mediterranean Pattern | | | Western Pattern | | | Traditional Pattern | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Self esteem** | | **β±SE** | **P*** | **P**** | **β±SE** | **P*** | **P**** | **β±SE** | **P*** | **P**** |
| **Medium** | T1 | 0.47±0.43 | 0.27 | 0.26 | 0.28±0.44 | 0.52 | 0.53 | 0.14±0.41 | 0.72 | 0.699 |
| | T2 | 0.33±0.42 | 0.43 | | 0.03±0.42 | 0.92 | | 0.71±0.46 | 0.11 | |
| | T3 | - | - | | - | - | | - | - | |
| **High** | T1 | 0.60±0.48 | 0.21 | 0.20 | 0.28±0.44 | 0.52 | 0.96 | 0.17±0.46 | 0.71 | 0.694 |
| | T2 | 0.35±0.47 | 0.45 | | 0.03±0.42 | 0.92 | | 0.84±0.50 | 0.09 | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | T3 | - | - | | - | - | | - | - | |
| | | | | | | | | | | |
| **Adjusted Model** | | **β±SE** | **P*** | **P**** | **β±SE** | **P*** | **P**** | **β±SE** | **P*** | **P**** |
| **Medium** | T1 | 0.41±0.44 | 0.35 | 0.35 | 0.25±0.45 | 0.57 | 0.57 | 0.17±0.42 | 0.67 | 0.69 |
| | T2 | 0.25±0.42 | 0.54 | | -0.04±0.43 | 0.91 | | 0.75±0.47 | 0.11 | |
| | T3 | - | - | | - | - | | - | - | |
| **High** | T1 | 0.56±0.49 | 0.24 | 0.24 | -0.06±0.49 | 0.89 | 0.87 | 0.03±0.47 | 0.93 | 0.94 |
| | T2 | 0.33±0.48 | 0.48 | | -0.37±0.48 | 0.43 | | 0.74±0.51 | 0.14 | |
| | T3 | - | - | | - | - | | - | - | |

T, Tertile of dietary pattern; SE, standard error; P*, real P; P**, P trend; adjusted by age, BMI and Mets.