



Association of dietary diversity score with anxiety in women



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ABSTRACT

Evidence suggests that diet plays an important role in the development of mental disorders, especially anxiety. Dietary diversity score is an indicator for assessing diet quality. However, its association with anxiety has not been investigated. The aim of this study was to examine the association of dietary diversity score with anxiety. A cross-sectional study was conducted among 360 women attending health centers in the south of Tehran in 2014. General information among others were collected. Weight, height and waist circumference were measured and body mass index (BMI) was calculated. Dietary intake and anxiety score were assessed using a 24-h dietary recall and Depression, Anxiety, Stress Scales (DASS) questionnaires, respectively. Dietary diversity score was computed according to the guidelines of FAO. About 35% of the participants were found to exhibit anxiety. The dietary diversity score in 12.5% of the subjects were between 1 and 3 (low dietary diversity score) but 87.5% scored between 4 and 7 (high dietary diversity score). The adjusted mean of anxiety score in subjects with high dietary diversity score was significantly lower than those with low dietary diversity score. Dietary diversity score was found to be inversely associated with anxiety. However, the causality between anxiety and dietary diversity could not be determined.

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1. Introduction

It has been reported that inadequate nutrition and low qualitative diets can be risk factors for the incidence or progression of mental disorders (Weng et al., 2012). According to the USDA dietary guideline and the Food Guide Pyramid, dietary diversity is one of the characteristics of healthy diet (Hatloy et al., 1998). Dietary diversity score is an easy and cost-benefit index for evaluating diet quality and reflects the consumption of various foods between and within each food group (Azadbakht and Esmailzadeh, 2011). The result of some studies among women of different age groups have demonstrated that higher dietary diversity score is related to increased nutrient adequacy of the diet (Kennedy et al., 2013). Higher dietary diversity can result in more nutrition adequacy and adequate intake of the nutrient and non-nutrient elements can lead to physical and mental health (Mirmiran et al., 2003). In addition to the positive relationship between dietary

diversity score and the intake of macronutrients and micronutrients, several studies have evaluated the relationship between dietary diversity score and chronic diseases (Azadbakht et al., 2005). According to the results of previous investigations, dietary diversity score was found to have an inverse relationship with metabolic syndrome (Azadbakht et al., 2005), cardiovascular diseases (McCullough et al., 2002), cancer (Fernandez et al., 2000), and high blood pressure (Miller et al., 1992). However, according to our knowledge, no study has examined the relationship between dietary diversity score and anxiety. The purpose of this study was to determine the association between anxiety and dietary diversity score in women who attend the health centers.

2. Methods

2.1. Subjects

A descriptive-analytical cross-sectional study was conducted among 360 women aged 20–49 years, attending urban health centers in the south of Tehran. Each health center provides

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primary health care for the households within its reach or coverage. The services provided includes immunization, family planning, children growth monitoring, prenatal care and health education. Women who attend these health centers are usually healthy and comparable with women of the same age, from the general population. Ten health centers were randomly selected from the twenty-nine (29) available. The frequency of women aged 20–49 years in each health center was obtained. Simple sampling technique was employed to select the study participants from each health center, using the proportion to size approach. Participants had at least elementary education and BMI between 18.5–34.9 kg/m². In total, 400 women were invited to participate in the study of which 40 subjects declined, resulting in a response rate of 90%. The exclusion criteria was set before commencing the study and this included the exemption of women who were pregnant and lactating, had been diagnosed with anxiety by a psychiatrist in a past year, currently on anti-anxiety medication or treatment, had received anti-anxiety treatment within a year prior to the start of the study, currently uses drugs, alcohol or tobacco products and those who are experiencing stressors such as divorce, bankruptcy, love failure, death of first-degree relatives or close friends in recent times (6 months prior to the start of the study). Women with diagnoses such as diabetes, cardiovascular diseases, cancer, high blood pressure, kidney, liver, hyperthyroid disease, epilepsy, multiple sclerosis, or regular use of any medication or on any special diet were excluded from this study. The study protocol was approved by the Medical Ethics Committee of Tehran University of Medical Sciences. Before the collection of data, all participants completed a written informed consent form.

2.2. Assessment of anxiety score

The Depression, Anxiety, Stress Scales (DASS, 42-items) questionnaire was used to measure the score of anxiety. This questionnaire was designed by Lovibond in 1995. The Cronbach's alpha for the DASS questionnaire in 717 Australian normal subjects, have been reported as follows: depression 0.81, anxiety 0.77 and stress 0.73 (Lovibond and Lovibond, 1995). In another study on 400 high school students in Kermanshah in the west of Iran, the Cronbach's alpha for the depression, anxiety and stress scales were reported as 0.94, 0.85 and 0.87, respectively (Afzali et al., 2007). The DASS questionnaire consists of 14-items in each of the three scales, including depression, anxiety and stress. The responses were classified as never, low, moderate and severe with scores of 0, 1, 2 and 3, respectively. Based on the scoring of the DASS questionnaire, all the participants were divided into 5 groups; normal, mild, moderate, severe and extremely severe anxiety. For statistical analysis, subjects were categorized into three levels; scores ≤ 7 were considered normal; 8–14 as mild to moderate and ≥ 15 as severe anxiety (UNSW).

2.3. Dietary diversity measurement

A 24-h dietary recall questionnaire was completed for each participant in a face-to-face interview. The FAO (2013) dietary diversity score questionnaire was used to determine the dietary diversity score of each participant (Kennedy et al., 2013). According to the structure of this guideline, all the food items were categorized into 9 food groups, including: (1) cereals and white roots, (2) milk and dairy products, (3) vitamin A-rich vegetable and fruits, (4) green leafy vegetables, (5) other vegetable and fruits, (6) meat, fish and sea food, (7) organ meat, (8) eggs, (9) nut, seeds and legumes. The dietary diversity score was calculated using a minimum consumption of at least half serving of one food item from each of the mentioned food groups. The score of dietary diversity was the total of all food group's scores. The range of

dietary diversity score was from 0 to 9. Dietary diversity score was classified into two groups; (1) low (≤ 3) and (2) high (> 3) (Driemé et al., 2013).

2.4. Covariate assessment

The physical activity of participants was assessed with the short form of IPAQ. Vigorous and moderate intensity activities (at least 10 min in duration) were measured separately in hours, minutes, and days. Based on IPAQ, the participants were classified into three levels of low-, moderate- and high-activity (IPAQ, 2005).

Weight was measured using a balance scale with a precision of 100 g and these were done while participants were in minimal clothing and without shoes. Height was measured using a stadiometer without shoes, with a precision of 1 mm. BMI was calculated as weight (kg) divided by height squared (m²). Waist circumference was measured using a flexible measuring tape and measurements were done at the middle of the interval between the last rib and the iliac crest, with a precision of 1 mm.

A questionnaire was used to collect socio-demographic data and this was completed for each subject. Variables such as age, education as the prosperous years of schooling, marital status (single, married, widowed or divorced), household income (< 500000 , 500000 – 1000000 , > 1000000 tomans), and dietary supplement intake (defined as 3 or more times/week) were collected. The responses for marital status were later categorized into two levels as either married or unmarried. The USDA food composition table and Nutritionist software version 4 (First Data Bank, San Bruno, Ca. USA) were used to estimate the daily energy intake.

2.5. Statistical analysis

All statistical analyses were performed using the Statistical Package for Sciences Software (SPSS Inc., Chicago, IL, USA) version 16. The associations between qualitative (categorical data) variables were assessed using Chi-square test. Analysis of variance (ANOVA) was used to determine the relationship between anxiety and quantitative variables. Analysis of covariance (ANCOVA) was used to compare the anxiety score between the two groups of dietary diversity score, after adjustment for covariates. Covariates with p -value < 0.2 in the univariable analysis were included in the final models. Further analyses using important covariates including income, dietary supplements use, energy intake and BMI in addition to the above mentioned covariates were done by entering it into the final models.

3. Results

The mean age of the 360 women studied was 32.1 ± 6.3 years. The prevalence of mild/moderate and severe anxiety was 21.9 and 13.1%, respectively. Table 1 shows the anxious status and basic characteristics of the participants. Physical activity was found to be inversely associated with anxiety (p -value = 0.005). There was no statistically significant relationship between the other variables and anxiety. About 23.3% of women used dietary supplements; 10.5% iron, 10.2% folic acid, 5.3% calcium–vitamin D, 2.5% multi-vitamin, 1.1% zinc, 1.7% vitamin E and 2.3% other supplements.

The respondents' dietary diversity score ranged from 1–7; 12.5% had low dietary diversity score and 87.5% had high dietary diversity score. In the present study, the percentage of most food groups' consumption in anxious people were less than that of healthy people, but the differences are not statistically significant (Table 2). The results did not change after excluding subjects who were taking dietary supplements. There was no association between food consumption and income, in the nine groups (data has not been shown).

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