

Perceived stress, depression and food consumption frequency in the college students of China seven cities

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Received 7 January 2007; received in revised form 24 May 2007; accepted 24 May 2007

Abstract

The aim of the study was to explore the association between perceived stress, depression and food consumption frequency. A self-administered questionnaire that included the perceived stress scale, the depression scale and dietary intake was used in the baseline survey of a cohort study of 2579 local college students over 7 cities in China. Gender and city differences were found in perceived stress scores and depression scores. There were also significant differences among diverse smoking levels and among perceived weight categories in perceived stress and depression scores. Stepwise logistic regression models found that frequency of consumption of fresh fruit, ready-to-eat food and snack food had apparently independent effects on perceived stress, whereas the intake level of fresh fruit, ready-to-eat food and fast food was significantly associated with depression. The link between food consumption frequency, perceived stress and depression suggests that diet intervention may be considered a mediate strategy integrated in psychology prevention program among normal population of the college.

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Keywords: College student; China; Food frequency; Perceived stress; Depression

1. Introduction

People's eating habits and food choices are not simply the result of class, culture, media, gender or hormones, but are also the outcome of individual intention and agency [1]. Food consumption pattern of human being reflects complex interrelations and interactions among the individual, the culture and the society in which people live. Individual factors include age, education, and psychological characteristics [2]. There is growing evidence that food consumption has an influence on how we feel [3]. The effect of carbohydrate meal on mood is most frequently reported in this field. Some psychological researches have showed that carbohydrate intake is associated with improved mood [4–6]. Low

carbohydrate/high protein breakfast for 3 weeks resulted in reports of increased anger [7]. But some studies revealed that dietary composition had no effect on mood and behavior [8]. Conflicting findings have aroused increasing interest among different domains in the past two decades.

The influence of diet on stress is an attractive subject in health-related behavior research. People use food not only for nourishment, but also to cope with stress and tension [2,9]. In health psychology literature, food choice was considered a tool or deliberate strategy to modify temperament and mood [10]. Some investigators have found that stress induced over-eating. Some have observed higher energy and fat intake under stressful situations [11–14]. However, other studies showed no differences in intake by comparing the periods of high and low life stress [15–17].

Wurtman RJ and Wurtman JJ developed the most quoted hypothesis that carbohydrate could relieve depression [18]. When those suffering with carbohydrate craving obesity were

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asked why they snacked most on carbohydrate-rich foods, the reason was more likely to be that these foods made them feel calmer or more clearheaded, rather than satisfying hunger. The weight-related studies found that obese individuals increased their food intakes in response to depression and other negative emotions [19,20]. But recent study on depressive symptoms and adolescent eating found that total caloric intake and snaking frequency were not significantly associated with depressed mood [21].

The results of negative mood on food intake are more difficult to interpret because of the conflicting findings in the mood and food consumption. It remains unclear whether the consumption of food changes in negative mood situations or whether more or less intake of some food leads to unpleasant emotion.

In these studies, the relationship between stress and carbohydrate intake or the relationship between depression and eating disorder were more commonly reported respectively. Moreover, most of these researches were conducted with clinical or subclinical populations [22–24]. Less is known about stress or depression and frequency consumption of different food groups in nonclinical settings, especially among college students. We were interested in which categories of food contribute to stress and depression and how closely was the food consumption frequency correlated with the two negative moods among Chinese college students.

The current study was set up to assess associations between perceived stress, depression and food consumption frequency in the college students of China seven cities. We used cross-sectional data from China Seven City Study baseline survey to evaluate the distribution of consumption frequency of ten main food groups, measure perceived stress and depression symptom with gender, city and grade and test the hypothesis that the college students with higher stress or depression would have higher consumption frequencies for carbohydrate-rich or/and energy-rich food.

2. Methods

2.1. Procedure and sample

The study was conducted in seven cities of China: Shenyang and Harbin in the northeast, Qingdao in east coastal area, Hangzhou in the southeast, Wuhan in the center, Kunming in the southwest and Chengdu in the west-central China. All these are capital cities of China provinces except Qingdao. Collectively these cities represent the northern and southern cultures of China, the economically developed coastal region and the developing interior regions of the country. The survey was approved by the Institutional Review Boards (IRB) of China seven cities' Health Bureaus. In each city, one 3-year college and one 4-year college were drawn from a city level comprehensive university. Colleges were stratified and selected by the school system, either 3-year or 4-year. Two academic majors were randomly selected for the 3-year and 4-year colleges for course sampling. Years 1–3 in the three-year colleges and Years 1–4 in the four-year colleges constituted the sample. One class was randomly selected from each grade in the selected major. The

overall study population included 2579 college students. Consents from both parents and students were obtained before data collection. Of the 2579 students, 2541 students (98.5%) provided consents and were invited to participate in the survey during November 2003 to January 2004. The participants were asked to complete a self-administered, paper and pencil questionnaire in their classrooms. The questionnaire, including general characteristics, depression scale, perceived stress scale and dietary intake, was distributed and collected in the envelopes provided. The protocol was the same across the 7 cities.

2.2. Assessment of dietary intake

Dietary intake for the previous month was assessed by food frequency in the questionnaire. One paper on reproducibility of the food frequency questionnaire was published in Chinese Journal of Public Health. Another paper on validity is in press. The carbohydrate-rich or/and energy-rich foods were categorized into five groups: fresh fruits (including fruit juice); sweets (such as desserts, ice cream, candy, or soda); Ready-to-eat food (such as instant noodle, frozen, canned or microwave foods); snack food items (such as potato chips, corn chips and tortilla chips); something from a fast food restaurant, namely fast food (like McDonald's, KFC, Pizza Hut/Bi Sheng Ke etc.). Consumption frequency of each group of food last month was divided into six categories: less than once a week, once a week, 2–3 times a week, 4–6 times a week, once a day and two or more times per day. The six categories were converted into the following values respectively: 0, 1, 2.5, 5, 7 and 14 when we calculated the total frequencies for different cities and different gender.

2.3. Stress and depression measures

The perceived stress scale (PSS) was designed to measure the degree to which situations in one's life are appraised as stressful [25]. It has been widely used in research on stress and health status. The questions in the scale ask about feelings and thoughts during the last month. The original scale consisted of 14 items (PSS14). 10-item (PSS10) and 4-item (PSS4) versions of the scale have also been validated later. The alpha reliability coefficient for PSS14 was 0.75, for PSS10 was 0.78 and for PSS4 was 0.60 [26]. From PSS10 version, dropping 4 reverse-scored items (felt confident about ability to handle personal problems, felt that things were going your way, been able to control irritations in life, felt on top of things) and an item whose content overlapped with hostility assessment (been angered because of things that were outside of your control), there were 5 items remained. The remaining 5 items were translated and back translated and piloted on 75 college students and 213 middle school students in Wuhan, China. The 3 items from the pilot had the highest item-total correlations. Coefficient alpha for the 3-item scale was 0.83 in the youth sample. Participants' sense of being under stress was assessed with this short 3-item scale: "In the last month, how often have you felt nervous and stressed?", "In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?" and "In the last month, how often have you

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