Original Article

Family Dinner Frequency is Inversely Related to Mental Disorders and Obesity in Adolescents: the CASPIAN-III Study

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Abstract

Purpose: Family dinner is a proxy of family connectedness that may affect mental health. The present study aimed to examine the associations of frequency of family dinner with mental disorders and obesity in a nationally-representative sample of Iranian adolescents.

Methods: A total of 5528 Iranians adolescents aged 10–18 years were enrolled in 2009 – 2010 in the third survey of a national surveillance program, entitled Childhood and Adolescence Surveillance and Prevention of Adult Non-communicable disease (CASPIAN-III) study. The frequency of family dinner meal was assessed. Mental health assessments were done as part of the World Health Organization-Global School-based Student Health Survey. The odds of having mental disorders and obesity were assessed by logistic regression.

Results: No significant difference was found in dietary intake between family dinner consumers (≥5 times (night)/wk) and skippers (<5 times/wk); however, they were more likely to consume breakfast and had higher meal frequency. After controlling for some confounders, dinner consumers had lower odds for all types of mental disorders (OR = 0.55; 95% CI = 0.47–0.64), anxiety (OR = 0.47; 95% CI = 0.4–0.54), insomnia (OR = 0.6; 95% CI = 0.53–0.7), and confusion (OR = 0.7; 95% CI = 0.6–0.86), as well as the body mass index- z score (OR = 0.78; 95% CI = 0.73–0.84).

Conclusion: The current study showed an inverse relationship between the frequency of family dinner consuming and mental disorders and obesity in a nationally-representative sample of Iranian adolescents. Such simple recommendations for consuming family dinner for families may be feasible, sustainable, and effective for health promotion and disease prevention.

Introduction

Epidemiological evidence has revealed that up to 20% of children and adolescents suffer from mental disorders, and 50% of adults with mental disorders have been affected during childhood or adolescence. Additionally, there are many gaps in resources and management of mental disorders in children and adolescents, such as failure to provide social services and counties care, in low income countries.[1] However, few studies have assessed the prevalence and predictors of mental disorders among adolescents in developing countries. A representative data from 10–18-year-old Iranian adolescents showed that 27.8% and 11.5% of adolescents had emotional problems and anxiety, respectively.[2] A growing trend has been also observed for obesity among children and adolescents in both developed and developing countries[3,4] including Iran.[5]

Although genetic factors underlie the individual susceptibility to both obesity and mental disorders, environmental and lifestyle factors play an important role in the phenotypic expression of these disorders. The concurrent increments in mental disorders and obesity have been associated with considerable changes in lifestyle factors such as sleep pattern, physical activity, meal pattern, diet quality and nutrient intake. Several observational and epidemiologic studies have reported a positive link between obesity, irregular meal patterns and poor diets[6,7] as well as a positive link between mental disorders, irregular meal patterns and poor diets.[8,9]

Having regular meal pattern and family dinner are associated with a healthier dietary pattern.[10–13] and a better communication between adolescents and parents.[14] It has been shown that irregular meal pattern is associated with lower consumption of nutrient-rich foods such as fruits, vegetables and fiber whilst it is associated with higher consumption of soft drinks, trans and saturated fatty acids.[10,11,15–18] Furthermore, increased frequency of family dinner is associated with higher healthy eating index-C (HEI-C) score[13] as well as higher consumption of some key nutrients for mental health including vitamins B9, B6, B12, iron, and vitamin C.[10] HEI,

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as a diet quality index, is also inversely associated with mental disorders such as depression.[19,20]

In addition, findings from earlier studies have shown that frequent family dinner consumers are less likely to omit breakfast and lunch meals[13] and are less likely to be overweight or obese.[21–25] The beneficial effect of having breakfast on mental health has been shown before.[23,25]; however we are aware of few studies that have examined the association between dinner and mental health in adolescents.[26,27] A recent study showed that family dinner is associated with both positive and negative dimensions of mental health in adolescents, and is mediated by ease of relationship between adolescents and their parents. However, another study showed that frequent family dinner is associated with higher well-being score and lower depression score, even after adjusting for parental communication and monitoring and family connectedness.[27]

Since regular meal intake is an indicator of a healthy lifestyle, and family dinner is associated with higher diet quality and better parental communication, better mental status could be expected among dinner consumers. However, because of various eating habits such as different portion sizes and dietary intakes in various cultures, such association should be assessed separately in different populations. We are aware of no study in this field among Iranian adolescents; therefore, this study was conducted to determine the association of having family dinner with mental disorders and the prevalence of overweight and obesity among Iranian adolescents. The other objective of this study is to compare dietary intakes of dinner consumers and skippers.

Materials and Methods

Study population

The present study was conducted within the framework of Childhood and Adolescence Surveillance and Prevention of Adult Non-communicable disease (CASPIAN) Study, which is a national school-based surveillance program.[28] Subjects in the present study were participants in the third survey of CASPIAN Study which was performed in 2009–2010. The detailed methodology is provided elsewhere.[29] Briefly, eligible schools were selected randomly using the data bank provided by the Ministry of Education, and then, students were randomly selected from them. Totally, 5528 students aged 10–18 years were recruited from 27 provinces in Iran using multistage clustering random sampling. In order to assess the socioeconomic status, mental health, behaviors, attitude, knowledge, skills and dietary habits of families, some reliable and validated self-administered questionnaires were used.[30] An experts' panel confirmed the validity of the questionnaires' content based on observations and item analysis. Reliability was affirmed based on a pilot study on 120 urban and rural students in Islamshahr. Cronbach's reliability coefficient was >0.7. All questionnaires, including mental health, were designed based on the World Health Organization Global School-based Student Health Survey (WHO-GSHS). All parents and students expressed their willingness to participate in the study by providing a written informed consent and oral assent, respectively. This study was approved by the ethics committee and other relevant national regulatory organizations.

Anthropometric assessment

Trained healthcare providers measured weight and height under standard protocol, using calibrated equipment Body mass index (BMI) was calculated as weight divided by height squared (kg/m²). Waist circumference (WC) was measured at the narrowest level between the lowest rib and iliac crest, while participants wore light clothing, and recorded to the nearest 0.5 cm.

Assessment of socio-demographic variables and mental health

In order to design questionnaires for CASPIAN study, we used WHO STEPwise which is approved by NCD (Tools ver. 9.5) and WHO-GSHS. Related information regarding the socioeconomic status and family dietary habits were obtained using the parents' questionnaires. The validity and reliability of all questionnaires were confirmed in the first survey of CASPIAN study. Mental health assessments were done as part of the WHO-GSHS questionnaire and students were asked regarding feelings of anger, anxiety, insomnia and confusion. All questions in mental health questionnaire had the following response categories: almost every day, more than once per week, almost each week, almost every month, and seldom or never. The first three categories were considered as having the relevant mental disorder while the last two were considered as lack of mental disorder. The validity of these questionnaires was confirmed previously.[30] The frequency of having dinner was assessed with the question: "Typically, how many days per week do you have dinner or supper with your family?" Breakfast and lunch intake were also assessed with a similar question.

Definition of terms

In the present study, dinner consumers were defined as participants who had equal to or more than 5 dinner meals per week. Adolescents with waist to height ratio (WtHR) > 0.5 were considered as obese and centrally obese[31]. Obesity was defined as having BMI ≥ 95th percentile of age- and sex-specific BMI.

Statistical analysis

All data were analyzed using the Statistical Package for the Social Sciences (SPSS version 20, SPSS, Inc., Chicago). The significant mean differences of continuous variables were recognized using t-test between dinner consumers and non-consumers. The frequencies of categorical variables were compared between dinner consumers and non-consumers using Chi-square test. Logistic regression analysis was used to identify the associations of dinner consumption with anthropometric measurements and mental disorders in crude (Model I) and adjusted models for several potential confounders including sex, age and SES, single-parent living (Model II), additional adjustment for time spent on watching TV, computer use and sleep duration (Model III), further controlling for breakfast consumption, and meal frequency (Model IV). The linear regression model was also used to assess associations between dinner consumption with anthropometric measurements. The results of logistic and linear regression are presented as OR (95%CI) and β coefficient (SE) respectively. P-values less than 0.05 were considered as statistically significant.

Results

Table 1 shows the general characteristics of participants. The proportion of boys was higher among dinner skippers than consumers (53.8% vs. 48.9%, respectively, P = 0.0001). Dinner skippers were more likely to suffer from mental disorders, and to

Table 1. General characteristics of study population by dinner consuming pattern[1].

Variables	Diner consumption		P-Value
	Yes (*n* = 75%)	No (*n* = 25%)	
Sample size (n)	4146	1382	
Mean±SD			
Age (yr)	14.8 ± 2.4	14.4 ± 2.3	0.840
BMI* (kg/m^2)	19.3 ± 4.4	19.8 ± 4.0	0.0001
WC* (cm)	68.8 ± 22.8	68.5 ± 12.2	0.874
WtHR*	0.44 ± .14	0.45 ± 0.07	0.737
Meal frequency	2.5 ± 0.5	1.3 ± 0.7	0.0001
Boys (%)	48.9	53.8	0.001
SES* (%)			0.757
Weak	33.2	33.9	
Moderate	32.9	33.4	
Strong	33.9	32.7	
Single-parent family (%)	4.9	7.2	0.001
Breakfast consumption (Yes %)	64.2	31.6	0.0001
Overweight or obese (%)	15.1	22.4	0.0001
Abdominal obese (%)	14.1	20.7	0.0001
Mental disorders (%)	64.2	77.6	0.0001
Angriness (%)	64.3	57.7	0.0001
Anxiety (%)	54.9	70.9	0.0001
Insomnia (%)	45.9	60.1	0.0001
Confusion (%)	34.8	43.4	0.0001
Sleeping (≤5h) (%)	4.5	8.9	0.0001
Sleep (h/day)	9.1 ± 2.1	8.6 ± 2.4	0.0001
Watching TV (>2h) (%)	77.5	71.4	0.0001
Current smokers (%)	6.9	9.5	0.035

[1]Continuous variable were compared using independent *t*-test and categorical variables were compared using Chi-square test.
*BMI = body mass index, WC = waist circumference, WtHR = waist to height ratio, SES = socioeconomic status.

Table 2. The prevalence with school satisfaction by dinner consuming pattern.

Variables	Diner consumption		
	Yes (*n* = 4146)	No (*n* = 1382)	P-Value[1]
Communication with friends			0.411
Weak (%)	1.2	1.2	
Moderate (%)	74.1	75.9	
Strong (%)	24.6	22.9	
School atmosphere satisfaction (Yes) (%)	83.0	79.9	0.016

[1] Resulted from Chi-square test.

have general and abdominal obesity. The prevalence of anxiety, insomnia and confusion was higher among dinner skippers compared with consumers. Dinner consumers had significantly higher meal frequency and sleep duration than skippers.

We found no significant difference between the two groups regarding some dietary habits at home including type of bread, type of oil used for food preparation, type of dairy used and adding salt to table foods. Both groups of dinner consumers and skippers used refined grain-bread, moderate fat dairies and vegetable oil, and added salt to the table foods.

Table 2 presents social communication skills and satisfaction. Dinner consumers were more likely to be satisfied with school

atmosphere, but no significant difference existed between dinner consumers and skippers in terms of communications with friends.

Table 3 shows the crude and multivariate adjusted odds ratios (ORs) of mental disorders in dinner consumers compared with skippers. We found a 45% reduction in all types of mental disorders in model III. Further adjustment for breakfast consuming and meal frequency eliminated the significant association. After controlling the effect of confounders (in model III), dinner consumption reduced the odds of anxiety (53%), insomnia (40%) and confusion (27%). However, dinner consuming significantly increased the risk of angriness (29%).

Table 4 indicates the association between dinner consuming and

Table 3. Multivariate-adjusted odds ratio (OR) and 95% confidence interval (95% CI) for mental disorders in dinner consumers compared with non-consumers.

Variables	Diner consumption	
	OR	95% CI
Mental disorders		
Model I	0.520	0.451–0.599
Model II	0.508	0.438–0.589
Model III	0.548	0.469–0.641
Model IV	1.108	0.867–1.416
Angriness		
Model I	1.325	1.167–1.503
Model II	1.290	1.129–1.475
Model III	1.288	1.118–1.483
Model IV	1.172	0.93–1.478
Anxiety		
Model I	0.500	0.438–0.571
Model II	0.479	0.416–0.551
Model III	0.467	0.402–0.541
Model IV	0.755	0.599–0.951
Insomnia		
Model I	0.563	0.495–0.640
Model II	0.554	0.484–0.635
Model III	0.608	0.527–0.702
Model IV	0.901	0.720–1.127
Confusion		
Model I	0.699	0.607–0.804
Model II	0.732	0.630–0.850
Model III	0.730	0.623–0.855
Model IV	0.951	0.755–1.197

Model I: Crude. Model II: Adjusted for sex, age and SES, single-parent living. Model III: Further adjusted for TV, sleep, computer. Model IV: Further adjusted for breakfast consumption and meal frequency.

Table 4. Linear regression of dinner consumption with anthropometric measurements.

Variables	Diner consumption		
	β	SE	P-Value
BMI* (kg/m2)			
Model I	-0.5	0.1	<0.0001
Model II	-0.7	0.1	<0.0001
Model III	-0.8	0.1	<0.0001
Model IV	-0.6	0.2	0.002
BMI* (z score)			
Model I	-0.1	0.03	<0.0001
Model II	-0.2	0.03	<0.0001
Model III	-0.2	0.03	<0.0001
Model IV	-0.2	0.05	0.002
WC* (cm)			
Model I	0.3	0.6	0.579
Model II	-0.4	0.7	0.586
Model III	-0.6	0.8	0.438
Model IV	-0.5	1.2	0.694
WtHR			
Model I	-0.006	0.004	0. 154
Model II	-0.004	0.005	0.409
Model III	-0.005	0.005	0.326
Model IV	-0.003	0.008	0.748

Model I: Crude. Model II: Adjusted for sex, age and SES, single-parent living. Model III: Further adjusted for TV, sleep, computer. Model IV: Further adjusted for breakfast consumption and meal frequency. * BMI = body mass index, WC = waist circumference, WtHR = waist to height ratio.

anthropometric measurements. We found that dinner consumption decreased BMI (β: -0.6) and z-scores of BMI (β: -0.2). Even after accounting for various confounders, all coefficients remained significant. However, dinner consumption was not associated with WtHR or waist circumference.

Table 5 compares the OR and 95% confidence interval (CI) for anthropometric measurements between dinner consumers and skippers. Dinner consuming was inversely associated with general and abdominal obesity. Dinner consumption reduced the odds of central obesity by more than 30% (95%CI: 0.5, 0.96). Further adjustment for breakfast consuming and meal frequency could not eliminate the significant association for general and central

Table 5. Multivariate-adjusted odds ratio (OR) and 95% confidence interval (95% CI) for general and central obesity in dinner consumers compared with non-consumers.

Variables	Dinner consumption	
	OR	95 %CI
Overweight		
Model I	0.7	0.6, 0.9
Model II	0.8	0.6, 1.0
Model III	0.8	0.6, 1.06
Model IV	1.01	0.7, 1.5
Obesity		
Model I	0.6	0.5, 0.7
Model II	0.6	0.5, 0.8
Model III	0.6	0.5, 0.7
Model IV	0.67	0.5, 0.96
Abdominal obesity		
Model I	0.6	0.5, 0.7
Model II	0.7	0.5, 0.8
Model III	0.6	0.5, 0.7
Model IV	0.7	0.5, 0.96

Model I: Crude. Model II: Adjusted for sex, age and SES, single-parent living. Model III: Further adjusted for TV, sleep, computer. Model IV: Further adjusted for breakfast consumption and meal frequency

obesity [OR for obesity: 0.67 (95% CI: 0.5, 0.96) and OR for central obesity= 0.7 (95% CI: 0.5, 0.96)]. However, the significant relationship with overweight disappeared after accounting for breakfast and meal frequency.

Discussion

In the present paper, we studied the association between family dinner consumption, mental disorders and the prevalence of overweight and obesity in a large representative sample of Iranian adolescents. Approximately 75% of adolescents consumed dinner. In spite of similar dietary intake, dinner skippers were more likely to be overweight or obese and suffered from various mental disorders. Furthermore, our results suggested that some obesity-related behaviors, such as skipping breakfast, short sleep duration and less meal frequencies, were more common among dinner skippers than consumers. In the crude model, we showed that dinner consuming protects against mental disorders. The findings remained significant even after accounting for various lifestyle factors, but adjusting the effects of meal frequency and breakfast consumption eliminated these significant relationships, except for anxiety.

Our findings are in line with previous studies regarding the beneficial effects of family dinners on mental health.[22,26] A longitudinal study showed that female adolescents who had five or more family meals per week were less likely to exhibit substance use five years later.[32] Similar findings have been also suggested by the US National Center on Addiction and Substance Abuse (CASA).[22] In CASA study, adolescents who had 0-2 family dinners per week were four times more likely to use alcohol, tobacco, or marijuana compared to those who had more than 5 family dinners per week.[22] Another survey found a dose-response association between the frequency of family dinner consumption and mental disorders.[26] They showed a positive association between emotional well-being, pro-social behavior, life satisfaction and family dinner frequency, while internalizing and externalizing were negatively related to the frequency of

family dinner consumption. It seems that better mental status among dinner consumers is attributable to the ease of parent-adolescent communication. Mealtimes are useful opportunities for families to discuss problems and events during the day and provide consistency and a time for parents to supervise their children and keep them away from negative peer influences. However, it should be kept in mind that family dinners are not a panacea for optimal mental health. It is possible that families who frequently dine together have different characteristics compared with others who rarely do.

Our data suggested that the beneficial effect of family dinner on mental health is mediated to some extent by the effects of breakfast consuming and frequent meal frequencies. Although some previous studies controlled the effect of various demographic confounders, we did not find any research that controlled the effects of meal frequency and breakfast consumption. However, adjusting the effects of these two variables might be overadjustment. On the other hand, it is more probable that dinner consumers had more meal frequencies, and also they may have healthier lifestyle and dietary habits such as eating breakfast. Nevertheless, adjusting the effects of other confounders could not significantly change the protective effect of dinner on mental health.

We found that higher frequency of family dinner is associated with lower odds of overweight. Even after adjusting the effect of breakfast consuming and meal frequency, the beneficial effect of dinner on body weight remained significant. Although most cross-sectional studies are in line with our findings,[23,24] the results of longitudinal studies are inconsistent.[23,24] The different methodology of longitudinal studies should be considered when interpreting their results. For example, in one study with 1 year follow-up,[24] no significant association was observed between dinner consuming and becoming overweight, but another study reported an inverse association after 3 years of follow-up.[23] Furthermore, the different definitions for overweight and different methods for assessing the frequency of family dinner are other points which need to be considered. There are some reasons to explain the beneficial effect of dinner on body weight. Consuming

family dinner provides an opportunity to increase healthy eating habits.[10,33] Additionally, better connectedness in these families protects adolescents against some psychological disorders that could affect the quality and quantity of their food consuming. Nevertheless, our findings did not show any difference in dietary intakes between dinner consumers and skippers.

The main limitation of this study is its cross-sectional design which impedes a conclusion of causality. Dinner consuming could be a proxy for other characteristics of families who dine together. Another limitation of the present study is the self-report assessment of mental health. Confirming data from parents and teachers would have provided more reliable data; however, we used the validated questionnaire of WHO-GSHS for this purpose, and we can rely on our findings about the mental health. Although we did not categorize adolescents based on their gender, age groups or levels of affluence, a current study showed the same results in different age and gender groups.[26] The strength of this study is its large and representative sample size, and including participants with different socio-cultural backgrounds from the entire country. Furthermore, our findings provide a simple approach to assessing the mental health status of adolescents by questioning them about the frequency of family dinner consuming.

In conclusion, the current study showed a protective role of family dinner consumption against mental disorders and obesity. Furthermore, dinner consumers were more satisfied with school atmosphere. Encouraging a healthy lifestyle at home and simple measures such as having family dinner can have beneficial effects on different aspects of health in adolescents. It should be taken into account that dinner time provides a good opportunity to have better communication with children, and it does not necessarily entail a full course or overeating.

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