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Subclinical eating disorders in female medical students in Anhui, China: a cross-sectional study

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Abstract

Purpose: This cross-sectional study explored the prevalence of eating disorders (EDs) and possible associated factors (depressive symptoms, anxiety and BMI, etc) on EDs in female medical students in China.

Methods: A total of 1,135 students in Wuhu, Anhui Province were sampled to participate in this survey. The survey collected sociodemographic data, depressive symptoms, anxiety and eating behaviors of students.

Results: The students at risk for eating disorders were 2.17%. Eating disorder risk was more frequent in students with poor parent's relationship, students with poor relationship with parents, students with high body mass index, students who were excessive focus on slimming propaganda, and students whose relatives have a diet. Also, the mean scores for the psychological factors of depression and anxiety were higher in students with eating disorder risk. A multiple linear regression model was produced depicting that depression, anxiety, high level of BMI, focusing on slimming propaganda, and dieting status among relatives were risk factors of having an eating disorder risk.

Conclusions: A significant fraction of female medical students in Anhui are at high risk of development of eating disorders. A comprehensive intervention focusing on family environment and emotion management should be designed to prevent occurrence of such disorders among medical students that would undoubtedly hamper the availability of dependable medical services in future.

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Key words: *Depression. Anxiety. Eating disorders. China.*

SUBCLÍNICA DE TRASTORNOS DE LA ALIMENTACIÓN EN MUJERES ESTUDIANTES DE MEDICINA EN ANHUI, CHINA: UN ESTUDIO TRANSVERSAL

Resumen

Objetivo: Este estudio transversal exploró la prevalencia de los trastornos de la Alimentación (eds) y posibles factores asociados (síntomas depresivos, ansiedad y BMI, etc) sobre EDS en mujeres estudiantes de medicina en China.

Métodos: un total de 1135 estudiantes en Wuhu, provincia de Anhui fueron seleccionadas para participar en esta encuesta. La encuesta recoge datos sociodemográficos, síntomas depresivos, ansiedad y conductas alimentarias de estudiantes.

Resultados: los estudiantes en situación de riesgo para los trastornos alimentarios eran 2,17%. Trastorno alimenticio riesgo fue más frecuente en los estudiantes con la relación de los estudiantes con la pobre padre, mala relación con los padres, los alumnos con alto índice de masa corporal, los estudiantes que son la excesiva atención a la propaganda de adelgazamiento, y estudiantes cuyos familiares tienen una dieta. Además, la media de las puntuaciones para los factores psicológicos de la depresión y la ansiedad fueron mayores en los estudiantes con trastorno alimentario riesgo. Un modelo de regresión lineal múltiple fue producido que muestran que la depresión, la ansiedad, el alto nivel de IMC, centrándose en la propaganda y la dieta de adelgazamiento, condición entre parientes eran factores de riesgo de tener un trastorno alimenticio y riesgo.

Conclusiones: una importante fracción de mujeres estudiantes de medicina en Anhui están en alto riesgo de desarrollo de trastornos de la alimentación. Una intervención integral centrado en el entorno familiar y manejo de emociones deben ser diseñados para prevenir la ocurrencia de tales trastornos entre los estudiantes de medicina que, sin duda, obstaculizar la disponibilidad de servicios médicos de confianza en el futuro.

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Introduction

Eating disorders (EDs), which can cause insufficient ingestion and/or overeating, are a serious mental illness that has shown the highest morbidity and mortality among all types of mental disorders^{1,2}. EDs included anorexia nervosa (AN), bulimia nervosa (BN) and binge eating disorder (BED), which are considered the third most prevalent chronic health condition among adolescent females³. According to the recent report of US, the lifetime morbidity rates of AN, BN, and BED were 0.3%, 0.9%, and 1.6%, respectively among adolescents⁴. EDs is the outcome of the western cultures. With the development of economic globalization, EDs has become an increasingly a global problem. It was reported that increasing exposure to Western advertising may be fueling the drive for thinness and muscularity in the East, exacerbating body dissatisfaction and unhealthy eating attitudes and behaviors in both men and women^{5,6}.

There are some studies of populations that observe the at-risk prevalence for eating disorders in Asian countries. A study conducted in the 1990s in Hong Kong reported that the prevalence of eating disorders in 1020 undergraduate students was 0.46%⁷, whereas a more recent study found a 5.1% prevalence in a female college sample (n=7812) in Tokyo⁸. More recent Chinese studies have shown a trend towards an increase of these disorders, ranging from 4.7% to 17%^{9,10}, which are approaching the prevalence rates of university students in western countries (6% to 20%)^{11,12}. Dieting and bingeing behaviors, which are most frequent disordered eating behaviors, have been found to be common among Chinese young females¹³. Some studies in China have reported that between 49.9%¹⁴ and 55.7%¹⁵ of the university females had dieted and between 20%¹⁶ and 58.3%¹⁴ of the students binged frequently. Consequently, disordered eating has become a significant and growing problem in modern China.

Subclinical disordered eating is more prevalent than full-threshold disordered eating. Moreover, it is dangerous because it puts affected individuals at risk for the subsequent development of clinically significant disordered eating¹⁷. Subclinical disordered eating has also been associated with poor health-related quality of life and high rates of mood-related psychopathology¹⁸. Therefore, understanding emerging patterns of subclinical disordered eating is of clinical importance.

Although, the etiology of the eating disorders remains unclear, it is believed that a combination of biological, psychological and/or environmental abnormalities contribute to their development^{19,20}. Some studies have found that psychological stress and negative affects, such as depression and anxiety, have been suggested to be strongly associated with disordered eating^{21,22}. In college students' samples, there is an increasing presence of academic related stress and anxiety²³. Also, Medical students are associated with high levels of depression²⁴. A study from US showed that 15% of the female medical students had history of eating disorders²⁵.

From the theory and practice, it is well documented that depression and anxiety can affect eating behavior in western countries. While, there has been very little research which were done on the dietary habits in Chinese medical female students. Hence, we intend to undertake a descriptive study to assess the prevalence of eating disorders among female medical students of China. We hypothesized that there would be a significant relationship between disordered eating and symptoms of anxiety and depression in female students.

Methods

Design

A cross-sectional descriptive survey design was used to explore symptoms of disordered eating and body shape concerns, social anxiety, and depression in a sample of medical female students.

Participants

Participants were 1,135 medical female students from Wannan Medical College (Anhui Province, Wuhu City) in China recruited to participate in a study on depression and associated conditions. They were the freshmen, sophomore students and the third year student. A total of 1,135 anonymous questionnaires were handed out to the participants and 28 questionnaires were discarded because of high levels of missing data or their answers were clearly inconsistent. Finally 1,107 usable questionnaires remained. The overall response rate was 97.5% (1,107/1,135).

Procedure

Before conducting the study, approval was obtained from the Ethics Commission of Wannan Medical College. Written parental consent was not a requirement for survey research in China. However, in our research, students were asked for verbal consent to join in the study. And also they were free to withdraw at any stage. We assured that the responses of students would be kept either anonymous or confidential.

Measures

Demographic information

Demographic variables include age, grade, weight and height self-reported, parents relationship, relationship with parents, media attention, and dieting status among relatives and whether only one child. The following standard formula was used to calculate their body mass index: BMI = weight (kg)/height (m)².

Eating Disorders Inventory-1 (EDI-1)

The Eating Disorder Inventory (EDI) is widely used as a screening instrument for assessing disordered eating behaviors and associated psychological characteristics in non-clinical samples in the West²⁶. The 64 items instrument includes eight subscales: drive for thinness (DT), bulimia (B), body dissatisfaction (BD), ineffectiveness (IE), perfectionism (P), interpersonal distrust (ID), interoceptive awareness (IA), and maturity fears (MF). Participants are asked to respond to each question on a 6-point scale which score respectively 3 (always), 2 (Usually), 1 (Often), 0 (never), 0 (Rarely) and 0 (Sometimes), indicating how often they have the eating symptoms and concerns that are common in eating disorders. Scale scores are the sum of all items for each subscale. Higher scores indicate higher disordered eating attitudes and behaviors. A score of DT at or above 14 indicates a high risk of eating disorder. Zhang and co-workers translated the EDI-1 into Chinese, and is widely used and highly reliable and valid²⁷.

Self-Rating Depression Scale (SDS)

The SDS is a 20-item questionnaire assessing mood symptoms over the past week (eg, "I feel downhearted, blue, and sad"), which has been found to be a reliable measure of depression²⁸. Each item is scored on a Likert scale ranging from 1 (never) to 4 (always), and the total raw score was the sum of the scores for each item. The standard score was the integer portion of the product of 1.25 and the total raw score. In China, an SDS standard score ≥ 50 indicates conscious depression. Higher scores indicated greater depressive symptomatology. The reliability coefficient for this study was 0.78.

Self-Rating Anxiety Scale (SAS)

The SAS is a 20-item questionnaire assessing the subject's anxiety levels over the past week²⁹. Items are scored on a Likert scale ranging from 1 (never) to 4 (always), and the total raw score was the sum of the scores for each item. Higher scores indicate higher levels of social anxiety, while lower SAS scores indicate milder anxiety. The standard score for these 20 items is the integer portion of the product of 1.25 and the total raw score. An SAS standard score ≥ 50 indicates conscious anxiety.

Data analysis

Data were input using the EpiData 3.1, and all data analyses were conducted using SPSS 13.0 for Windows statistical software. Descriptive statistics (mean, standard deviation, and percentage) were calculated to reflect the background characteristics of the study

sample. The bivariate correlation analysis was conducted to test the associations between eating behaviors and BMI, anxiety and depression using the Spearman correlation coefficient. Finally, we performed multiple linear regression models to assess the risk factors for eating behaviors controlling for individual socio-demographic covariates. Statistical significance was defined as a p value lower than 0.05.

Results

Sample characteristics

Of the 1135 females students invited to participate, 1107 participants returned a completed questionnaire. The participants' ages ranged between 17 and 25 years and a mean BMI of 19.91 ± 2.10 . Most students (73.1%) were of normal weight ($18.5 \leq \text{BMI} < 23.9$), 23.9% underweight ($\text{BMI} < 18.5$), and 3.0% overweight ($\text{BMI} \geq 24$)³⁰. There was 24 students (a score of DT at or above 14) regarded as "weight concern", who were maybe the eating disorders or dieters. According to the manual of EDI, the estimated prevalence of eating disorders = [(the numbers of students whose score of DT at or above 14 $\times 0.75$)/investigation sample] $\times 100\%$. The estimated prevalence of eating disorders in the students was 2.17% (24/1107). The prevalence of the freshmen, sophomores and third year student was 2.20% (10/328), 3.05% (10/328) and 1.52% (7/46), respectively.

The score of total eating disorder among different characteristics students

As indicated by table I, parent's relationship, relationship with parents, media attention on slimming, and dieting status among relatives were associated with students' eating disorder. To be more specific, in the single factor analysis, poor parent's relationship, poor relationship with parents, focusing on slimming propaganda, and dieting status among relatives had been found to be positively correlated with disordered eating attitudes.

Relationship between BMI, anxiety, depression and eating disorders

Table II presents the Spearman correlation coefficients between BMI, anxiety, depression and distorted eating attitudes. The results showed that scores of anxiety and depression and scores for EDI subscales were strongly positively correlated ($P < 0.001$). Significant correlations were observed between scores on DT, BD, B, IA, total for EDI subscales and BMI for the sample as a whole ($P < 0.001$). These findings suggest that students with higher level of depressive symptoms, anxiety symptoms and BMI had more eating problems.

Table I
Comparison of eating disorders score of female students in different characteristics

Variables	Categorical variables	Number	Total score of EDs		Z	P
			M	Q		
parent's relationship	good	876	31	21	20.894	0.000
	general	209	38	27		
	poor	17	33.5	28.75		
relationship with parents	good relationship with father and mother	855	30	21	32.234	0.000
	good relationship with father	52	30.5	20.25		
	good relationship with mother	144	38	22		
	general relationship with father and mother	54	47	25		
	poor relationship with father and mother	0	-	-		
media attention on slimming propaganda	much attention	68	48	24.25	58.086	0.000
	general attention	691	34	22		
	never attention	337	27	18		
dieting status among relatives	yes	113	41	29.75	3.287	0.001
	no	988	31	21.75		
dieting status among peers or friends	yes	694	33	23	1.551	0.121
	no	404	31	21		

M: Median; Q: Quartile; EDs: Eating disorders.

Table II
Spearman's correlation coefficients between BMI, anxiety, depression and eating disorders among female students

Group	DT	BD	B	P	ID	MF	IA	IE	Total
anxiety	0.175*	0.172*	0.297*	0.057	0.347*	0.301*	0.439*	0.451*	0.487*
depression	0.213*	0.228*	0.245*	0.034	0.421*	0.309*	0.469*	0.547*	0.513*
BMI	0.303*	0.434*	0.116*	0.052	0.011	0.010	0.109*	0.024	0.271*

DT: drive for thinness; BD: body dissatisfaction; B: bulimia; P: perfectionism; ID: interpersonal distrust; MF: maturity fears; IA: interoceptive awareness; IE: ineffectiveness.

* P<0.001

Multivariate analysis (Table III)

A step-wise multiple regression was used to determine significant correlates of distorted eating attitudes with the score of total EDs as the dependent variable and parent's relationship(1=good; 2=general; 3=poor), relationship with parents(1=good relationship with father and mother; 2=good relationship with father; 3= good relationship with mother; 4=poor relationship with father and mother), media attention on slimming propaganda(1=much attention;2=general attention;3=never attention), dieting status among relatives(1=yes;2=no), anxiety scores, depression scores, and BMI as independent variables. The analysis suggested that depression ($t=6.451$, $p=0.000$), anxiety ($t=5.943$, $p=0.000$), high level of BMI($t=4.732$, $p=0.000$), poor relationship with parents($t=3.974$, $p=0.000$), focusing on slimming propa-

ganda($t=-6.441$, $p=0.000$), and dieting status among relatives($t=-2.831$, $p=0.005$) were risk factors of having an eating disorder risk (Table III).

Discussion

Eating disorders which once was considered a Western "culture-bound" syndrome, is now known to exist among non-Western populations. With the deepening of reform and opening up and the infiltration of western values, physical appearance and in particular the drive for slenderness has become increasingly important in Chinese cultures, particularly among young Chinese females^{13, 31, 32}. In the last 30 years, with undergoing a period of extremely rapid economic growth, it has been seen a significant increase in disordered eating behaviors in China^{15, 16, 33}, which is likely to reflect an

Table III
Multivariate analysis of contributing factors of eating disorders with step-wise regression among students

<i>Factors</i>	<i>B</i>	<i>SE</i>	<i>Beta</i>	<i>t</i>	<i>p</i>	<i>95%CI for B</i>
anxiety	0.708	0.119	0.261	5.943	0.000	0.474~0.942
depression	0.657	0.102	0.283	6.451	0.000	0.457~0.857
BMI	5.295	1.119	0.144	4.732	0.000	3.098~7.491
relationship with parents	2.332	0.587	0.118	3.974	0.000	1.180~3.484
media attention on slimming propaganda	-6.032	0.936	-0.196	-6.441	0.000	-7.869~-4.192
dieting status among relatives	-4.788	1.692	-0.083	-2.831	0.005	-8.110~-1.467

increase in the prevalence rate and awareness of the illness by Chinese professionals¹³.

In our study, it was found that 2.71% of Chinese medical female students displayed at-risk eating attitudes. This is considerably lower than rates reported in previous surveys in both Asian and Western cultural contexts³⁴⁻³⁷. This may be due to the different social and cultural contexts, as well as differing definitions and criteria for measuring eating disorders. And another possible explanation could be related to the specific characteristics of our sample. Although the results of this study is lower than other regions of the results, but the survey object is medical college female students who should be have a more scientific understanding of nutrition and food. Furthermore, 36% underweight girls and 88% normal weight girls think that their ideal weight should be less than the current weight. It suggests that many of them will likely become a member of the diet in the army. Given the above data, the development of eating disorders in the region cannot be ignored.

Our findings indicated that eating disorder risk was more frequent in students with poor parent's relationship, students with poor relationship with parents, students with high body mass index, students who were excessive focus on slimming propaganda, and students whose relatives have a diet. After controlling for these individual and family factors, a multiple linear regression model was produced depicting that depression, anxiety, and high level of BMI were risk factors of having an eating disorder risk.

Family theorists indicate that family factors play a very important role in the development of eating disorders³⁸. A recent study indicated that maternal eating disorders together with comorbid psychopathology increase risk for psychiatric disorders in childhood and early adolescence³⁹. Some studies have shown that negative feedback from mothers about daughters' figures and eating patterns significantly increased daughters' difficulties in these areas^{40, 41}. Furthermore, mothers who showed a greater internalization of media messages about thinness were most likely to have daughters with eating pathologies. In our study, significant positive relationships were observed between distorted

eating and media attention on slimming propaganda. In some countries with high prevalence of eating disorders, social values are advocating "with thin for beauty". Women who have a slim figure get more social recognition and praise. Under the influence of this mainstream ideology, young women are in the pursuit of the ideal body shape, which easily enter into the mistaken idea of eating disorders. According to the results of this and many other studies, over concern with body shape for female is significant risk factors for the development of eating disorders and consequently should be a strong focus in early health promotion and prevention.

This study showed that, within the Chinese population of young women, disordered eating is highly associated with symptoms of depression and anxiety. That is to say, students with higher scores of depression and anxiety were more prone to have disordered eating than those with an average level. This finding is consistent with past studies examining the relationship between depression and anxiety and eating disorders in the Western world⁴²⁻⁴⁴. From the point of motivation psychology, eating disorder is a protective and defensive mechanism. The individual covert psychological problems through his abnormal eating, which can help him/her successfully escape to psychological unbearable environment. One study proposed that the association between certain psychological variables, including family conflict, family cohesion and childhood abuse, and disordered eating was mediated by alexithymia and depression⁴⁵. Research showed that the patients with eating disorder showed negative emotional characteristics, and the levels of patients with depression, anxiety and guilt were higher than those of the normal human²³.

There are several limitations in our study. First, this study was cross-sectional which leads to difficulty to determine a causal order among the variables. Second, all information was obtained from a self-reported questionnaire, resulting in the possibility of response bias.

In conclusion, a significant fraction of female medical students in Anhui are at high risk of development of eating disorders. Although correlations were observed between anxiety, depression, and unhealthy

eating behaviors. Further cohort studies are needed to confirm the causal effects of emotional symptoms (anxiety and depression,) on unhealthy eating behaviors, and possible neuropsychological mechanisms, among Chinese adolescents. A comprehensive intervention focusing on family environment and emotion management should be designed to prevent occurrence of such disorders among medical students that would undoubtedly hamper the availability of dependable medical services in future.

Financial disclosure and conflict of interest

All authors declare that they have no conflicting interest and no financial relationships relevant to this article to disclose.

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