

The Prevalence of Eating Disorders (EDs) and Comorbid Psychiatric Disorders in Adolescents: A Two-Stage Community-Based Study



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SUMMARY

Objective: The aims of this study were to determine the prevalence of eating disorders (EDs) in adolescents and the prevalence of comorbid psychiatric disorders in adolescents with EDs.

Method: During stage 1 of the study the Eating Attitude Test (EAT) was administered to 2907 randomly selected adolescent students. During stage 2 of the study students with an EAT score >30 underwent a clinical interview and those diagnosed with an ED (based on DSM-IV criteria) were included in the ED group. The control group included students that were age- and sex-matched with the ED group, were not diagnosed with an ED, and had an EAT score <30. Psychiatric comorbidity in the ED and control groups was evaluated using the Structured Clinical Interview for DSM-III-R (outpatient and non-patient forms). Additionally, a demographic data form, the Beck Depression Inventory (BDI), and the Beck Anxiety Inventory (BAI) were administered to all the participants.

Results: In total, 68 (9 male and 59 female) of the 2907 students met the diagnostic criteria for an ED. Point prevalence rates were as follows: anorexia nervosa: 0.034%; bulimia nervosa: 0.79%; eating disorder not otherwise specified: 1.51%; binge eating disorder: 0.99%; any ED: 2.33%. None of the male participants were diagnosed with anorexia nervosa or bulimia nervosa. In all, 8 male students were diagnosed with binge eating disorder. The prevalence of comorbid psychiatric disorders was higher in the ED group. Major depression was the most prevalent comorbid disorder in the ED group, followed by generalized anxiety disorder and social phobia. The body mass index, and BDI, BAI, and EAT scores were higher in the ED group than in the control group.

Conclusion: The results of this study show that whereas the point prevalence rate for EDs among all the participants was 2.3%, it was 4.03% among the female participants. Moreover, ED not otherwise specified was the most prevalent ED, and binge eating disorder was the most common ED among the males. The prevalence rates in the present study are similar to those observed in Western countries, except for the prevalence rate for anorexia nervosa, which in the present study was lower. Major depression and generalized anxiety disorder were the most prevalent comorbid disorders in the ED group.

Keywords: Eating disorders, anorexia nervosa, bulimia nervosa, binge eating disorder, epidemiology, comorbidity

INTRODUCTION

Eating disorders (EDs) are characterized by severely impaired eating behavior. According to DSM-IV diagnostic criteria they are classified as anorexia nervosa (AN), bulimia nervosa (BN), and ED not otherwise specified (EDNOS). Binge eating disorder (BED) is not included in the DSM-IV official

classification system and is evaluated under the category of EDNOS, but it has been recently recognized more accurately and separately from EDNOS. There are prevalence rate variations of eating disorders between the clinical samples and community (Hoek 2002, Hoek 2006). The prevalence rates of EDs vary according to country, and the differences are especially great between Western and Eastern countries. The

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prevalence of AN linear increased from 1935 to 1970s, and reached a plateau during the 1990s (van Hoeken et al. 2003; Hoek 2006). Industrialization, changes in eating habits, urban life, the effect of media, and an increase in inter-cultural interaction/comparison are reported to be the primary factors underlying the observed increase in the prevalence of AN. As such, large-scale community-based research became the focus of attention.

The prevalence of EDs is usually expressed as 1-year and point prevalence rates. Prevalence rates are important for treatment planning (van Hoeken et al. 2003). The creation of health policies based on the results of such research is a reasonable approach. The most important problem in epidemiological research on EDs is sampling. As the prevalence of EDs are low and patients tend to remain anonymous, it is necessary for researchers to work with large samples (Hoek and van Hoeken 2003). Thus, epidemiological research on EDs is expensive and time-consuming. These difficulties can be overcome, to a certain extent, by conducting two-stage studies and limiting the cohort to a particular population.

Two-stage studies are most commonly used to identify ED cases within a community. During the first stage of such research, high-risk groups are identified based on questionnaire scores, especially in large community samples. During the second stage, specific cases are identified via clinical interview of those in the identified high-risk group, and comparisons are made with a randomly selected control group. The strength and utility of two-stage studies are limited by low response rates, and the specificity and sensitivity values of the questionnaires that are used (Hoek and van Hoeken 2003).

High school and university students have the highest risk of developing EDs; however, it is difficult to generalize the results obtained with this population to the general population. Two-stage research conducted with young populations and according to strict AN diagnostic criteria reported point prevalence rates for AN of 0%-0.9% (Whitaker et al. 1990, 1992; Steinhausen et al. 1997; Cotrufo et al. 1998; Hoek and Hoeken 2003). The lifetime prevalence of AN was reported to vary between 0.6% and 2.2% (Hudson et al. 2007; Keski-Rahkonen et al. 2007) and its point prevalence rate was reported to be 1.3% (Rathner and Messner 1993). The BN point prevalence rate varies between 0% and 4.6%, as reported by two-stage studies (Favaro et al. 2003; Hoek and Hoeken 2003). The BED prevalence rate varies between 0.2% and 3.5% (Cotrufo et al. 1998; Hudson et al. 2007). The lifetime prevalence rates for AN, BN, and BED were reported as 0.6%, 1%, and 3%, respectively, and were lower among males (Treasure et al. 2010).

Depression is the most common comorbidity among ED patients. It has been reported that 40%-45% of ED patients have depression, and that its lifetime prevalence is 68% and

its course is independent of ED (Halmi et al. 1991; Halmi 2003). Depression occurs more frequently in BED cases than in individual that are dieting. In addition, bipolar affective disorder has been observed in ED patients. Following depression, anxiety disorders are the second most common psychiatric comorbidity observed in ED patients. In ED cases anxiety disorders are observed in >60% of ED patients. Panic disorder and agoraphobia precede of ED (Halmi et al. 1991; Halmi 2003; Kaye et al. 2004). In ED patients social phobia and obsessive-compulsive disorder (OCD) frequently coexist. It has been suggested that EDs be considered OCD spectrum disorders (Halmi et al. 1991; Halmi 2003) and there is a strong correlation between obsessive symptoms and those of EDs (Erol et al. 2002). Affective and anxiety disorders are also common comorbidities in ED patients.

Personality disorders represent a distinct diagnostic category of ED comorbidity. In particular, borderline personality disorder and avoidant personality disorder are common comorbid disorders in ED patients (Halmi et al. 1991, Halmi 2003). It has been reported that AN patients and their families exhibit obsessive personality characteristics (Halmi et al. 1991; Halmi 2003). Alcohol/substance addiction is another psychiatric comorbidity observed in ED patients. Substance use is common among ED patients, particularly those with BN (Halmi et al. 1991; Halmi 2003; Keçeli et al. 2008). Moreover, post-traumatic stress disorder (PTSD), sexual assault, and physical abuse in childhood have been frequently reported in ED patients (Brewerton 2007).

It is important to demonstrate the co occurrence of ED and its rich accompanying psychiatric disorders in community based studies, since comorbidity studies are carried out with clinical cases. The aim of this present study was to determine the point prevalence rates of EDs in a group of high school students and the associated comorbid psychiatric disorders.

MATERIALS AND METHODS

Sample

The study included 10th and 11th grade high school students from Edirne, Turkey. At the time the study was performed Edirne had 16 high schools with a total of 5183 students in the 10th and 11th grades. Using stratified random sampling 3000 students (considered an adequate sample) were selected, of which 93 were excluded from the study due to inadequate questionnaire answers. In all, 2907 students were included in the study, of which 54% were female ($n = 1464$) and 46% were male ($n = 1443$). The control group was comprised of sex-matched students with an Eating Attitude Test (EAT) score <30 that were not diagnosed with an ED based on a clinical interview. Mean age of the participants in the ED and control groups was 17.04 ± 0.8 years and 16.9 ± 0.7 years, respectively.

Procedure

The study protocol was approved by the Ethics Committee, as well as the Edirne Directorate of the National Education Bureau of Turkey. Informed consent was obtained from all the participants. Supervisor teachers in the schools helped administer the EAT. In order to facilitate diagnostic consistency, prior to the study the investigators (EV and ME) conducted clinical interviews regarding DSM-IV diagnoses. Students with an EAT score >30 underwent a clinical interview conducted by only 1 of the investigators (ME), ensuring diagnostic consistency.

Participants were evaluated according to DSM-IV diagnostic criteria for AN and BN, and EDNOS and BED. Students diagnosed with an ED according to DSM-IV diagnostic criteria were administered the Structured Clinical Interview for DSM-III-R-Outpatient Form (SCID-OP) and psychiatric comorbidity was evaluated. The control group consisted of sex-matched students with an EAT score <30 that were not diagnosed with an ED. Those in the control group were administered the Structured Clinical Interview for DSM-III-Non-Patient Form (SCID-NP). Both groups completed a general demographic data form, the Beck Depression Inventory (BDI), and the Beck Anxiety Inventory (BAI), under the supervision of the investigators.

Instruments

General Demographic Data Form

This self-report form collects data regarding age, sex, height, weight, family structure, economic status, history of psychiatric treatment, current use of alcohol and tobacco, and history of physical and sexual trauma.

Eating Attitude Test (EAT)

EAT is a self-report measure of symptoms and concerns indicative of EDs. Overall score directly correlates with the degree of psychopathology. Clinically, EAT can determine susceptibility to and attitudes associated with dysfunctional eating behavior. Its 40 items are answered on a 6-point Likert-type scale. It has a cutoff point score of 30. It was developed by Garner and Garfinkel (1979), and the reliability and validity of the Turkish version was reported by Savaşır and Erol (1989).

DSM-IV criteria were translated into Turkish by Köroğlu (1995). For students diagnosed with BED the DSM-IV EDNOS criteria were used. According to the criteria suggested by de Zwaan and Mitchell (1992), diagnosis of BED is based on markedly eating until uncomfortably full, eating when not physically hungry, eating alone and feelings of depression or guilt, and lack of compensating behavior.

DSM-III-R Structured Clinical Interview (SCID)

SCID is a structured interview developed by Spitzer et al. for diagnosing DSM Axis I psychiatric disorders in accordance with DSM-III-R classification. The reliability of the Turkish version was reported by Series et al. (1990). SCID-OP (out-patient form) is used for outpatients not suspected of having a psychotic disorder. For normal control cases or samples from general community, SCID-NP is used.

Beck Depression Inventory (BDI)

The BDI measures the physical, emotional, cognitive, and motivational symptoms of depression. This self-report instrument does not diagnose depression, but objectively measures the severity of the symptoms of depression. Each of the 21 symptom category questions is answered on a 4-point Likert-type scale, and each item is scored between 0 and 3. Overall BDI score varies between 0 and 63. The reliability and validity of the Turkish version, utilizing a cutoff score of 17, was reported by Hisli (1989).

Beck Anxiety Inventory (BAI)

The BAI is a self-report instrument that measures the severity of the symptoms of anxiety. The scale's 21 items are scored between 0 and 3. Overall score ranges from 0 to 63. Higher total scores indicate greater severity of symptoms. The reliability and validity of the Turkish version was reported by Ulusoy et al. (1998).

Statistical evaluation

The Mann-Whitney U test was used for quantitative data not distributed normally. The chi square test was used to compare categorical data. A P value <0.05 was considered statistically significant.

RESULTS

Among the 2907 students included in the study the ED prevalence rate was 2.33% ($n = 68$) (Table 1). Of the 68 students with an ED, 86.8% ($n = 59$) were female and 13.2% ($n = 9$) were male (Table 3). The point prevalence rate for AN was 0.034% ($n = 1$), versus 0.79% for BN ($n = 23$) (Table 1 and Figure). No male student was diagnosed as AN or BN. Among the female students the prevalence rate for AN was 0.068%, versus 1.57% for BN (Table 1). The point prevalence rate for EDNOS was 2.39% ($n = 35$) among the female students, 0.62% ($n = 9$) among the males, and 1.51% ($n = 44$) overall (Table 1). The point prevalence for all EDs combined was 4.03% among the females and 0.62% among the males. Of the 44 students diagnosed with EDNOS, 21

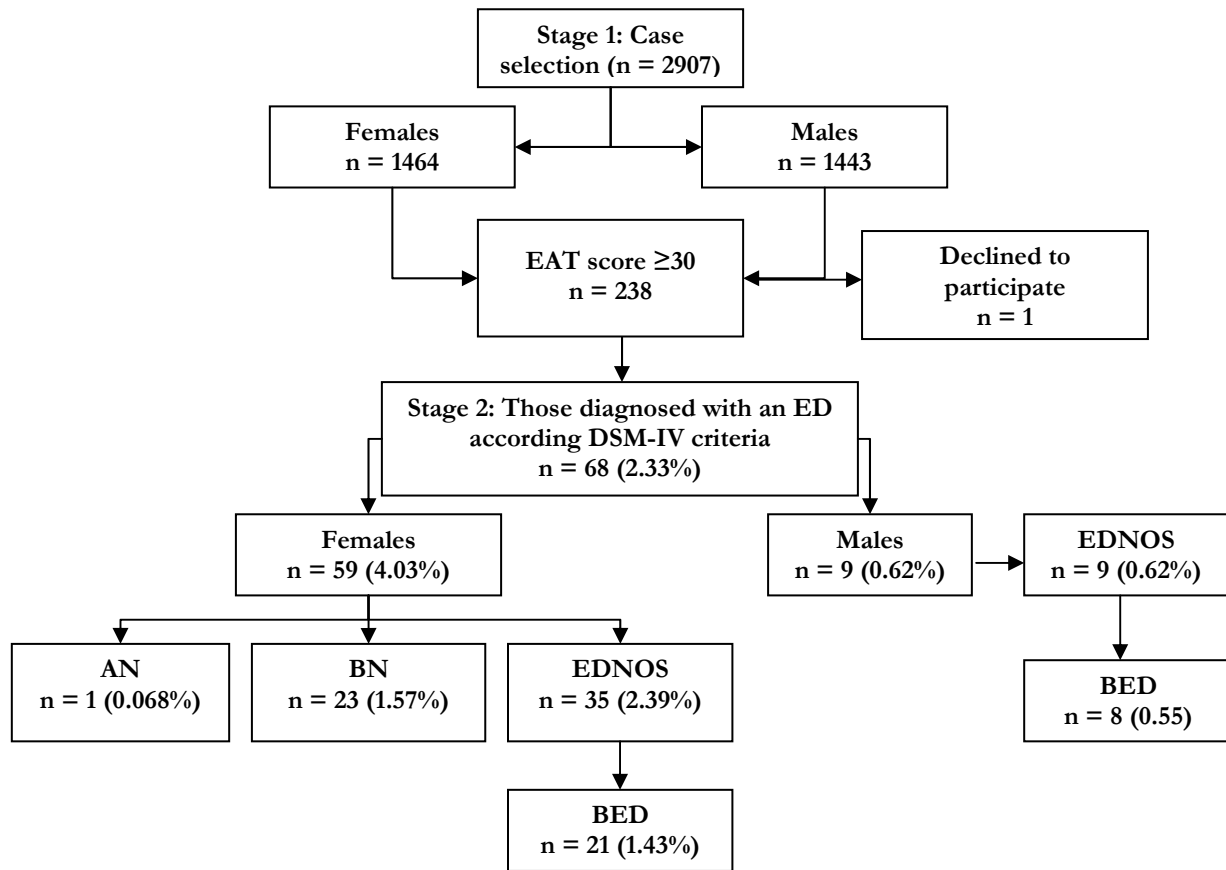


Figure. Study design

females and 8 males, overall 29 (0.997%) cases met the BED diagnosis according to DSM-IV research criteria. BED diagnosis corresponds rate of 63.6% within the EDNOS cases (Table 2). The point prevalence rate for EDNOS was 1.43% and 0.55% among the female and male students, respectively (Figure and Table 2).

Table1. ED point prevalence rates.

DSM-IV diagnosis	Female	Male	Overall
	n (%)	n (%)	n (%)
AN	1 (0.068)	0	1 (0.034)
BN	23 (1.57)	0	23 (0.790)
EDNOS	35 (2.39)	9 (0.62)	44 (1.510)
Overall ED	59 (4.03)	9 (0.62)	68 (2.330)

In all, 11 (16.2%) of the students diagnosed with an ED had a history of physical abuse and 2 (2.9%) had a history of sexual abuse, whereas in the control group 2 (2.9%) had a history of physical abuse and none had been sexually abused. The difference in the frequency of physical abuse between the 2 groups was statistically significant ($P = 0.017$). Smoking and alcohol use were similar in both groups (Table 2).

Table 2. Characteristics of the ED and control groups.

	ED Group n = 68	Control Group n = 68	Overall n = 136	Fisher's X^2 test
	n (%)	n (%)	n (%)	
Male	9 (13.2)	9 (13.2)	18 (13.2)	NS
Female	59 (86.8)	59 (86.8)	118 (86.8)	NS
Physical abuse	11 (16.2)	2 (2.9)	13 (9.6)	0.017*
Sexual abuse	2 (2.9)	-	2 (1.5)	NS
Smoking	13 (19.1)	13 (19.1)	29 (19.1)	NS
Alcohol use	6 (8.8)	8 (11.8)	14 (10.3)	NS

NS: Not significant. * $P < 0.05$

Comorbidities in the ED and control groups are shown in Table 3. The most common comorbidity in the ED group was major depression (13.2%), followed by adjustment disorder (11.8%), and generalized anxiety disorder (8.8%). In all, 55.9% of the ED group did not have any comorbidity, versus 85.3% of the control group (Table 3). Among the students diagnosed with BN, the most frequent comorbidity was major depression (26%), versus adjustment disorder (20.7%) among the students with BED (Table 4). The second most frequent comorbidity in the students with BED was social phobia (10.3%).

DISCUSSION

In the present study the point prevalence rate for AN and BN among the female students was 0.068% and 1.57%, respectively; these 2 disorders were not diagnosed in any of the male students. The overall EDs prevalence rate in the entire study population was 2.33%. In Western countries AN and BN are more common in Caucasians, girls, adolescents, and young adults (Fairburn and Harrison 2003). Prevalence ranges are 0%-0.9% for AN, and more higher (0%-4.6%) for BN. The causes of different prevalences rates is to variations in social structure and methodological differences between studies; however, there are prevalences rate differences between the studies carried out in similar social places and

Table 3. Psychiatric comorbidity in the ED and control groups.

DSM-IV diagnosis	ED	Control group	Overall
	n (%)	n (%)	n (%)
Major Depression	9 (13.2)	1 (1.5)	10 (7.4)
Generalized Anxiety Disorder	6 (8.8)	1 (1.5)	7 (5.1)
Obsessive-Compulsive Disorder	1 (1.5)	-	1 (0.7)
Adjustment Disorder	8 (11.8)	6 (8.8)	14 (10.3)
Social Phobia	4 (5.9)	-	4 (2.9)
Dissociative Disorder	1 (1.5)	-	1 (0.7)
Panic Disorder	1 (1.5)	-	1 (0.7)
Dysthymia	-	1 (1.5)	1 (0.7)
Post-Traumatic Stress Disorder	-	1 (1.5)	1 (0.7)
No Diagnosis	38 (55.9)	58 (85.3)	96 (70.6)
Overall	68 (100.0)	68 (100.0)	136 (100.0)

Table 4. Distribution of comorbid psychiatric disorders according to EDs.

	MD	GAD	OCD	AD	SOS PHO	DISOS	PANIC	NO DIAG	OVERL
AN	-	-	-	-	-	-	-	1 (100%)	1
BN	6 (26%)	3 (13%)	-	2 (8.7%)	1 (4.3%)	-	-	11 (47.8%)	23
AED	1 (6.7%)	1 (6.7%)	-	-	-	-	-	13 (86.7%)	15
BED	2 (6.9%)	2 (6.9%)	1 (3.4%)	6 (20.7%)	3 (10.3%)	1 (3.4%)	1 (3.4%)	13 (44.8%)	29
OVRL	9	6	1	8	4	1	1	38	68

MD: Major depression; GAD: generalized anxiety disorder; OCD: obsessive-compulsive disorder; AD: adjustment disorder; SOS PHO: social phobia; DISOS: dissociative disorder; PANIC: panic disorder; OVRL: overall.

A comparison of age and weight, and BDI, BAI, and EAT scores between the ED and control groups is shown in Table 5. Overweight was more common and mean BMI was higher in the ED group than in the control group ($z = -2.538$, $P = 0.001$), ($z = -2.875$, $P = 0.004$). In ED group, Mean BDI and BAI scores in the ED group were higher than those in control group [respectively, ($z = -2.850$, $P = 0.004$) and ($z = -2.915$, $P = 0.004$)]. The mean EAT score was significantly higher in the ED group ($z = -10.06$, $P < 0.001$).

Table 5. Age and weight, and BDI, BAI, and EAT scores in the ED and control groups.

	ED Group n = 68	Control Group n = 68	Mann Whitney U test	
	Mean $\pm$ SD	Mean $\pm$ SD		
Age	17.01 $\pm$ 0.86	16.96 $\pm$ 0.74	Z = -0.084	P = 0.933
Weight (kg)	60.11 $\pm$ 8.97	56.04 $\pm$ 8.86	Z = -2.538	P = 0.010*
Height (cm)	167.38 $\pm$ 8.86	166.22 $\pm$ 6.83	Z = -0.947	P = 0.344
BMI (kg m ⁻²)	21.41 $\pm$ 2.29	20.21 $\pm$ 2.43	Z = -2.875	P = 0.004*
Beck depression inventory scores	15.85 $\pm$ 9.30	12.10 $\pm$ 8.81	Z = -2.850	P = 0.004*
Beck anxiety inventory scores	17.42 $\pm$ 11.64	12.63 $\pm$ 10.53	Z = -2.915	P = 0.004*
EAT-40 scores	37.85 $\pm$ 6.93	17.27 $\pm$ 5.86	Z = -10.06	P < 0.001*

*P < 0.05

similar methodology. A two-stage study from Iran reported that the prevalence of ED, AN, and BN was 4.13%, 0.9%, and 3.23%, respectively (Nobakht and Dezhkam 2000). The highest prevalence rates are reported in two-stage studies, suggesting that BN is strongly influenced by culture, whereas AN is less dependent on cultural context (Steinhausen et al. 1997; Attia and Walsh 2007). EDs are universal and occur in all cultures (Treasure et al. 2010). In addition, it is reported that there is a recent increase in the prevalence of BN (Fairburn and Harrison 2003). Although rates of 0.9%-2.6% have been reported in studies on the prevalence of BN, two-stage studies that use strict DSM criteria report lower rates than these rates (Fairburn and Beglin 1990; Kjelsas et al. 2004) That rates are similar to the rate observed in the present study, yet, Trasure et al. (2010) indicate that highest prevalence rates such as 5%

In terms of Turkish epidemiological research, Uzun et al. (2006) reported 2 AN and 2 BN cases in a population of 414 students; their reported BN prevalence rate is lower than that observed in the present study, whereas their reported AN rate is higher. Kuğu et al. (2006) did not identify any AN cases among a group of 951 university students, but reported that the prevalence of BN and BED was 1.57% and 0.63%, respectively. This can be interpreted as showing that the studies in Turkey have some similarities and differences, and that their data are variable. Two-stage studies carried out in ac-

cordance with strict DSM criteria reported AN prevalence rates of 0%-0.9%, and a lifetime AN prevalence rate of 2.2%, which are higher than previously reported (Attia et al. 2007; Hudson et al. 2007; Keski-Rahkonen et al. 2007). Studies that utilize strict DSM criteria are expected to report higher EDNOS prevalence rates, as the diagnostic criteria cannot be completely fulfilled.

In the present study the most prevalent ED was EDNOS, with a prevalence rate of 2.39% among the females and 0.62% among the males. The present study utilized strict DSM-IV criteria for the diagnosis of EDs. Among the students diagnosed as EDNOS, 1.43% of the females and 0.55% of the males had BED^{3/4}remarkable high rates. Individuals with BED constitute a subgroup of EDNOS cases that do not exhibit compensatory behavior and are more overweight (Fairburn and Harrison 2003; Vardar et al. 2004), and binge eating behavior is observed in bulimic patients, which is an important problem because it causes diagnostic confusion (Mizes and Sloan 1998; Fairburn and Harrison 2003). It could be considered that two stage studies in community sample may be of benefit for the incorporation of BED in official classification systems. It has been reported that BED is observed in 20% of obese individuals, whereas the BED prevalence rate in the general population is 0.2%-4.5% and is more common in males (Robertson and Palmer 1997); in the present study BED was the most common ED in males. BED and EDNOS are prominent in males, especially those that are obese (Carlat et al. 1997). EDNOS should be taken into consideration as serious ED, because it has similar characteristics as other EDs and can transform into other EDs (Fairburn and Harrison 2003). Community-based studies have reported that BED occurs more commonly than AN and BN, and was common in males and obese individuals (Striegel-Moore and Franko 2003; Herzog and Eddy 2007). Kuğu et al. (2006) reported that the combined prevalence rate of BED in males and females was 0.63% and that BED was diagnosed only in males; BED prevalence rates reported in epidemiological studies using strict DSM criteria are lower than those not.

Studies on comorbidity in ED reported that comorbid mood, anxiety, impulse control, alcohol and substance abuse, and personality disorders occur at a high rate (Zaider et al. 2000; Milos et al. 2004; Gadalla and Piran 2007; Hudson et al. 2007). Similarly, in the present study major depression, generalized anxiety disorder, and social phobia were the most common comorbid disorders in the ED group, as evidenced by the high BDI and BAI scores in the ED group. While 44% of students with an ED had a psychiatric comorbidity, 15% of the control group did. Hudson et al. (2007) reported that 56% of AN patients, 95% of BN patients, and 79% of EDNOS patients had ≥ 1 comorbid DSM-IV Axis I diagnosis.

Comorbidity appears to be the rule, not the exception in

ED cases (Hudson et al. 2007; Munsch et al. 2007). ED comorbidity is higher in clinical studies than that in community based studies. Among BN patients, the rate of comorbid major depression is reported to be 50%-65% (Sansone and Sansone 2007), whereas in the present study the rate was lower (26%). This difference in rates might be because the present study was community-based and the students diagnosed with an ED may represent a group that does not seek medical care. It is a striking result of the present study that among all the students with an ED major depression was observed most frequently in those with BN. As such, we think it is essential that all BN patients be screened for major depression. Among the students in the present study that had an ED, the prevalence of a comorbid anxiety disorder was lower than previously reported. It was reported that 36% of ED patients have a comorbid generalized anxiety disorder and that 17% have comorbid social phobia (Sansone et al. 2007). Kaye et al. (2004) reported that 66% of ED patients had ≤ 1 comorbid DSM anxiety disorder, the most common of which was obsessive-compulsive disorder, followed by social phobia. Similarly, in the present study social phobia was primarily observed in the ED group. It can be note that psychiatric comorbidity is particularly common in BN and BED patients. Among ED patients, notably those that exhibit bulimic behavior, a history of sexual and physical trauma is common (Brewerton 2007). Similarly, in the present study a history of sexual and physical trauma was more common in the ED group than in the control group, indicating that PTSD in ED patients should be a consideration.

CONCLUSION

In the present study the point prevalence rate for EDs in the entire study population was 2.33%, versus 4.03% among the females. EDNOS was the most common ED overall and BED was the most common ED in males. ED prevalence rates in the present study were similar to those in Western countries, except for AN, which occurred at a lower rate. Major depression and generalized anxiety disorder were the 2 most common comorbidities in the students with an ED.

Limitations of the study

The present study included 10th and 11th grade students aged 16-17 years and a randomized control group. The study utilized a large sample and conducted clinical interviews, which are strengths; however, due to inadequate clinical records and referral of patients to different institutions, the reported incidence rates may not be precise. In addition, it is clear that the present results cannot be generalized to the general population. During the stage 1 of the study the students were administered the EAT questionnaire, which introduced the possibility of biased reporting. Additionally, AN patients tend to

hide their illness and avoid medical cooperation , which may have influenced the observed prevalence rates. Stage 2 of the present study may have limitations similar to those of all two-

stage studies on ED. The present study's strengths are that it utilized a population sufficiently large so as to be representative, a randomized control group, and clinical interviews.

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