

EATING DISORDER SUSCEPTIBILITY AMONG UNIVERSITY STUDENTS IN THAILAND

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Abstract. Physical appearance is very important among adolescents and young adults. Eating disorder (ED) is one of the most common fatal mental illnesses found during this development stage. Screening for unhealthy eating behaviors among this population might help to identify individuals that are at-risk for developing ED. Awareness of the prevalence and risk factors associated with this disorder will help to facilitate early diagnosis and intervention. This cross sectional study was conducted among university students aged 18-24 years using the Thai-version of the Eating Attitudes Test (EAT-26) as a self-administered questionnaire. Of the 385 students selected by random sampling and proportion allocation were recruited in this study, 326 (84.7%) completed the EAT-26. Of these, 56% were female, 3.7% were obese, 9.9% were overweight, and 16.7% were underweight. One hundred forty (43.5%) participants felt they were too fat and tried to lose weight, while 3.4% were always preoccupied with a desire to be thinner. Females expressed a desire to be thinner (61.9% vs 38.1%; $p=0.003$) and had a history of being on a diet (63.8 % vs 36.7%; $p=0.022$) more than male respondents. Prevalence of students at-risk for ED, defined as EAT-score ≥ 20 , was 4.3%. From univariate analysis, the risk factors associated with an EAT-26 score of ≥ 20 included: history of practicing food restriction ([odds ratio (OR) =19.231]); self-perception of being too fat (OR=8.4); a desire to be thinner (OR=1.069); and, history of father practicing food restriction (OR=5.025). On multivariate analysis, history of practicing food restriction (OR=19.231) and self-perception of being too fat (OR=8.4) were identified as significant independent risk factors for ED. The number of adolescents at-risk for developing an ED was high in this study, but comparable with the results of other Asian studies. Consistent with these findings, periodic screening and the development of an early prevention program is recommended.

Keywords: eating disorder, at-risk, screening and prevention, adolescents and young adults, susceptibility, Thailand

INTRODUCTION

Adolescence is the developmental stage when physical appearance and body image

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are most important. As a result, any influence that negatively affects an adolescents' appearance may interfere with their psychosocial development. Unhealthy eating is one of the behavior-related health conditions that is commonly found in adolescents. Unhealthy eating can lead to adolescents becoming underweight, malnourished, overweight or obese. Prevalence of obesity in American children and adolescents has been increasing dramatically (Schneider,

2008). Overweight and obesity status among adolescents aged 12-19 years in the US increased from 5% to 16% during 1999-2002 (Hedley *et al*, 2004). In Thailand, the prevalence of obesity was reported to have increased from 8.6% in 1995 to 15.5% in 2009. (Yamborisut and Mo-suwan, 2014). The practice of weight loss has been reported among adolescents, and some of these may end up developing some variety of eating disorder (Schneider, 2008).

Eating disorder (ED) is among the serious mental health problems in adolescents and young adults that results in significant morbidity and mortality. It is estimated that the lifetime prevalence of ED among 13- to 18-year-olds in the US is around 2.7% (Merikangas *et al*, 2010), and many studies have reported an increasing prevalence of ED among minority populations (Merikangas *et al*, 2010; CDC, 2014). Anorexia nervosa (AN) is the most fatal ED worldwide (Sullivan, 1995; Campbell and Peebles, 2014), with a mortality rate of at least 5%-6% (Sullivan, 1995; Herpertz-Dahlmann, 2009; Franko *et al*, 2013; Campbell and Peebles, 2014). Overall lifetime prevalence of AN was reported to be 0.5%-2%, with peak prevalence during adolescence (AAP, 2003; Siegel, 2008; Campbell and Peebles, 2014). Incidence of AN was found to be approximately 8.3 cases per 100,000 (with the highest incidence rate in 15-19 year-old girls) and the rate has increased over the past 50 years (Lucas *et al*, 1999). The incidence of bulimia nervosa (BN) was found to be approximately 1%-5% (AAP, 2003). Due to the high rate of morbidity and mortality associated with ED, prevention and early detection might be key factors in preventing further adverse sequelae.

Most studies in ED were conducted in Western countries, with very few reports coming from Asia. A study in Hong Kong found that more than 40% of adolescents and young adults in university have a history of being on a diet or practicing weight control, and one-tenth reported purging behaviors (Chiu, 1989). From

a survey conducted in the US, almost 70% of adolescents regarded themselves as being fat (Nylander, 1971; Greenfield *et al*, 1987), and 37% of adolescents said they were currently on or had been on a diet (Greenfield *et al*, 1987). Two studies found that 15% and 2% of adolescents were at risk for BN (Grey and Ford, 1985) and AN (Pope *et al*, 1984), respectively. Although ED etiology remains unclear, socio-cultural factors are widely considered to be a primary and resounding influence. A 2006 study conducted in both Thai and Australian students in an Australian university found that Thai students were at higher risk for developing ED than their Caucasian counterparts (Jennings *et al*, 2006). Very few studies in the effect of ED on adolescents and young adults have been conducted in Thailand.

The aim of this study was to investigate the prevalence of Thai adolescents that are at-risk for unhealthy eating behaviors and the potential development of ED, and to identify specific factors associated with Thai adolescents being at-risk for developing ED.

MATERIALS AND METHODS

Study design and study subjects

This cross-sectional questionnaire-based study was conducted in late adolescents attending regular (Thai language) and international (English language) undergraduate programs at the Salaya campus of Mahidol University, which is located in metropolitan Bangkok, Thailand. Three hundred eighty-five students from 15 university faculties were included and surveyed during the January 2012 to July 2012 study period. The Thai version of the Eating Attitudes Test (EAT-26), a self-administered survey, was this study's sole data collection tool. The protocol for this study was reviewed and approved by the Siriraj Institutional Review Board (SIRB), Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok, Thailand. Written informed consent was obtained from all participating students.

The majority of students resided in campus dormitories. Using data from previous studies, we calculated a sample size of 335 adolescents (AAP, 2003; Merikangas *et al*, 2010; Campbell and Peebles, 2014). All faculties were randomly sampled for participants using proportion allocation. After receiving SIRB approval, letters were sent to the deans of all 15 participating faculties. Once formal permission was given, the enrollment process was started by advertising for participants, both in classes and in public areas on the campus. Letters of instruction, written informed consent forms, and EAT-26 (Thai version) questionnaires were sent to all recruited students. To protect participant confidentiality, no respondent identity data was requested on the EAT-26 questionnaire. All completed surveys were sealed and dropped into a closed and sealed box that was positioned near student learning areas.

The Eating Attitudes Test (EAT-26) is a well-known and globally used standardized self-report assessment of symptoms and characteristic concerns relating to ED (Gardner and Garfinkel, 1979; Mintz and O'Halloran, 2000). EAT-26 can be used in groups or individual settings, primarily for adolescents and adults in communities, schools, and athletic programs (Garner *et al*, 1998). EAT-26 is easy to use and has high sensitivity and reliability (Mintz and O'Halloran, 2000). Individuals with a score of ≥ 20 should be referred to a specialist for further evaluation and potential diagnosis of ED (Gardner and Garfinkel, 1979; Garner *et al*, 1998). With permission from the developer, Kaewpornsawan and colleagues (2013) developed the Thai version of EAT-26 survey that was used in this study. EAT-26 has 26 items with 3 subscales that include dieting, bulimia with food preoccupation, and oral control. Each item has 4-score values of 0-3, with a total survey score of 78. The responses "never", "rarely", and "sometimes" are scored 0. The responses "often", "usually", and "always" are scored 1, 2, and 3, respectively.

With internal validity set at 0.82, a cut-off score of 20 has 71.4% sensitivity, 94.3% specificity, and 92.6% positive predictive value for diagnosing ED (Kaewpornsawan *et al*, 2013). Individuals with a score of ≥ 20 were defined as being at-risk for ED. Other information collected from the survey included age, current body weight, height, desired body weight, and calculated body mass index (BMI).

Statistical analysis

Descriptive statistics were used to present demographic data, anthropometric data, and data relating to eating habits and self-perception. Data are presented as percentage, number and percentage, or mean \pm standard deviation. Given that very few students were younger than 18 years of age, the BMI definitions used for overweight (≥ 25 to < 30 kg/m²), obesity (≥ 30 kg/m²), and underweight (< 18.5 kg/m²) were based on the US National Institutes of Health (NIH, 1998) and the adult clinical standard guideline (Neumark-Sztainer, 2009). Univariate analysis using chi-square or Fisher's exact test was performed to identify factors significantly associated with adolescents at-risk for developing ED. Variables with a *p*-value < 0.05 on univariate analysis were included in the multiple logistic regression analysis. Variables with a *p*-value < 0.05 on multivariate analysis were regarded as being statistically significant. Data analysis was performed using SPSS Statistics version 18 (IBM, Armonk, NY).

RESULTS

Participant demographic information, anthropomorphic characteristics, and self-perceptions of body image

Three hundred eighty-five students from 15 different Mahidol University faculties that were selected by random sampling and proportion allocation were recruited. All 385 identified students were sent an EAT-26 questionnaire and a written informed consent form. Of those, 326 (84.7%) students gave their consent to participate and returned a completed question-

naire. Two hundred thirty-five participants were studying in a regular program and 91 were enrolled in an international program. The mean age of participants was 19.28 ± 1.313 years (range: 16-23.8) and 56% were female. Mean BMI was 21.7 ± 3.741 kg/m² (range: 15-41.6). Two hundred twenty-five (69.4%) adolescents had normal BMI, 32 (9.9%) were overweight, 13 (3.7%) were obese, and 54 (16.7%) were underweight. Two hundred fifteen (66.2%) adolescents desired to be thinner, 140 (43.5%) felt they were too fat, 70 (21.7%) thought that their friends would prefer them more if they were thinner, and 139 (42.8%) had a history of being on a diet. Of the 183 female participants,

menarche started at 12.8 ± 1.406 years (range: 9-19), and 31 (17.4%) reported having an irregular menstrual cycle. Females were significantly more likely than males to express a desire to be thinner (61.9% vs 38.1%; $p=0.003$) and to have a history of having been on a diet (63.8% vs 36.7%; $p=0.022$) (Table 1).

Prevalence of adolescents at-risk for ED and outcome of EAT-26 survey

The percentage of positive responses to each answer alternative for each question on the EAT-26 questionnaire is shown in Table 2. Regarding responses, 34-65% of participants responded to each question as either "never or rarely";

Table 1
Participant demographic information, anthropomorphic characteristics, and self-perceptions of body image.

Characteristics	Female		Male		Total N (%)	p-value ^a
	n (%)	mean±SD	n (%)	mean±SD		
	182 (56)		143 (44)		326 (100)	
Age (yr)		19.57 ± 1.309		19.52 ± 1.270		
Current body weight (kg)		53.59 ± 9.049		67.77 ± 13.116		
Current body mass index (kg/m ²)		21.08 ± 3.481		22.52 ± 3.915		
Highest body weight (kg)		57.52 ± 10.142		72.57 ± 16.130		
Desired body weight (kg)		49.19 ± 5.426		65.62 ± 7.468		
Current height (cm)		159.53 ± 4.891		173.29 ± 5.09		
Menstruation						
Onset of menarche (yr)		12.77 ± 1.406		NA		
Current irregular cycles	31 (17.4)		NA			
Desire to be thinner	133 (61.9)		82 (38.1)		215 (66.2)	0.003
History of being on a diet to lose weight	88 (63.8)		51 (36.7)		139 (42.8)	0.022
Maternal history of being on a diet	45 (58.4)		32 (41.6)		77 (23.7)	0.621
Biological brother/sister history of being on a diet	57 (52.3)		52 (47.7)		109 (33.9)	0.311
Paternal history of being on a diet	10 (52.6)		9 (47.4)		19 (5.8)	0.739
Think that friends would like them more if they were thinner	37 (52.9)		33 (47.1)		70 (21.7)	0.562
Self-perception of being too fat	85 (60.7)		55 (39.3)		140 (43.5)	0.142

^ap-value comparing females and males. SD, standard deviation; NA, not applicable.

Table 2
Participant responses to Eating Attitudes Test-26 (EAT-26).

Questions	Positive response (%)					
	Never	Rarely	Sometimes	Often	Usually	Always
I am terrified about being overweight.	23.9	25.5	32.5	11.7	6.4	0.0
I avoid eating when I am hungry.	27.6	32.2	31.3	7.7	1.2	0.0
I find myself preoccupied with food.	19.3	27.6	28.2	17.5	7.4	0.0
I have gone on eating binges where I felt that I may not be able to stop.	27.0	29.4	23.0	16.0	4.6	0.0
I cut my food into small pieces.	26.7	31.3	23.9	10.7	6.1	1.2
I am aware of the calorie content of the foods that I eat.	26.4	28.8	26.4	13.5	3.7	1.2
I am careful to avoid food with a high carbohydrate content.	22.1	24.8	39.0	10.1	3.1	0.9
I feel that others would prefer if I ate more.	34.0	23.3	21.8	11.7	4.9	4.3
I vomit after eating.	67.5	0.0	11.3	1.2	0.9	19.0
I feel extremely guilty after eating.	48.8	26.1	0.0	8.6	15.6	0.9
I am preoccupied with a desire to be thinner.	28.2	24.8	26.4	11.0	6.1	3.4
I think about burning calories when I exercise.	19.9	26.7	37.7	12.0	3.7	0.0
Other people think that I am too thin.	42.6	26.1	20.6	7.4	3.4	0.0
I am preoccupied with the thought of having fat on my body.	25.8	27.6	26.4	10.7	7.1	2.5
I take longer than others to eat my meals.	24.8	32.5	26.7	8.3	4.9	2.8
I avoid foods with sugar in them.	24.2	27.9	33.1	12.6	2.1	0.0
I eat diet foods.	34.0	27.9	27.0	8.3	1.8	0.9
I feel that food controls my life.	37.4	22.1	23.9	12.3	2.8	1.5
I display self-control around food.	11.7	23.6	29.8	23.0	12.0	0.0
I feel that others pressure me to eat.	37.7	25.5	23.6	8.9	3.4	0.9
I give too much time and thought to food.	28.2	31.0	27.6	9.8	3.1	0.3
I feel uncomfortable after eating sweets.	38.3	23.0	30.7	8.0	0.0	0.0
I engage in dieting behavior.	31.3	23.3	0.0	12.0	30.7	2.8
I prefer my stomach to be empty.	35.9	29.1	28.2	5.5	0.9	0.3
I have the impulse to vomit after meals.	19.9	21.5	32.8	14.1	7.4	4.3
I enjoy trying new rich foods.	69.6	16.9	10.4	2.1	0.9	0.0

however, 24.7% reported "sometimes", 46% responded "often/usually/always" engaging in unhealthy dieting behaviors, and 17% felt that food controlled their life. Using the cut-off point of 20, we found that 14 (4.3%) participants were at-risk for developing ED.

Factors related to adolescents being at-risk for ED

From univariate analysis, the factors found to be associated with adolescents being at-risk for developing ED were BMI, their study program, first-relative family history of food restriction,

self-perception of body image, and gender. Further from univariate analysis, we found the following factors to be significantly associated with a total EAT-26 score of ≥ 20 : history of practicing food restriction to lose weight (OR = 19.231; 95% CI: 2.463-142.857, $p < 0.001$); self-perception of being too fat (OR = 8.4; 95% CI: 1.9-38.3, $p = 0.001$); a desire to be thinner

(OR = 1.069; 95% CI: 1.033-1.109; $p = 0.003$); and, paternal history of food restriction (OR = 5.025; 95% CI: 1.275-20, $p = 0.041$). On multivariate analysis, history of practicing food restriction for weight reduction (OR = 19.231) and self-perception of being too fat (OR = 8.4) were the two significant independent risk factors for adolescents developing ED (Table 3).

Table 3
Factors related to being at-risk for developing ED.

Related factors	Total Thai-version EAT-26 score		OR	95% CI	<i>p</i> -value
	<20 (<i>n</i> =312)	≥ 20 (<i>n</i> =14)			
	<i>n</i> (%)	<i>n</i> (%)			
BMI (kg/m ²)					0.504
<18.5	52 (16.7)	2 (15.4)			
18.5-24.9	214 (68.8)	11 (84.6)			
25-29.9	32 (10.3)	0 (0.0)			
≥ 30	13 (4.2)	0 (0.0)			
Academic program					0.506
International program	86 (27.6)	5 (35.7)			
Regular program	226 (72.4)	9 (64.3)			
Gender					0.636
Male	136 (43.6)	7 (50.0)			
Female	176 (56.4)	7 (50.0)			
Desire to be thinner	201 (64.6)	14 (100)	1.069	1.033-1.109	0.003
History of being on a diet to lose weight	126 (40.5)	13 (92.9)	19.231	2.463-142.857	$\leq 0.001^*$
Maternal history of being on a diet	73 (23.5)	4 (28.6)			0.748
Biological brother/sister history of being on a diet	102 (32.9)	7 (58.3)			0.068
Paternal history of being on a diet	16 (5.1)	3 (21.4)	5.025	1.275-20	0.041
Think that friends would like them more if they were thinner	65 (21.1)	5 (35.7)			0.195
Self-perception of being...					
too fat	128 (41.6)	12 (85.7)	8.4	1.9-38.3	0.001*
normal body shape	137 (44.5)	2 (14.3)			
too thin	43 (14)	0 (0.0)			

*Statistically significant from multivariate multiple logistic regression analysis ($p < 0.05$).

ED, eating disorder; EAT, Eating Attitudes Test; OR, odds ratio; CI, confidence interval; BMI, body mass index.

DISCUSSION

This is the first study in Thai adolescents for the risk of developing ED that were attending university in metropolitan Bangkok, Thailand. We found a prevalence of adolescents at-risk for developing ED of 4.3%, which was slightly lower than the rates reported by two previous studies in younger Thai adolescents using the same EAT-26 questionnaire. The study conducted in 1994 found a prevalence of 8.96% (Kaewpornawan, 1994), and the other, which was conducted in 2010, found a prevalence of 10.74% (Puengyod and Sukanich, 2011). Both of those studies targeted adolescents aged 12-19 years old that were studying in high school in Bangkok. Our finding was similar to those of other studies conducted in Asia, including Japan (Nakamura *et al*, 1999), Hong Kong (Tam *et al*, 2007), and China (Makino *et al*, 2006), that reported prevalence rates of abnormal eating attitudes that ranged from 3.9% to 6.5%. When compared to the Philippines (Lorenzo *et al*, 2002), a country with an economic setting that is generally similar to that of Thailand, the prevalence of abnormal eating attitudes among adolescents was 3.5 times higher than the rate found in this study. This study differs from other studies in that participants in this study were late adolescents that were attending university. In this study, almost half of respondents thought they were too fat; one-third usually engaged in dieting behavior; and, around one-fifth reported often being preoccupied with food, cutting food into small pieces before eating, feeling guilty after eating, or vomiting after eating. These findings suggest eating problems of varying severity, similar to what was found in other Asian and other developed countries (Nakamura *et al*, 1999; Lorenzo *et al*, 2002; Page *et al*, 2005; Jennings *et al*, 2006; Makino *et al*, 2006; Tam *et al*, 2007).

For factors associated with adolescents at-risk for developing ED, the two independent risk factors found in this study were history of practicing food restriction and self-perception

of being too fat. Other studies found that having an abnormal self-perception or distorted body image could influence unhealthy dieting behaviors in adolescents (Makino *et al*, 2006; Page *et al*, 2005), and having a history of being on a diet could increase the risk of developing an eating disorder (Tantichutin *et al*, 2008). In this study, no significant associations with at-risk status for ED were found for gender, BMI, or nutritional status. Two previous studies reported that extended exposure to 'Western-style' cultural influences could adversely impact an individual's body image and associate with the development of ED (Prince, 1985; Swartz, 1985); however, we found no indication that students studying in an international program were more at-risk for developing ED than students in the regular Thai program. Interestingly and in contrast to the foregoing, adolescents in the regular program in this study were found to be more at-risk for developing ED than students enrolled in an international program.

Regarding family-related variables that can influence at-risk status, it was reported that socioeconomic status and family-structure are associated with ED (Goodman *et al*, 2014; Mateos-Agut *et al*, 2014). On univariate analysis, we found that paternal history of practicing weight reduction was significantly associated with adolescents being at-risk for ED. This finding can likely be explained by the fact that, in Thai culture, the father is the dominant leader in the family. As such, the fathers' behavior as a role model could be expected to exert a strong influence on their children and other family members.

This study has some limitations. Consistent with the nature of any study that uses data from a self-administered survey, some responses may not have been complete and the validity of information that was provided could not be verified. In an effort to elicit the most truthful information, participants were asked not to identify themselves. The benefit of this anonymity was counterbalanced by the fact that the

investigators were not able to track and follow individuals found to be at-risk for ED. In order to ensure that assistance and support would be available for any adolescent in this study, the authors informed all participants that the university's mental health services were available for anyone who may need or could benefit from this service.

In conclusion, unhealthy eating behaviors with unclear etiology were commonly found among adolescents and young adults attending university in metropolitan Bangkok. The number of adolescents at-risk for developing an eating disorder was high in this study, but comparable with the results of other Asian studies. In multivariate analysis, history of practicing food restriction and self-perception of being too fat were identified as significant independent risk factors for ED. Consistent with these findings, periodic screening as part of a routine health check-up in school and university might help identify susceptible cases, while healthy eating habits and regular exercise should be recommended to all adolescents to prevent both ED and obesity.

ACKNOWLEDGEMENTS

This study was funded by a Chalermphrakiat Grant from the Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok, Thailand. The authors gratefully acknowledge Associate Professor Chulathida Chomchai for her support of this study, the Mahidol University faculties that authorized student participation, the students who agreed to participate, and Mr Suthipol Udompunthurak for assistance with statistical analysis.

CONFLICTS OF INTEREST

The authors hereby declare no personal or professional conflicts of interest regarding any aspect of this study.

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