

# Association between Abnormal Eating Attitudes and Risk for Developing Eating Disorders among Senior High School Students in Ubon Ratchathani, Thailand

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**Abstract** This study aimed to investigate the prevalence and association between abnormal eating attitudes combined with related factors and risk for developing eating disorders among senior high school students. A cross-sectional descriptive study was performed on senior high school students in Ubon Ratchathani Province. The Eating Attitudes Test-26 Thai version was used to assess abnormal eating attitudes and behaviors. Participants who had scores of 12 or higher were presumed to have abnormal eating attitudes and behaviors. Univariate analysis was used to evaluate the relationship between abnormal eating attitudes combined with related factors and the risk for developing eating disorders. A total of 227 of 315 participants completed the questionnaires (72.06%). The prevalence of abnormal eating attitudes was 24.3%. Participants who had relatively low body weight showed a 4.46-fold higher risk of eating disorders [CI = 1.13-18.71,  $p = 0.0090$ ] than participants with normal body weight. Participants who had both low and relatively low body weight had a 3.18-fold increased risk of eating disorders [CI = 0.88 - 11.30,  $p = 0.0328$ ]. Female students who had a relatively low body weight had a 3.52-fold higher risk of developing an eating disorder [CI = 0.82 - 15.57,  $p = 0.0400$ ]. There were no correlations between body mass index and body weight for height and eating disorder risk. This study revealed that participants who had relatively low body weight were related to an increased risk

of developing eating disorders, especially female students.

**Keywords** EAT-26 Questionnaires, Eating Disorders, Eating Attitudes, Senior High School Students, Body Mass Index

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## 1. Introduction

Eating disorder (ED) is a mental condition that disturbs eating behaviors, resulting in numerous major health consequences, such as osteoporosis, impaired taste receptors, oral health problems, reduced concentration, and cognitive and physical changes [1]. In particular, people who have the major classifications of eating disorders, such as anorexia nervosa and bulimia nervosa, are associated with an increased mortality rate [2].

For growth, development, and physical fitness, nutrition is crucial for both elementary school kids [3] and high school students, who are adolescents. In order for students to get used to maintaining healthy lives, it is important to emphasize the value of keeping healthy habits in addition to eating well. However, adolescents and young adults are the most common high-risk populations for developing eating disorders worldwide [4, 5]. Although the etiology

remains unclear, a serious concern with physical appearance and body image due to sociocultural, media, family, or societal pressure was considered. Therefore, screening for abnormal eating attitudes and behaviors in this population may help to identify those at risk for developing an eating disorder and may be effective for early diagnosis and intervention [1]; [5-8].

The Eating Attitude Test-26 (EAT-26) was used to assess abnormal eating attitudes and behaviors in various countries, including Thailand. However, a cutoff point is controversial [7,9]; [10-15]. A previous report in Thailand evaluated the criterion validity of the Eating Attitudes Test-26 (EAT-26) Thai version among Thai females and found that a cutoff point of 12 scores had good criterion-related validity (sensitivity; 71.43%, specificity; 94.29%, and positive predictive value; 92.59%) [16]. A few studies used this cutoff point to investigate abnormal eating attitudes in Thailand [12-14]. Moreover, there have been no reports regarding abnormal eating attitudes among the Northeast Thai population. Therefore, this study aimed to examine the prevalence and association between abnormal eating attitudes with a cutoff point of 12 combined with related factors and the risk for developing eating disorders among senior high school students in Northeast Thailand.

## 2. Materials and Methods

### 2.1. Study Design

The research was a cross-sectional observational analysis carried out at Lukhamhan Warinchamrab School in Ubon Ratchathani Province, Thailand. The study's design was approved by the Research Ethics Committee at Ubon Ratchathani University (UBU-REC-16/2563). All participants were thoroughly briefed on the study's goals, methods, and any associated risks or benefits before signing an informed consent document.

### 2.2. Subjects and Sample Size Calculation

The study targeted high school students between the ages of 15 and 18 from Lukhamhan Warinchamrab School in Ubon Ratchathani Province, Thailand, totaling 1,470 students ( $n=1,470$ ). With a permitted margin of error set at 5%, we applied the Taro Yamane formula [17] to determine that the needed sample size was 315 students. Participants were selected in proportion to the sample size, stratified by academic year and gender. Convenience sampling was employed until the predetermined sample size was achieved for each academic level and gender group (110 males, 205 females).

### 2.3. Questionnaire

The study used the Thai version of the EAT-26 questionnaire, originally developed by Kaewporndawan et al. [16], to gauge the incidence of eating disorders among

senior high school students. This updated version originates from the 1982 version [18].

The EAT-26 Thai version is divided into three sections:

Section 1: Basic demographic details (such as gender, current height, and various weight metrics).

Section 2: A set of 26 questions focused on health and eating habits.

Section 3: An additional five questions about dietary patterns over the last six months.

From the analysis of Kaewpornawan et al. [16], the appropriate cutoff score of the EAT-26 was 12 with 71.4% sensitivity and 94.3% specificity. Thus, scores of 12 and higher were considered to be cutoff points in this study. In addition, we conducted a pilot study to test the questionnaire's reliability among senior high school students in a high school in Khon Kaen Province, Thailand, and the Cronbach's alpha value was 0.70.

### 2.4. Data Collection and Nutritional Status Determination

For data collection, participants were provided with a participant information form and a self-administered questionnaire (EAT-26) and given 30 minutes to complete it; after completing the questionnaire, they returned it in an opaque box to ensure confidentiality.

For anthropometric measurements, participants' body weight was determined using a digital scale (Thomson), and their height was determined by friends using a height chart, both of which were made available by the school. All participants were required to complete their anthropometric measurements within a month, and the nursing room teacher oversaw all measurements to confirm that the obtained data were correct.

Evaluation of the nutritional status of students under the age of 18 using the growth criteria defined by the Department of Health, The Ministry of Public Health, Thailand [19]. According to these criteria, nutritional status was defined into 3 categories and 5 levels for each as follows:

1. Body weight for age: low, relatively low, normal, overweight, obesity
2. Body weight for height: thin, relatively thin, normal, overweight, obesity
3. Height for age: short, relatively short, normal, relatively tall, very tall

The nutritional status of the participants in our study was calculated using a program developed by the Institute of Nutrition, Mahidol University (INMU-ThaiGrowth) [20] based on their body weight and height and then categorized according to their body weight for age and body weight for height. In addition, the body mass index (BMI) computed from the participant's body weight and height ( $\text{kg}/\text{m}^2$ ) was also utilized to define their nutritional status. The BMI of participants was classified using the Asian BMI cutoff points.

### 2.5. Statistical Analysis

Statistical analyses were performed using the Excel program and STATA software version 10. The participants' demographic data are presented as frequencies, percentages, means, and standard deviations (SDs). The association between related factors (BMI, weight for age, and weight for height) and risk for developing eating disorders were assessed by using univariate logistic regression. The strength of the association between related factors and the risk of developing an eating disorder was measured by using odds ratios (OR) with a 95% confidence interval (CI). A p-value of less than 0.05 was considered a statistically significant difference.

## 3. Results

This study was conducted on 315 senior high school students in Ubon Ratchathani, Thailand. A total of 227 of 315 participants completed the questionnaires (72.06%).

### 3.1. Participants' Demographic Information

The 227 senior high school students were comprised of 68 male students (30%) and 159 female students (70%). The mean current body weight and height of the participants were 62.2±15.284 kg, and 172±0.061 cm, in males and 51.3±10.363 kg, and 160±0.054 cm, in females,

respectively. The mean lowest body weight was 53.3±12.124 kg, in males and 43.9±6.625 kg, in females. The mean desired body weight was 60.0±8.809 kg, and 47.2±5.017 kg, in males and females, respectively.

In males, most participants showed normal weight (66.18% when evaluated by body weight for age and 64.71% when evaluated by body weight for height). Other body weight statuses were heavy weight or obesity (23.53% evaluated by body weight for age and 19.12% evaluated by body weight for height) and overweight (8.82% evaluated by body weight for age and 5.88% evaluated by body weight for height).

In females, most participants also showed normal body weight (71.70% and 74.21% when evaluated by body weight for age and body weight for height, respectively). Other body weight statuses were heavy weight or obesity (15.09% and 13.21% evaluated by body weight for age and body weight for height, respectively) and relatively low body weight or relatively thin (6.92% and 5.66% evaluated by body weight for age and body weight for height, respectively).

This study also showed that male participants with relatively low body weight were 1.47%, while female participants with relatively low body weight were 6.92% when evaluated by body weight for age.

The mean BMI for both male and female participants was in the normal range (21.0±4.386 kg/m<sup>2</sup> among males and 20.1±3.630 kg/m<sup>2</sup> among females) (Table 1).

**Table 1.** Demographic information (n=227)

Characteristics	Male		Female	
	n (%)	Mean ± SD	n (%)	Mean ± SD
Gender	68 (30)		159 (70)	
Current body weight (kg)		62.2+15.284		51.3+10.363
Current height (cm)		172+0.061		160+0.054
Current BMI (kg/m <sup>2</sup> )		21.0+4.386		20.1±3.630
The lowest body weight (kg)		53.3+12.124		43.9±6.625
Desired body weight (kg)		60.0+8.809		47.2±5.017
Body weight for Age	68 (100)		159 (100)	
Low body weight	0 (0.00)		2 (1.26)	
Relatively low body weight	1 (1.47)		11 (6.92)	
Normal body weight	45 (66.18)		114 (71.70)	
Overweight	6 (8.82)		8 (5.03)	
Obesity	16 (23.53)		24 (15.09)	
Body weight for Height	68 (100)		159 (100)	
Thin	3 (4.41)		5 (3.15)	
Relatively thin	4 (5.88)		9 (5.66)	
Normal body weight	44 (64.71)		118 (74.21)	
Overweight	4 (5.88)		6 (3.77)	
Obesity	13 (19.12)		21 (13.21)	

SD, standard deviation

### 3.2. Association between Related Factors and at Risk for Developing Eating Disorders

Among BMI, body weight for age, and body weight for height, this study found an association between weight for age and the risk of developing an eating disorder. Participants who had relatively low body weight had a 4.46-fold increased risk for eating disorders [CI=1.13-18.71,  $p=0.0090$ ] when compared with normal body weight. Moreover, participants who had low body weight plus relatively low body weight had a 3.18-fold increased risk for eating disorders [CI=0.88-11.30,  $p=0.0328$ ] (Table

2).

In addition, we examined the association between risk factors and eating disorders among male and female students. No associations were found between BMI and body weight for height and risk for eating disorders (Table 3 and Table 5, respectively). Interestingly, female participants with relatively low body weight had a 3.52-fold increased risk of developing eating disorders compared to those with normal body weight [CI=0.82-15.57,  $p=0.0400$ ] (Table 4).

**Table 2.** Association between related factors and risk for developing eating disorders

Related factors	EAT-26 score		OR [95%CI]	P value
	<12 (N=172)	≥12 (N=55)		
<b>BMI (kg/m<sup>2</sup>)</b>				
<18.5	63 (36.63)	20 (36.36)	0.86 [0.41-1.76]	0.6544
18.5-22.9	73 (42.44)	27 (49.09)	1	
23-24.9	14 (8.14)	3 (5.45)	0.58 [0.10-2.32]	0.4142
≥25	22 (12.79)	5 (9.09)	0.61 [0.17-1.90]	0.3677
23-24.9 plus ≥25	36 (20.93)	8 (14.55)	0.60 [0.21-1.54]	0.2558
<b>Body weight for Age</b>				
Low body weight	2 (1.16)	0 (0.00)	- <sup>a</sup>	- <sup>a</sup>
Relatively low body weight	5 (2.91)	7 (12.73)	4.46 [1.13-18.71]	0.0090*
Low weight plus Relatively low body weight	7 (4.07)	7 (12.73)	3.18 [0.88-11.30]	0.0328*
Normal body weight	121 (70.35)	38 (69.09)	1	
Overweight	10 (5.81)	4 (7.27)	1.27 [0.26-4.73]	0.6959
Obesity	34 (19.77)	6 (10.91)	0.56 [0.18-1.50]	0.2254
Overweight plus Obesity	44 (25.58)	10 (18.18)	0.72 [0.30-1.64]	0.4136
<b>Body weight for Height</b>				
Thin	7 (4.07)	1 (1.82)	0.41 [0.01-3.35]	0.3938
Relatively thin	9 (5.23)	4 (7.27)	0.39 [0.27-4.84]	0.7027
Thin plus Relatively thin	16 (9.30)	5 (9.09)	0.89 [0.24-2.76]	0.8346
Normal body weight	120 (69.77)	42 (76.36)	1	
Overweight	8 (4.65)	2 (3.64)	0.71 [0.07-3.79]	0.6768
Obesity	28 (16.28)	6 (10.91)	0.61 [0.19-1.65]	0.3075
Overweight plus Obesity	36 (20.93)	8 (14.55)	0.63 [0.24-1.54]	0.2880

\* $p<0.05$ ; OR, odds ratio; CI, confidence interval; <sup>a</sup> drop because of zero cell counts.

**Table 3.** Association between body mass index (BMI) and risk of developing eating disorders among males and females

Gender	BMI	EAT-26 score		OR [95%CI]	P value
		<12	≥12		
Male	18.5-22.9	23 (13.37)	7 (12.73)	1	0.9685
	<18.5	16 (9.30)	5 (9.09)	1.03 [0.22-4.56]	
	23-24.9	7 (4.07)	0 (0.00)	- <sup>a</sup>	
	≥25	10 (5.81)	0 (0.00)	- <sup>a</sup>	
Female	18.5-22.9	50 (29.07)	20 (36.36)	1	0.5696
	<18.5	47 (27.33)	15 (27.27)	0.80 [0.34-1.86]	
	23-24.9	7 (4.07)	3 (5.45)	1.07 [0.16-5.30]	
	≥25	12 (6.98)	5 (9.09)	1.04 [0.25-3.71]	

OR, odds ratio; CI, confidence interval; <sup>a</sup> drop because of zero cell counts.

**Table 4.** Association between weight for age and risk of developing eating disorders among males and females

Gender	Weight for Age	EAT-26 score		OR [95%CI]	P value
		<12	≥12		
Male	Normal body weight	36 (20.93)	9 (16.36)	1	0.4557
	Low body weight	0 (0.00)	0 (0.00)	- <sup>a</sup>	
	Relatively low body weight	0 (0.00)	1 (1.82)	- <sup>a</sup>	
	Overweight	4 (2.33)	2 (3.64)	2.0 [0.16- 16.44]	
	Obesity	16 (9.30)	0 (0.00)	- <sup>a</sup>	
Female	Normal body weight	85 (49.42)	29 (52.73)	1	0.0400*
	Low body weight	2 (1.16)	0 (0.00)	- <sup>a</sup>	
	Relatively low body weight	5 (2.91)	6 (10.91)	3.52 [0.82-15.57]	
	Overweight	6 (3.49)	2 (3.64)	0.98 [0.09-5.85]	
	Obesity	18 (10.47)	6 (10.91)	0.98 [0.29-2.89]	

\*p<0.05; OR, odds ratio; CI, confidence interval; <sup>a</sup> drop because of zero cell counts.

**Table 5.** Association between weight for height and risk of developing eating disorders among males and females

Gender	Weight for Height	EAT-26 score		OR [95%CI]	P value
		<12	≥12		
Male	Normal body weight	32 (18.60)	12 (21.82)	1	
	Thin	3 (1.74)	0 (0.00)	– <sup>a</sup>	
	Relatively thin	4 (2.33)	0 (0.00)	– <sup>a</sup>	
	Overweight	4 (2.33)	0 (0.00)	– <sup>a</sup>	
	Obesity	13 (7.56)	0 (0.00)	– <sup>a</sup>	
Female	Normal body weight	88 (51.16)	30 (54.55)	1	
	Thin	4 (2.33)	1 (1.82)	0.73 [0.01-7.81]	0.7844
	Relatively thin	5 (2.91)	4 (7.27)	2.35 [0.43-11.62]	0.2141
	Overweight	4 (2.33)	2 (3.64)	1.47 [0.13-10.80]	0.6658
	Obesity	15 (8.72)	6 (10.91)	1.17 [0.34-3.57]	0.7616

OR, odds ratio; CI, confidence interval; <sup>a</sup> drop because of zero cell counts.

## 4. Discussion

This was the first study to assess the prevalence of the risk of developing eating disorders among senior high school students in Northeast Thailand using the Thai version of the EAT-26. The prevalence of students at risk for developing an eating disorder was found to be 24.23% among senior high school students in Ubon Ratchathani, Thailand, which was similar to other studies conducted in Thailand using the same cutoff point and relative population. A recent study showed a prevalence of 23.8% among senior high school female students in Bangkok [14]. The comparable results may be attributable to the same age group, notably adolescents, who were concerned with their body image. Our study demonstrates that a subset of high school students with a low or relatively low body weight had a 4-fold increased risk for developing eating disorders, particularly female students. In contrast, Fumaneeshoat et al. [13] found a prevalence of 37.2% of abnormal eating attitudes and behaviors among overweight and obese undergraduates at the university of Southern Thailand. Similarly, Pitanupong et al. [12] reported a prevalence of 15.9% among Thai medical students in southern Thailand, which increased the risk of developing eating disorders by 2.3-fold among obese individuals compared with underweight individuals. Moreover, Yılmaz et al. [21]

found a prevalence of 24.1% of abnormal eating attitudes in young adults and an association with overweight/obese participants [21]. Age differences among participants may contribute to the different results. Our findings revealed disordered eating attitudes and behaviors in middle adolescents (15-18 years) who had low and relatively low weight, indicating that self-objectification and body surveillance are the primary concerns in this age range [14], whereas a previous study indicated that overweight and obese undergraduate students (late adolescence, ages 18 to 21) had disordered eating attitudes and behaviors, the possible cause being a result of multiple causes, such as academic pressure. However, a previous study showed that overweight status was associated with overeating and frequent eating, whereas underweight status was associated with less frequent eating and longer sleep duration [22]. This indicated whether overweight/obese or underweight was associated with abnormal eating behaviors.

Abnormal eating behaviors involve several factors. Three main factors affect individual eating behaviors: intrapersonal influences, interpersonal influences, and cultural environmental influences. In particular, interpersonal influences are the most influential factors because health behaviors result from imitation of attitudes and behaviors, and it is a part of social learning, especially from role models, friends, film stars or celebrities, etc. For

this reason, the prevention of individuals at risk for developing eating disorders regarding knowledge about the impacts of eating disorders, promotion of attitudes and values of nutrition, especially the five food groups, accepting real size body, lifestyle modification such as exercise, and consulting an expert if individuals want to gain weight or lose weight. This may be appropriate information for at-risk students, leading to a reduced incident rate of eating disorders [8].

This is the first study to evaluate the growth and nutritional status of high school students using the growth standards established by the Department of Health and the Ministry of Public Health. The participants with low or relatively low body weight were shown to have a 4-fold increased risk of having an eating disorder, although the BMI did not indicate a significant association, as reported in our results and by others [14]. This suggests that BMI may be an effective measurement of growth and development as well as nutritional status in individuals who were older than 18 when they reached adulthood, whereas the evaluation by using body weight for age and body weight for height may be appropriate for individuals under the age of 18.

Furthermore, previous studies using the EAT-26 test and defining a cutoff point of 20 scores as opposed to 12 scores found a prevalence of 4.3-10.74% [7,10,11,23,24]. These findings suggested that a cutoff affects the prevalence of individuals with an abnormal eating attitude. The high scores of a cutoff point may result in a population prevalence underestimate.

Nonetheless, the Thai EAT-26 serves merely as a standard measure for identifying irregular eating habits, so these findings only indicate the frequency of these atypical attitudes and actions towards food. For a more detailed diagnosis of specific eating disorders, further evaluation by a psychiatrist is necessary, utilizing established diagnostic guidelines like DSM-5 or ICD-10 for conditions such as anorexia nervosa, bulimia nervosa, binge eating disorder, and ED-NOS [25].

This study has some limitations. First, the sample size was quite small, particularly for men, which led to some prevalence being blinded. Second, our study was limited to only one high school in Ubon Ratchathani Province, making it difficult to generalize the results to other high schools in other areas of Thailand. Finally, with a cutoff point of 12 points, the Thai Eating Attitude Test-26 (EAT-26) may have good criterion-related validity for female participants, but this validity may be limited for male participants.

## 5. Conclusions

The prevalence of at-risk students for developing eating disorders among senior high school students in Ubon Ratchathani, Thailand, was 24.23%. Relatively low body weight status evaluated by body weight for age was the

factor associated with an increased risk for developing eating disorders, particularly in females compared to normal body weight. We found no correlations between BMI and body weight for height and risk for developing an eating disorder. Further research is required to determine how other genetic backgrounds, neurochemical substances, personality traits, sociological factors, and environmental factors may impact adolescent eating attitudes and behaviors.

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## Author Contribution

NM: Conceptualization, methodology, writing-original draft, writing-reviewing and editing

MW: Investigation, Methodology, Formal analysis, Writing-original draft

PP: Data collection, investigation

SP: Data collection, investigation

## Funding

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## Conflicts of Interest

None to declare

## Ethics Approval

Ethical approval was given by the Ubon Ratchathani University Research Ethics Committee (UBU-REC-16/2563).

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