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Eating Disorders in University Students and Their Relationship with Body Image

Trastornos de la conducta alimentaria en estudiantes universitarios y su relación con la imagen corporal

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ABSTRACT

University students are a population at particular risk for developing eating disorders, influenced by body image dissatisfaction and lifestyle factors. Despite this, little is known about how eating disorder risk relates to objective body composition measures and perceived body image in this group. The aim was to assess the risk of developing eating disorders in university students using the SCOFF questionnaire and correlate the findings with body composition and body image perception. A total of 500 students, both male and female, aged 18 to 30 years old, were evaluated anthropometrically using the InBody 270 device. Body image perception was assessed using Stunkard's silhouettes, and participants completed the five-question SCOFF questionnaire. A high prevalence of eating disorders risk (44 %) was observed, with a significant association with sex (chi-square, $p < 0.01$), as women showed a higher frequency of risk (63 %). Individuals at risk of EDs had higher weight, BMI, body fat, and lower muscle mass (t-test, $p = 0.001$, $p = 0.000$, $p = 0.0001$, and $p = 0.01$, respectively). A significant relationship was also found between eating disorder risk and body image dissatisfaction (chi-square, $p < 0.0001$). Risk analysis revealed that females are 2.5 times more likely to develop eating disorders, and body image dissatisfaction increases this risk by fourfold. The most common condition identified was binge eating disorder, affecting 63 % of at-risk individuals. The high frequency of eating disorders observed among university students is notable, with associated risk factors, such as sex and body image perception, aligning with previous findings. The results highlight that female sex, body image underestimation, and dissatisfaction are key risk factors for developing eating disorders. These findings support the development of targeted interventions to prevent this condition.

Keywords: Eating disorder, body image, body composition, young adult, image distortion.

1. Introduction

Eating disorders (ED), such as anorexia nervosa, bulimia, and binge eating disorder, among others, are psychiatric conditions that involve impaired eating behaviors that negatively affect the physical and mental health of individuals [1].

This disorders are frequently characterized by unhealthy relationships with food, including restrictive behaviors, self-induced vomiting, binge eating, or compensatory behaviors [2]. Recent data on eating disorders in Latin America reveals a concerning prevalence and highlights the importance of understanding sociocultural factors that contribute to the development of these disorders [3-4]. A meta-analysis has found that the prevalence of bulimia nervosa and binge eating disorder (BED) is notably higher in Latin American countries compared to Euro-American contexts while anorexia nervosa is reported at lower rates [5]. For instance, studies indicate that the prevalence of bulimia nervosa in specific Latin American populations aligns with rates observed in Western countries, suggesting that cultural factors might influence eating behaviors similarly across diverse regions [5].

In Chile, there are various initiatives aimed at preventing, addressing, diagnosing, and treating eating disorders. These include bills that recognize the risk of disorder on individual health and the family environment [6]. However, this requires timely recognition of the risk of developing it, especially in adolescents and young adults.

Young adults, including university students, are considered an at-risk age group for developing EDs due to lifestyle factors such as their relationship with nutrition, social interaction, adaptation to loneliness, conflicts with peer groups, etc [7]. A study in the United States assessed the risk of developing EDs in university students and found that 16.2 % were at high risk, with the rate significantly higher among women [8]. In Bangladesh, a study conducted with 800 university students with an average age of 21 years showed that 37.6 % were at risk of developing EDs [9].

EDs are also more common in Western cultures, where beauty standards are more strongly emphasized than in Eastern cultures [10]. Additionally, genetic, environmental, and psychological factors, along with personality traits and family background, are among the causes of EDs [11]. According to family and twin studies, there may be a familial predisposition to eating disorders. Considering that individuals with family members diagnosed with EDs have a 7 to 12 times higher risk, genetics appears to play an important role among etiological factors [1].

Currently in Chile, there has been a 30 % increase in consultations for eating disorders among adolescents, with an even larger undiagnosed population likely, especially among men, as recent trends show a significant increase in EDs among young males [12]. Therefore, it is essential to seek easy-to-use tools for the early recognition of ED risk, particularly in high-risk populations.

In most psychological disorders, the diagnosis is clinical, and for validity, it must be made by experts based on criteria from current classification systems such as the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) [13]. However, this methodology is difficult to implement in primary care due to the length of the questionnaire and the need for expert interpretation. In contrast, the questionnaire whose acronym in english is Sick (self-induced vomiting), Control (loss of control overeating), One stone (weight loss), Fat (feeling fat), and Food (food dominates life) called SCOFF has shown adequate specificity and sensitivity for ED screening in the general population and is easy to apply by any healthcare professional. This questionnaire has opened a window of opportunity for identifying EDs in clinical settings without needing a specialist [14]. The SCOFF questionnaire has been validated in several languages and for both genders. In Mexico and Colombia, it has been

validated in Spanish, and its sensitivity and specificity were assessed, confirming that SCOFF is an effective screening tool for detecting EDs [14-15].

One of the described risk factors for developing EDs is body image dissatisfaction [16]. Body image encompasses the perception of one's body, body image concepts, and the affective evaluation individuals have toward their own bodies. Body perception is one of the most important dimensions, as a person may desire a body image different from their actual one, a condition known as body dissatisfaction [17] . A study conducted in the United States that followed more than a thousand people for 15 years reported that dissatisfaction increased over time in both sexes. Among the young adults who began the study, the frequency of dissatisfaction was 50 % in women and 25.9 % in men. The proportion of individuals with ED-related problems or weight issues rose from 78.1 % to 82.3 % in women and from 60.1 % to 69.2 % in men [18]. Among people with eating disorders, men represent a group that has been under-reported in research on the topic, especially in relation to how men relate to their body image. Paphiti et al. (2024) [19] conducted a male-only study to identify body perception issues, finding that participants were highly concerned with how others evaluated their bodies, and with muscularity rather than thinness. Similarly, a cross-sectional study conducted in Brazil on 103 women and 91 men who practiced CrossFit found that women had a higher frequency of eating disorders, and in men with eating disorders, muscularity-oriented behavior was the only predictor of disordered eating [20]. Therefore, there is growing evidence on eating disorders in men that makes it necessary to investigate the risk factors that may predict its development.

On the other hand, the nutritional status observed refers to objective measurements of weight, height, and body composition. Several studies have shown that a mismatch between perceived and actual nutritional status, recognized as body image distortion, is a risk factor for developing EDs [21-22]. Both body dissatisfaction and distortion are particularly common among young adults and university students, the groups at highest risk of developing EDs [21].

For these reasons, the present project aims to evaluate the risk of developing EDs in university students, while also determining the factors that may be associated with their onset, specifically those related to body composition and body image.

2. Materials and Methods

Subjects

A total of 500 university students of both sexes were evaluated. All participants were from Santiago de Chile, from different universities in the Metropolitan Region. Subjects of both sexes, ages 22.5 ± 2.1, were evaluated. The sample was recruited at different universities in the Metropolitan Region of Chile through advertisements on social networks during the years 2023 and 2024.Inclusion criteria were age between 18 and 30 years old of either sex or currently enrolled as university students. Exclusion criteria included: individuals diagnosed with psychological disorders such as depression, anxiety, sleep disorders, or obsessive-compulsive disorders; individuals under medication for psychological disorders, self-medication, or use of appetite suppressants, or sleep disorder medications; pregnant women and breastfeeding mothers. All participants signed an informed consent form approved by the Ethics Committee of the Universidad Autónoma de Chile.

Procedures

- General Data Survey

  Participants were asked about their date of birth, food intolerances, and smoking habits.

- Data Collection Instruments

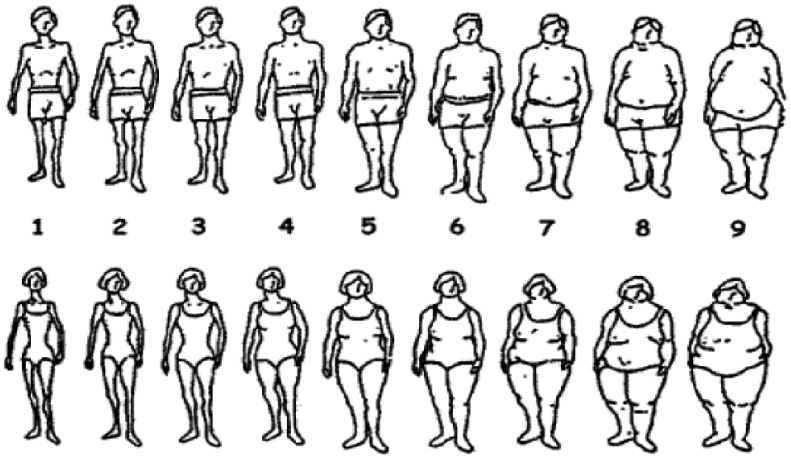
  Observed and Perceived Nutritional Assessment

Participants were evaluated at the Nutritional Assessment Laboratory of the Universidad Autónoma de Chile to determine their nutritional status and body composition using the InBody 270 device. This measurement provided weight, height, and body composition (fat-free mass and body fat percentage). Body Mass Index (BMI) was calculated using weight and height.

Perceived Nutritional Assessment was conducted using the Stunkard [26] figure rating scale, which includes nine silhouettes ranging from very thin to obese for both men and women. Each participant selected the silhouette that best represented their current body image and the one they would like to resemble. If the difference between the desired and current image was zero, the subject was considered satisfied with their body image. A positive difference indicated a desire to be larger, and a negative difference indicated a desire to be thinner. Both positive and negative discrepancies were classified as body image dissatisfaction (Figure 1).

The equivalence between BMI and each image of the instrument was previously validated by Bulik, et al., (2001) [23]. In Mexico, Cortés-Martínez, et al., (2009) [24] validated the Stunkard silhouettes in children and adolescents, finding high accuracy in detecting overweight and obesity in both men and women (area under the curve between 0.84 and 0.89). Likewise, Parzer, et al., 2021 [25] validated the instrument in children and adults, finding a strong correlation between image identification and BMI in both men and women ($r = 0.76$, $p < 0.001$ and $r = 0.80$, $p < 0.001$, respectively).

Figure 1.
Stunkard Silhouettes [26]



- Body Image Distortion

This was determined by comparing the objective nutritional diagnosis based on BMI with the subjective assessment from the participant's selected current silhouette. The silhouettes were categorized as follows: figure 1 = underweight; figures 2 to 4 = normal weight; figure 5 = overweight; figure 6 or higher = obesity [26].

- Eating Disorder Assessment

This was carried out using the SCOFF questionnaire, which includes five yes/no questions. Two or more positive answers indicate the presence of an eating disorder. The Spanish validation of this questionnaire was conducted in Spain, Mexico, and Colombia EDs [14-15]. Furthermore, the specificity and sensitivity of the questionnaire, administered to 203 Spanish participants, were 97.7 % and 94.4 %, respectively [27]. However, in Brazil, when both sexes were studied, the specificity and sensitivity of the questionnaire, were 71.5 % and 80.0 %, respectively [28].

- SCOFF Questionnaire [29]

Do you make yourself vomit because you feel uncomfortably full?

Do you worry you have lost control over how much you eat?

Have you recently lost more than 7 kg (about 15 pounds) in a three-month period?

Do you believe yourself to be fat when others say you are too thin?

Would you say that food dominates your life?

Determination of ED Type

The type of ED was identified using the clinical algorithm ExpaliTM, which combines BMI and SCOFF questionnaire responses to classify individuals into one of four eating disorder categories as defined by the DSM-5 [30].

- Statistical Analysis

Quantitative and continuous variables are presented as mean ± SD. Qualitative variables are presented as frequencies and percentages. Differences between participants with and without risk of eating disorders were assessed using the Student t test or the Mann-Whitney U test, depending on the normality of the variables. Chi-square tests were used to evaluate the relationships between EDs, sex, nutritional status, and body image perception. A logistic regression was performed to assess the association between the independent variables and the likelihood of the ED risk as a binary variable (No ED = 0, ED = 1). The model was fitted using the maximum likelihood estimation method. Model fit was evaluated using several indicators: Pseudo R^2 and Likelihood Ratio Test (LR test). Information criteria used were AIC (Akaike Information Criterion) and BIC (Bayesian Information Criterion). These values were used to compare alternative models, with preference given to the model with the lowest AIC/BIC. The number of observations was 500. Statistical analysis was performed using Stata 17 software, with a significance level of $p < 0.05$.

3. Results

A high prevalence of risk for eating disorders (ED) was found at 44 %. A significant relationship was also observed with sex (chi-square, $p < 0.01$), with women showing a higher frequency of risk (63 %) (Table 1).

Table 1.
General characteristics of the population studied

Characteristics	Without ED n = 278	With ED n = 222	p
Men/Women n(%)	149(54)/129(63)	70(32)/152(68)	0.002*
Age (years)	22.6 ± 2.1	22.2 ± 1,8	0.05
Weight (Kg)	67,7 ± 13,7	71,1 ± 14,2	0.007
Height (mt)	1.65 ± 0.08	1.63 ± 0.08	0.001
BMI (kg/mt2)	24.4 ± 3.8	26.5 ± 4,5	0.0001
Body Fat (%)	27.1 ± 9.4	33.9 ± 8.8	0.0001
Fat Free Mass (kg)	27.4 ± 6,9	25.9 ± 6,1	0.01
Nutritional Status			
Underweight n (%)	2 (0.7)	1 (0.4)	0.0001*
Normal n (%)	174 (63)	88 (40)	
Overweight n (%)	77 (28)	86 (38)	
Obese n (%)	25 (9)	47 (21)	

Data are presented as means ± SD. Differences were assessed using Student's test or U Mann Whitney, depending on the normality of the variables; significance level was $p < 0.05$.

*Analysis performed using the chi-square test.

Individuals at risk for ED had higher weight, BMI, and body fat percentage, and lower muscle mass (Student's t-test, $p = 0.001$, $p = 0.0001$, $p = 0.0001$, and $p = 0.01$, respectively) (Table 1).

When analyzing the relationship between ED risk and nutritional status, it was observed that subjects with ED tended to fall into overweight or obese categories, with a significant association between these variables (chi-square, $p < 0.0001$) (Table 1).

Likewise, a significant relationship was found between ED risk and body image dissatisfaction (chi-square, $p<0.0001$), with negative dissatisfaction being the most predominant trait among the student population (Table 2). 84% of students at risk for ED were dissatisfied with their body image (Table 2).

Table 2.
Relationship between body image dissatisfaction and risk of eating disorders in university students

Body image Dissatisfaction	ED	
	Without ED n = 278	With ED n = 222
Present (wishing to be thinner) n (%)	137 (49)	188 (84)
Absent n (%)	73 (26)	17 (8)
Present (wishing to be larger) n (%)	68 (24)	17 (8)
Distorted Body Image		
Underestimation n (%)	54 (19)	54 (24)
Absent n (%)	202 (73)	136 (61)
Overestimation n (%)	22 (8)	32 (14)

Data are presented as frequencies (percentages). Differences were assessed using the chi-square test; disagreement: $p < 0.0001$; distortion: $p < 0.006$.

Body image distortion also showed a significant association with ED risk, with underestimation (negative distortion) being most frequent among university students (24%) (Table 3).

Table 3.
Types of eating disorders in university students

ED Type	n=222
Anorexia n (%)	4 (2)
Bulimia n (%)	59 (26)
Binge eating disorder n (%)	139 (63)
Unidentified n (%)	20 (9)

The data are presented as frequency (percentage).

According to the Expali™ algorithm, the most common type of ED identified was binge eating disorder (Table 3).

Table 4 shows the logistic regression models evaluating the association of sex, BMI, body image dissatisfaction, and distorted body image with the presence of EDs. In the crude models, all predictors except BMI were significantly associated with EDs ($p < 0.05$). After adjustment, sex remained a significant predictor (OR = 1.80, 95 % CI: 1.22 – 2.84, $p = 0.004$), as did body image dissatisfaction (OR = 5.60, 95 % CI: 4.51 – 7.01, $p < 0.001$) and distorted body image (OR = 2.08, 95 % CI: 1.12 – 3.82, $p = 0.020$). In contrast, BMI was not associated with EDs in the adjusted model (OR = 0.96, 95 % CI: 0.91 – 1.05, $p = 0.615$). All models showed a significant improvement over the null model according to the likelihood ratio test ($p < 0.001$). The Pseudo R^2 ranged from 0.117 to 0.126, indicating modest explanatory power. Model 3, which included body image dissatisfaction, presented the lowest AIC (612.13) and BIC (637.42), suggesting it provided the best overall fit among the four models.

Table 4.
Risk factors for the development of eating disorders in university students

Predictor	OR crudo (IC95 %)	p	OR ajustado (IC95 %)	p	Pseudo R^2	LR Test (p)	AIC	BIC	N
Model 1 – Sex	2.52 (1.73 – 3.62)	<0.001	1.80 (1.22 – 2.84)	0.004	0.1170	80.33 (<0.001)	614.5	631.3	500
Model 2 – BMI	1.12 (0.89 – 1.40)	0.231	0.96 (0.91 – 1.05)	0.615	0.1174	80.61 (<0.001)	659.6	668.0	500
Model 3 – Body image dissatisfaction	4.15 (2.33 – 7.29)	<0.001	5.60 (4.51 – 7.01)	<0.001	0.1263	86.72 (<0.001)	612.1	637.4	500
Model 4 – Distorted body image	4.29 (2.19 – 4.97)	<0.001	2.08 (1.12 – 3.82)	0.020	0.1242	85.28 (<0.001)	613.5	638.8	500

The data were analyzed using logistic regression, with the absence of Eds = 0 and the presence of Eds = 1. Crude OR: bivariate analysis of each predictor in relation to the presence of eating disorders (ED). Adjusted OR: multiple logistic regression model adjusted for sex, body mass index (BMI), body fat, body image dissatisfaction, and body image distortion. Statistical significance: $p < 0.05$.

4. Discussion

This study aimed to evaluate the risk of ED in university students and to associate its presence with factors related to nutritional status and body image. ED risk frequency was assessed using the SCOFF questionnaire, revealing a high prevalence of 44 %. Previously, Urzúa, et al. (2011) [31] using the EDI-2 Scale in Chilean students aged 14 to 18 found 7.4 % at risk, while Zapata, et al. (2018) [32] in a similar Chilean population (13 to 18 years old) using the EAT-40 found a 16.1% risk. Our findings were significantly higher than those previously reported. However, several authors have observed that post-COVID-19 pandemic, ED rates have increased significantly, with symptoms also becoming more severe [33-34].

Zapata, et al. (2018) [32] also noted differences between sexes, with ED risk higher in females than males (21.8 % v. 6.6 %). Our study found similar results: 68 % of women were at risk compared to 32 % of men. Sex differences in ED frequency have been widely reported, with female-to-male ratios ranging from 2:1 to 10:1 [35], especially during puberty. Factors like appearance-related pressure and societal weight ideals in women contribute to this difference. However, animal studies during puberty also reveal sex-based differences, suggesting biological factors may also play a role [36].

The most frequent ED type in our population was binge eating disorder (BED) (63 %), followed by bulimia (26 %), both more prevalent in women (BED: 43 % women v. 19 % men; bulimia: 19 % v. 6 %, data not shown). BED is one of the most common EDs and is often associated with mood and anxiety disorders [2]. BED is linked to obesity due to its characteristic pattern of uncontrolled eating episodes accompanied by emotional distress. As this disorder lacks compensatory behaviors like vomiting or fasting, it increases obesity risk and is also associated with elevated cholesterol, type 2 diabetes, hypertension, and cardiovascular risk. Early diagnosis is essential, especially in young populations [37].

Bulimia, in contrast, often occurs in individuals with normal or overweight BMI, includes binge episodes, and features compensatory behaviors aimed at preventing weight gain [2].

In the present study, it was found that students with eating disorders (EDs) tend to be overweight or obese. Similarly, Zapata, et al. (2020) [32] reported that the highest risk of EDs was observed in overweight women and obese men. Hay, et al. (2015) [38], in a cross-sectional study involving 6,041 adult individuals, observed that those with binge eating disorder and bulimia nervosa were more frequently obese findings that are consistent with those of our group, which showed that overweight and obese individuals had a higher risk. Furthermore, their body composition differed, as students at risk of EDs had a higher total fat percentage than those without the risk and lower muscle mass, which may indicate the associated risk of these abnormal eating behaviors, as reported by other authors. Overweight and obesity in those at risk of ED may perpetuate symptoms, particularly in young adults who are highly influenced by social media beauty standards. Nutritional status may negatively affect self-esteem, promoting disordered eating behaviors [2]. Bulimia and binge eating disorders are distinguished by occurring in individuals with varying nutritional statuses. In bulimia, individuals may be found at the brink of being underweight due to compensatory behaviors such as vomiting, use of medications, fasting, or excessive exercise. In contrast, binge eating disorder (BED) is mainly observed in individuals with obesity [2]. Our study supports this association, as individuals with bulimia were predominantly of normal nutritional status (20 %), while overweight and obese individuals were less frequent (4 % and 2 %, respectively). On the other hand, among individuals with binge eating disorder, the predominant nutritional status was overweight (32 %), followed by obesity (18 %), and to a lesser extent, normal weight (13 %).

People with ED often exhibit disturbed attitudes toward food and distorted perceptions of weight and appearance [39]. Multiple biological, genetic, and social factors contribute, with social media

playing a key role in shaping beauty standards. The disconnect between media portrayals and actual body image may result in body dissatisfaction, which arises from body image distortion. Both dissatisfaction and distortion are key contributors to ED development due to the psychological distress they cause [18]. In our study, only 8% of students at risk for ED were satisfied with their body image, while 84 % expressed negative dissatisfaction, wanting to be thinner than they perceived themselves. In terms of body image distortion, 61 % showed no distortion, while 38 % showed either negative or positive distortion. Overall, students were more often dissatisfied with their image than distorted.

Social comparison theory has supported the link between body dissatisfaction and ED risk. University studies have shown that self-esteem and body image are significantly associated with ED risk [16]. Jiménez-Limas et al. (2022) [17], in a six-year follow-up of university students, found EDs strongly associated with body dissatisfaction and distortion, with odds ratios increasing from 3.6 to 15.9 for dissatisfaction and from 1.9 to 3.3 for distortion.

In our study, crude analysis showed ED risk associated with female sex (OR = 2.5, CI: 1.73 – 3.62), overweight and obesity (OR = 1.12, CI: 1.89 – 4.09), and body image dissatisfaction and distortion (OR = 4.15, CI: 2.19 – 4.97 and OR = 4.29, CI: 2.19 – 4.97, respectively), supporting prior findings. Even after adjustment, female sex, distortion, and dissatisfaction remained significant risk factors.

EDs are mental disorders that can seriously impact the health and well-being of affected individuals. One-third of women worldwide have experienced an ED, and if untreated, long-term consequences can be devastating. Recent data shows increasing ED prevalence globally, with onset age as low as 12 years old and decreasing. Restrictive EDs are more frequent in older adolescence, while purging behaviors appear earlier [17].

Some of the limitations of this study included the lack of local validation of the SCOFF. However, it is important to understand the scope of the problem with an instrument of proven specificity and sensitivity. A critical aspect that remains to be evaluated in university students is other psychopathological conditions for comprehensive mental health interventions. In the present study, all students at risk for eating disorders were advised to voluntarily seek psychological counseling at the university.

5. Conclusions

The results show that young adults, particularly university students, are at risk of developing eating disorders due to the multiple changes involved in higher education. The main risk factors identified were female sex and body image dissatisfaction. These findings support the need for targeted interventions to prevent the onset of this condition.

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Conflict of interest

Nothing to declare.

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RESUMEN

Los estudiantes universitarios son una población con un riesgo particular de desarrollar trastornos de la conducta alimentaria (TCA), influenciados por la insatisfacción con la imagen corporal y factores de estilo de vida. A pesar de esto, se sabe poco acerca de cómo el riesgo de trastornos alimentarios se relaciona con medidas objetivas de composición corporal y con la percepción de la imagen corporal en este grupo. El objetivo fue evaluar el riesgo de desarrollar trastornos de la conducta alimentaria en estudiantes universitarios utilizando el cuestionario SCOFF y correlacionar los hallazgos con la composición corporal y la percepción de la imagen corporal. Un total de 500 estudiantes, hombres y mujeres, de entre 18 y 30 años, fueron evaluados antropométricamente mediante bioimpedanciometría con InBody 270. La percepción de la imagen corporal se evaluó utilizando las siluetas de Stunkard, y los participantes completaron el cuestionario SCOFF de cinco preguntas. Se observó una alta prevalencia de riesgo de trastornos de la conducta alimentaria (44 %), con una asociación significativa con el sexo (chi-cuadrado, $p < 0,01$), ya que las mujeres mostraron una mayor frecuencia de riesgo (63 %). Los individuos en riesgo de TCA presentaron mayor peso, IMC, grasa corporal y menor masa muscular (t-test, $p = 0,001$; $p = 0,000$; $p = 0,0001$ y $p = 0,01$, respectivamente). También se encontró una relación significativa entre el riesgo de TCA y la insatisfacción con la imagen corporal (chi-cuadrado, $p < 0,0001$). El análisis de riesgo reveló que las mujeres tienen 2,5 veces más probabilidades de desarrollar un trastorno alimentario, y la insatisfacción con la imagen corporal aumenta este riesgo cuatro veces. La condición más común identificada fue el trastorno por atracón, que afectó al 63 % de los individuos en riesgo. La alta frecuencia de trastornos de la conducta alimentaria observada entre los estudiantes universitarios es notable, con factores de riesgo asociados, como el sexo y la percepción de la imagen corporal, en concordancia con hallazgos previos. Los resultados destacan que el sexo femenino, la subestimación y la insatisfacción con la imagen corporal son factores de riesgo clave para desarrollar trastornos de la conducta alimentaria. Estos hallazgos respaldan el desarrollo de intervenciones específicas para prevenir esta condición.

Palabras clave: Trastorno de la conducta alimentaria, imagen corporal, composición corporal, adultos jóvenes, distorsión de la imagen corporal.