ORIGINAL RESEARCH

Prevalence of Binge-Eating Disorder and Its Association with Nicotine Dependence Among Under-Graduate Students at a Saudi Public University

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Purpose: There is minimal information regarding the prevalence of binge-eating disorders in Saudi Arabia. This study aims to measure the prevalence of BED and its association with nicotine dependency (ND) among undergraduate university students at Imam Mohammad Ibn Saud Islamic University (IMSIU).

Methods: A cross-sectional study recruited 878 participants, with an inclusion criteria that encompassed all IMSIU undergraduate students of either sex. The online-based self-report questionnaire was distributed through e-mail, which used the Binge-Eating Disorder Screener-7 (BEDS-7) to evaluate BED symptoms and the Fagerstrom Test of Nicotine Dependence (FTND) to measure the levels of ND. The e-FTND version was also adapted into the questionnaire to account for modern methods of nicotine usage.

Results: A total of 165 participants were BED positive, with a prevalence of 18.8%, 99 of whom were women, and 66 were men. Women were significantly more predicted for BED than men (p = 0.035). Men appeared to be mainly more expected to be nicotine dependent (p < 0.001). BED positive participants showed a higher probability of being nicotine dependent than BED negative participants in the multivariate logistic regression analysis (95% CI 1.3–3.2; p = 0.002).

Conclusion: BED prevalence was notably high compared to worldwide estimates, with a significant association to nicotine dependence by the multivariate analysis. In the future, more investigations regarding the prevalence of specific types of eating disorders, including BED, in Saudi Arabia need to be considered.

Keywords: binge-eating disorder, eating disorders, nicotine dependence, students, Saudi Arabia

Introduction

With the development of the latest Diagnostic and Statistical Manual of Mental Disorders (DSM-V), Binge-Eating Disorder (BED) has been considered an official psychiatric eating disorder to join Anorexia Nervosa (AN) and Bulimia Nervosa (BN) as the three main types of eating disorders. BED is defined in DSM-V as eating a more considerable sum of food in a specific period than most people eat in similar circumstances, with a lack of control over eating during the binge-eating episode.[1] Furthermore, BED has been found to have severe complications due to its high association with obesity, obesity-related disorders (eg, diabetes mellitus), and

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metabolic disorders.[2] The main difference between BN and BED is the lack of inappropriate compensatory weight loss behaviors in BED. Compared to the increased caloric intake in the two other eating disorders, AN is diagnosed with significant low body weight due to inadequate caloric intake.[1] BED is the most prevalent of eating disorders, with an estimated lifetime prevalence of 1.9% in a survey of 14 countries.[3]

Despite its significant prevalence worldwide, BED continues to be an under-recognized healthcare concern, with a lack of published articles describing the prevalence of BED in Saudi society. However, five studies were published to analyze the prevalence of eating disorders in subgroups of the Saudi population; two focused on under-graduate female students, one on adolescent girls, one focused on gym members, and the last article explored the presentation of eating disorders. Eating Attitude Test 26 (EAT-26) was used in most of the articles, except the last article, which relied on the Eating Disorder Examination (EDE) and Eating Disorder Examination Questionnaire (EDE-Q) to report on the symptoms of disordered eating. In the first article, female university students in Taif were evaluated using the EAT-26 tool's cutoff score of 20. The results revealed that 35.4% of the students were considered at high risk of eating disorders.[4] Secondly, a study conducted at Imam Abdulrahman bin Faisal University, Dammam, showed that 29.4% of female preparatory year students had a high risk of eating disorders.[5] A relatively proximate result was observed by a third study in Arar, Saudi Arabia, targeting adolescent schoolgirls, where 25.5% of the participants had scores above 20 on the EAT-26 expressing symptoms of disordered eating.[6]

Furthermore, a recent paper that enrolled gym members in Saudi Arabia using EAT-26 found symptoms of eating disorders in 36.6% of their participants.[7] The last paper aims to assess the presence of eating disorders in Saudi Arabia by implementing EDE and its questionnaire form EDE-Q amongst 133 participants, with females being the majority (100 females, 33 males), and concluded a prevalence of 18.8% for BED in their sample (19% females, 18.2% males).[8] The drawback of these scientific papers is that most of them focused on eating disorders in general without exploring their types; three of them were exclusively targeting females.

Biologically, BED and Nicotine dependence has been shown to have similarities, by which both increase the activity of the dopaminergic reward system in the brain.[9]

Moreover, hypo-activity of the prefrontal cortex has been noted in both disorders, which are associated with disrupted self-control, eventually constituting vulnerability to food and substance abuse.[9] In addition to biological similarities, an association between BED and Nicotine Dependence (ND) has been marginally noted.[10] In a sample of 910 residents of the greater metropolitan area of St. Louis, 19.3% showed signs of ND, 1.2% representing the "negative BED with Obese bodyweight" category (95% CI 0.8–1.7%), whereas 1.9% of BED positive participants, regardless of body weight, had nicotine dependence (95% CI 1.0–3.5%).[10] BED appeared to show the highest association rate with smoking than other eating disorders, with a lifetime prevalence of 47.73%.[11] A case study of a 48-year-old African American woman who was diagnosed with BED and undergoing smoking cessation revealed that she had surging desires to binge-eat with high frequency and increased intensity, as well as an intense desire to smoke before binge-eating episodes, these primarily manifested in the evenings, mainly due to the nicotine withdrawal effect.[12]

This research aims to measure the prevalence of BED among undergraduate university students in Imam Mohammad Ibn Saud Islamic University (IMSIU), count the ND among the participants, and describe the association of BED and ND. The reasons for implementing this study were due to the insufficient prevalence of studies in Saudi Arabia about binge-eating disorder and the relation between BED and ND. We hypothesize that a high prevalence of the binge-eating disorder among undergraduate university students is indicated with a direct connection to nicotine dependence.

Materials and Methods
Study Design
This is a cross-sectional study performed at IMSIU between November 2020 and January 2021. The study was conducted according to the guidelines of the Declaration of Helsinki and approved by the Institutional Review Board of the Imam Mohammad Ibn Saud Islamic University IRB committee number 109–2020 dated Nov 30, 2020.

Participants and Sampling
The total number of all registered undergraduate students on the main university campus in Riyadh is 80,114. The target sample size calculation is 727 with a 99%

confidence interval and a 0.05 precision rate. The inclusion criteria encompassed all registered IMSIU undergraduate university students of either sex. An invitation was sent by e-mail through the IMSIU deanship of information technology. In addition, two e-mails and SMS weblink messages were sent as reminders to enhance the response rate. The students were informed about the purpose of the study. Instructions regarding the questionnaire were provided to volunteering students. The confidentiality of the information was also ensured. Once students voluntarily signed the informed consent, they were requested to fill out the study questionnaire.

Study Questionnaire

The data were collected using an online-based self-reported survey questionnaire that contained three main sections: the first section collected personal and demographic data, the second used the Binge Eating Disorder Screener-7 (BEDS-7) questionnaire to evaluate BED symptoms, and the final section used the Fagerstrom Test for Nicotine Dependence (FTND) to measure the levels of ND.

BEDS-7 was developed in 2014 by Shire Inc., with a sensitivity of 100% and a specificity of 38.7%.[13] It is composed of 7 questions to detect the possibility of the patient having BED. First, a filter question was asked if the participant experienced at least one episode of excessive overeating during their last three months; if answered yes, they were asked whether they had felt distressed from their episodes of excessive eating, followed by five questions using a Likert-like rating scale. An answer of "YES" to both first two questions with a response of "Always", "Often," or "Sometimes" to question three through six, and an answer of "Never or Rarely" or "Sometimes" to question seven will yield a result of showing symptoms of BED, depicted as BED positive.

FTND was finalized in 1991 as a revised version of the original Fagerstrom Tolerance Questionnaire (FTQ) initially developed in 1978.[14] The questionnaire is composed of 6 questions, with varying choices in each question. Each option is accompanied by a number indicating its score for the questionnaire scoring system. The total score is categorized as follows: 0–2 indicates a very low dependence, 3–4 indicates a low dependence, 5–7 indicates a moderate-to-high dependence, lastly, 8+ indicates a very high dependence. In addition, a filter question inquiring if the participant is a user of nicotine products was asked before the questionnaire. The e-FTND version was also adapted to account for modern methods of

nicotine usage; 10 puffs of e-cigarettes is equivalent to one traditional tobacco cigarette, which is estimated to be the average puffs of a single cigarette.[15]

Body mass index (BMI) was evaluated using the weight and height of participants by utilizing the formula weight (kg)/height squared (m²). The BMI was classified into 5 classes: Underweight (<18.5 kg/m²), Normal (18.5–24.9 kg/m²), Overweight (25–29.9 kg/m²), Obese (Class I obesity; 30–34.9 kg/m²), and extremely obese (Class II and III obesity; >35 kg/m²).

Statistical Data Analysis

The analysis was performed using SPSS IBM statistical analysis program version 21. The mean and standard deviation were used to describe continuous variables, and the frequency and percentages were used for categorical variables. The histogram and the statistical Kolmogorov–Smirnov (K-S) test were used to assess the normality assumption of continuous variables and Levene's test of homogeneity of variance for testing the equality of statistical variance assumption. The chi-square test was used to assess the correlations between categorical variables. The independent samples t-test was implemented to determine the statistical significance of mean differences in metric variables across the levels of categorical binary outcomes. Corrected Likelihood Ratio chi-squared test was used when the statistical assumptions of the chi-square test expected counts were violated. The Multivariate Binary Regression analysis was used to assess the statistical significance of the predictors of students' odds of having a binge-eating disorder and nicotine dependence. The association between the students "odds of binge-eating disorder and nicotine dependence with the students" sociodemographic and other relevant predictor variables was expressed as an Odds Ratio with an associated 95% confidence interval. The alpha significance level was considered at the 0.05 level.

Results

The study cohort contained 878 participants, 52.6% were women, and men were 47.4%. The predominant age group was 21–23 years old, consisting of 46% of the participants. The mean weight measured was 70.57 ± 20.48. Body Mass Index (BMI) was obtained, and the majority, 46.2%, were categorized as normal (18.5–24.9 kg/m2), and 44.1% were categorized as overweight and above (≥25 kg/m2). In addition, 85.9% of the students were never married, whereas the rest were classified as ever married (married/divorced/widowed), measuring 14.1% of the total

participants. Detailed descriptive analysis of the students' sociodemographic and academic characteristics is presented in Table 1.

Table 1 Descriptive Analysis of the Students' Sociodemographic and Academic Characteristics

n=878	n (%)
Sex	
Women	462 (52.6)
Men	416 (47.4)
Age group	
18–20 years	200 (22.8)
21–23 years	404 (46)
24–26 years	137 (15.6)
≥27 years	137 (15.6)
Height (Meters), mean ± SD	1.66 ± 0.095
Weight (Kg), mean ± SD	70.57 ± 20.48
Body Mass Index (BMI), mean ± SD	25.32 ± 6.20
BMI Category	
Underweight	85 (9.7)
Normal	406 (46.2)
Overweight	216 (24.6)
Obese	97 (11.1)
Very Obese	74 (8.4)
Marital state	
Never married	754 (85.9)
Ever married	124 (14.1)
Residence	
With family	819 (93.3)
Rented apartment	42 (4.8)
Students Dormitory	9 (1)
Other	8 (0.9)
Study Level	
First year	135 (15.4)
2nd year	187 (21.3)
3rd year	180 (20.5)
4th year	253 (28.8)
5th year	52 (5.9)
Internship	71 (8.1)
College	
Computer science and Information technology	107 (12.2)
Economics and Administrative Sciences	328 (37.4)
Engineering	32 (3.6)
Languages and Translation	83 (9.5)
Medicine	96 (10.9)
Science	44 (5)
Humanities	86 (9.8)
Islamic sciences and Sharia	102 (11.6)

Of those who answered BEDS-7, 165 were screened as BED positive, of whom 99 were women (60%), and 66 were men (40%). The prevalence of BED was 18.8%, 15.4%, and 21.4% amongst men and women, respectively. Bivariate analysis of the university students' binge-eating disorder and nicotine dependence was implemented and presented in Table 2. The mean weight for BED positive students was 77.54 kg ± 22.59, in contrast to BED negative participants with 68.96 kg ± 19.63, showing that BED positive students measured a statistically significantly higher mean weight than BED negative students (p<0.001). Furthermore, women were found to be substantially more predictive for BED compared to men (p=0.035), who were found to be appreciably less predicted (56.6% times less) to binge-eating compared to women (OR: 0.434; 95% CI: 0.291–0.647; p<0.001).

Body mass index was significantly higher for the students with BED (Mean=28.17) compared to those not identified to have BED (Mean = 24.67) (p<0.001). The students' BMI classification has also converged significantly on their risk of having BED. Students classified as obese and extremely obese were significantly more inclined to be BED positive than students with overweight and lower BMI states. Furthermore, the association between BMI and the mean predicted probability of BED in both men and women is shown in Figure 1. Students' age, height, marital state, residence conditions, and study level, as well as their colleges, did not correlate significantly with their likelihood of having BED.

Table 3 indicates the descriptive analysis of the FTND questionnaire results depicted as non-nicotine consumers and nicotine consumers and their nicotine dependence levels. The mean FTND score for the students was equal to 4.57 ± 2.78 points. Men were found to be significantly more inclined to nicotine dependence compared to women (p<0.001), this was also indicated in the multivariate regression analysis model (OR 7.71; 95% CI 5.177–11.483, p<0.001). In the bivariate analysis, the students' age correlated significantly with their likelihood of being nicotine dependent; on average, students aged between 18 and 20 years were considerably less predisposed to nicotine dependence than those aged 21 or older (p=0.002). Moreover, Figure 2 shows that as the students' age increases, their predicted mean probability of having nicotine dependence rises linearly. The nicotine-dependent students were significantly heavier (M=75.59 kg) than those who were not nicotine dependent (M=68.94 kg) (p<0.001). Additionally, nicotine-dependent students were

Table 2 Descriptive Bivariate Analysis of the University Students' Binge-Eating Disorder and Nicotine Dependence

	Binge-Eating Disorder			Nicotine Dependence		
	No, n=713	Yes, n=165	p-value	No ND, n=663	ND, n=215	p-value
Sex			0.035			<0.001
Women	363 (50.9)	99 (60)		419 (63.2)	43 (20)	
Men	350 (49.1)	66 (40)		244 (36.8)	172 (80)	
Age group			0.863			0.002
18–20 years	163 (23)	37 (22.4)		171 (25.8)	29 (13.5)	
21–23 years	324 (45.4)	80 (48.5)		298 (44.9)	106 (49.3)	
24–26 years	113 (15.8)	24 (14.5)		98 (14.8)	39 (18.1)	
≥27 years	113 (15.8)	24 (14.5)		96 (14.5)	41 (19.1)	
Height (Meters), mean ± SD	1.7 ± 0.1	1.7 ± 0.1	0.108	1.6 ± 0.1	1.7 ± 0.1	<0.001
Weight (Kg), mean ± SD	69 ± 19.6	77.5 ± 22.6	<0.001	68.9 ± 20.2	75.6 ± 20.6	<0.001
Body Mass Index (BMI), mean ± SD	24.7 ± 5.9	28.2 ± 6.7	<0.001	25.23 ± 6.21	25.6 ± 6.2	0.408
BMI Category			<0.001			0.502
Underweight	82 (11.5)	3 (1.8)		61 (9.2)	24 (11.2)	
Normal	344 (48.2)	62 (37.6)		318 (48)	88 (40.9)	
Overweight	172 (24.1)	44 (26.7)		159 (24)	57 (26.5)	
Obese	71 (10)	26 (15.7)		71 (10.7)	26 (12.1)	
Very Obese	44 (6.2)	30 (18.2)		54 (8.1)	20 (9.3)	
Marital state			0.836			0.448
Never married	613 (86)	141 (85.5)		566 (85.4)	188 (87.4)	
Ever married	100 (14)	24 (14.5)		97 (14.6)	27 (12.6)	
Residence			0.243			0.013
With family	662 (92.8)	157 (95.2)		627 (94.5)	192 (89.3)	
Rented apartment	35 (4.9)	7 (4.2)		23 (3.5)	19 (8.8)	
Students Dormitory	9 (1.3)	0		8 (1.2)	1 (0.5)	
Other	7 (1)	1 (0.6)		5 (0.8)	3 (1.4)	
Study Level			0.776			0.341
First year	108 (15.1)	27 (16.4)		106 (16)	29 (13.5)	
2nd year	154 (21.6)	33 (20)		140 (21.1)	47 (21.9)	
3rd year	142 (19.9)	38 (23)		136 (20.5)	44 (20.5)	
4th year	210 (29.5)	43 (26.1)		191 (28.8)	62 (28.8)	
5th year	44 (6.2)	8 (4.8)		33 (5)	19 (8.8)	
Internship	55 (7.7)	16 (9.7)		57 (8.6)	14 (6.5)	
College			0.858			0.003
Computer science and Information technology	86 (12.1)	21 (12.7)		84 (12.7)	23 (10.7)	
Economics and Administrative Sciences	269 (37.7)	59 (35.9)		231 (34.7)	97 (45)	
Engineering	27 (3.8)	5 (3)		21 (3.2)	11 (5.1)	
Languages and Translation	63 (8.8)	20 (12.1)		68 (10.3)	15 (7)	
Medicine	80 (11.2)	16 (9.7)		78 (11.8)	18 (8.4)	
Science	38 (5.3)	6 (3.6)		32 (4.8)	12 (5.6)	
Humanities	68 (9.5)	18 (10.9)		59 (8.9)	27 (12.6)	
Islamic sciences and Sharia	82 (11.5)	20 (12.1)		90 (13.6)	12 (5.6)	
Nicotine dependence level			0.110			
No ND	545 (76.4)	118 (71.5)		–	–	
Very Low	45 (6.3)	14 (8.5)		–	–	

(Continued)

Table 2 (Continued).

	Binge-Eating Disorder			Nicotine Dependence		
	No, n=713	Yes, n=165	p-value	No ND, n=663	ND, n=215	p-value
Low	33 (4.6)	4 (2.4)		–	–	
Moderate-to-high	63 (8.8)	24 (14.5)		–	–	
Very High	27 (3.8)	5 (3)		–	–	
Binge-Eating Disorder						0.185
Negative	–	–		545 (82.2)	168 (78.1)	
Positive	–	–		118 (17.8)	47 (21.9)	

Abbreviation: ND, nicotine dependence.

significantly taller (1.71 meters) compared to non-nicotine-dependent students (1.64 meters) (p<0.001).

Bivariate analysis showed a significant association between ND and colleges; students in the College of Economics and Administrative Sciences were found to be more predisposed to nicotine dependence; however, in Languages and Translation, college and those studying Islamic sciences and Sharia were found to be notably less inclined to nicotine dependence than the other students (p=0.003). In the multivariate analysis, students studying Economics and Administrative Sciences still showed slightly more, though not significant, predictability
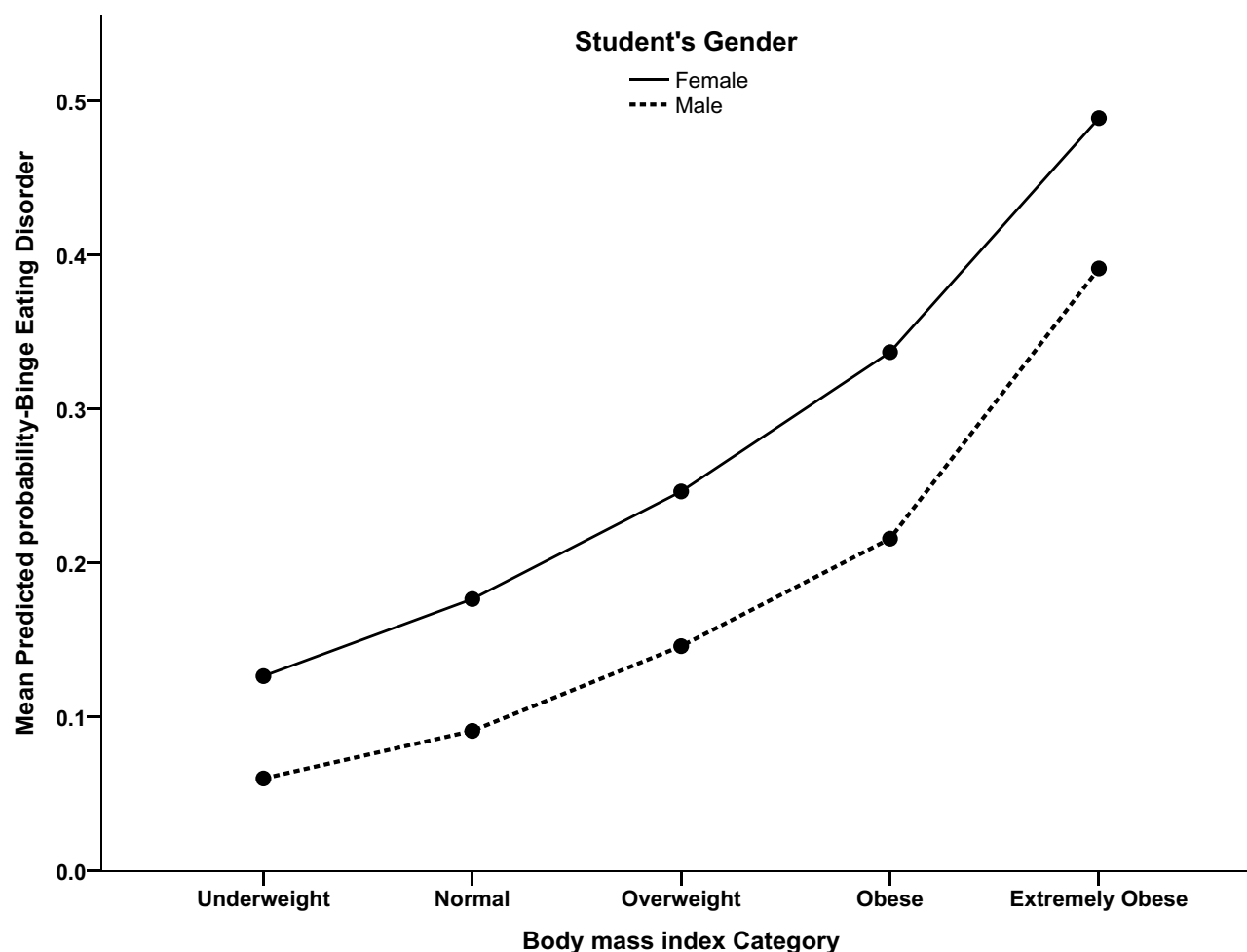

Figure I The association between university students' body mass index classification with their multivariate mean predicted probability of having binge-eating disorder.

Table 3 Descriptive Analysis of the FTND Questionnaire Results

n=878	n (%)
Non-nicotine consumers	663 (75.5)
Nicotine consumers	215 (24.5)
Very Low ND	59 (27.4)
Low ND	37 (17.2)
Moderate-to-High ND	87 (40.5)
Very High ND	32 (14.9)

Abbreviations: FTND, Fagerström Test for Nicotine Dependence; ND, nicotine dependence.

to have nicotine dependence than the students in other majors (p=0.051). In contrast, the students studying Islamic sciences and Sharia were found to be significantly less predicted, 55.7%, to have nicotine dependence (p=0.022).

Students who have a history of nicotine consumption had a significant probability of experiencing BED symptoms in contrast to non-nicotine consumers, approximately 2.5 times more (95% CI 1.4–4.3; p=0.002). Bivariate analysis between BED and ND was statistically not significant. However, in multivariate logistic regression analysis, BED positive students showed more probable chances of being nicotine dependent than BED negative students, with an estimated two times higher chances (95% CI 1.3–3.2; p=0.002).

Discussion

The study explored the prevalence of BED and its association with ND among undergraduate students of different colleges at IMSIU. Overall, the prevalence of BED was 18.8%, with a prevalence of 21.4% in women and 15.9% in men. Students with a history of nicotine consumption had a significant probability of experiencing BED symptoms compared with non-nicotine consumers. Even though there was no statistical association between ND and BED in the bivariate analysis, BED positive had twice as high chances of being nicotine dependent compared to BED negative students in the multivariate logistic regression model. The observed results delineated that the prevalence of BED among the participants was interestingly similar to the prevalence rates concluded in the past literature conducted in Saudi Arabia.[8] Women outnumbered men by a small margin in our sample and posed a higher rate of BED positive participants than men with a ratio of 3:2. Women were shown to be more frequently dissatisfied with weight.[16] This may contribute to the clinical criteria of guilt post a binge-eating episode, leaning towards a higher rate of BED in women.

The link between BED and BMI is strong, with BED positive students showing a higher BMI than BED negative students. In addition, those categorized as obese (BMI 30–34.9 kg/m^2) and extremely obese (BMI > 35 kg/m^2)
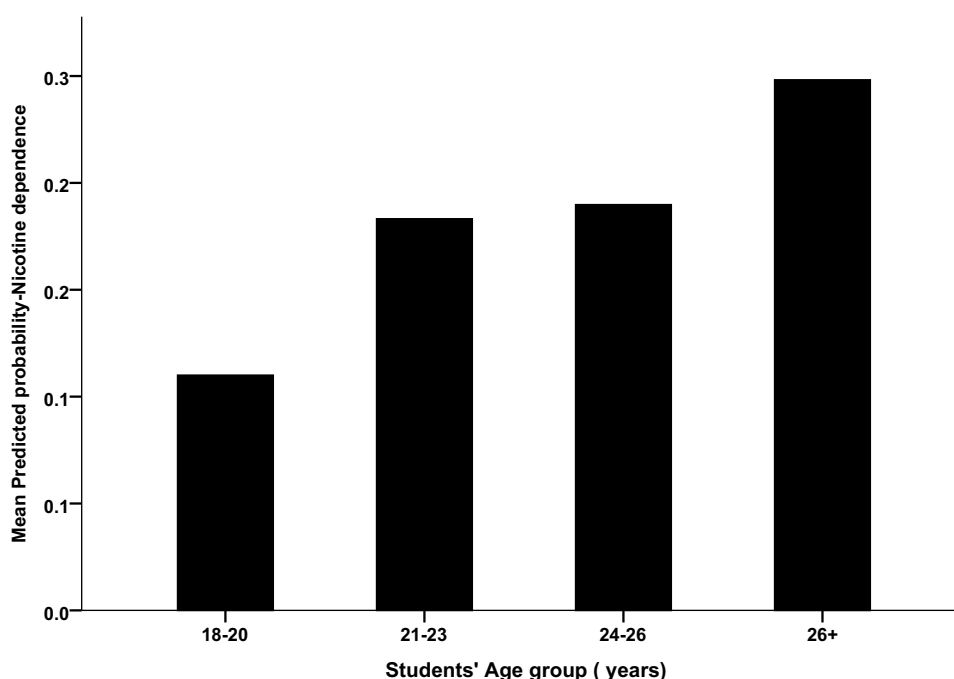
Figure 2 The association between university students' age group with their likelihood of having nicotine dependence.

were more prone to binge-eating compared to those with lower body mass index states. We noticed that our yields are similar to an article that utilized the same BMI classification as ours.[17]

Although there is no significant association between BED and colleges, Economics and Administrative Sciences had the greatest BED positive percentage, followed by Computer science and Information technology. Many factors, including individual and environmental risk factors, could explain the distribution of BED cases.[18] Nonetheless, more research is needed to determine the underlying factors influencing BED positive rates among specific colleges.

To our knowledge, this is the first article in Saudi Arabia to include e-FTND as a means of accounting for modern nicotine use modalities and other nicotine consumption methods that have been overlooked in the calculation of nicotine dependence scores. Nicotine consumers accounted for 24.5% of our sample; this is consistent with previous results observing college students smokers, which mentioned that 25.1% of college students would experiment with smoking, with 97% of them would progress to established smokers.[19] The average FTND score was 4.6 ± 2.7, similar to the average FTND score of 4.13 ± 2.55 found in a study conducted on male students at King Faisal University.[20] Men were remarkably more likely to have nicotine dependence than women (p<0.001). This outcome is supported by a study that found women to be markedly more dependent on nicotine than women and another study that found men to have higher nicotine dependency levels than women among daily smokers.[21,22] Many factors that explain this differ depending on ethnicity, culture, and the surrounding environment; for instance, men can sometimes depict smoking as a manly behavior and cause social pressure on the surrounding environment.[21] Interestingly, nicotine-dependent students were found to have a higher mean weight than those who are not, 75.59 kgs and 68.94 kgs, respectively (p<0.001). This finding is contrary to a previous observation showing higher numbers of ND positive in the non-obese category than obese.[23]

The highest rates of ND were observed at the Economics and Administrative Sciences colleges. Surprisingly, it also had the highest percentage of people who had no dependence. This observation could be attributed to Economics and Administrative Sciences having a higher response rate than other colleges. The chi-square test of the association demonstrated that students specializing in Economics and Administration sciences were significantly more likely to develop nicotine dependence. However, students specializing in language and translation and those studying Islamic sciences and Sharia were found to be notably less likely to develop nicotine dependence. In Al-Mohamed's paper, conducted at King Faisal University, varying percentages of nicotine dependence were dispersed among its colleges. In both studies, the medical schools were much lower in terms of nicotine dependence. However, in their research, they found that the college of computer science had one of the highest scores.[20] Similarities and disparities in ND rates for both universities and their colleges may be influenced by various factors, including psychiatric disorders such as BED, as seen in the literature.[24] This prompts the need for additional studies exploring the correlation between psychiatric disorders and ND amongst university students.

It was observed that students who consumed nicotine products were 2.5 times more likely to exhibit BED. This is in line with a systematic review and meta-analysis that found a significant correlation between BED positive participants and their likeness of being active smokers.[11] As indicated in the bivariate analysis, students exhibiting BED symptoms were slightly more predicted to express any level of nicotine dependence than students known not to have binge-eat, yet this does not correlate significantly. This result aligns with the current literature.[10,23] In addition, those with moderate-to-high ND were more predicted to have BED. However, this also did not converge to statistical significance. Despite the bivariate analysis results, the multivariate logistic regression analysis was used to regress the students' odds of having nicotine dependence of any level against their sociodemographic, academic, and other relevant predictors and risk factors, which demonstrated a statistically significant result, showing that the students who were BED positive showed more probable chances of being nicotine-dependent contrary to BED negative students, with approximated two times higher chances.

Our hypothesis was confirmed, as the prevalence of BED in undergraduate students was found to be 18.8%, which is much higher than the previously described worldwide prevalence of 1.9%. Also, a direct and significant association has been established regarding the relationship between the two variables, as indicated in the multivariate logistic regression analysis.

This study has a few limitations. First, since this is a cross-sectional study, no causal effects can be determined. Additionally, this study is based on data provided by the respondents; hence, self-report bias may have occurred, especially those related to weight and height. It has been shown previously that women can sometimes exaggerate height and underestimate the weight.[25] Furthermore, potentially important covariates such as a family history of BED or obesity, familial BMI, and nicotine dependency in non-smokers exposed to second-hand smoke were not considered.[26] Generally, smoking is socially unacceptable in the current Saudi society, and thereby the prevalence of nicotine dependence based on self-reported information may have been underrepresented. However, evidence suggests that the proportion of smokers who deny or minimize smoking in survey studies may be negligible because they do not significantly alter the results based on smoking status,[27] so the magnitude of this disadvantage may be minimal.

Conclusion

Ultimately, the study denoted the prevalence of BED and its relationship with ND among undergraduate students at Imam Mohammad Ibn Saud Islamic University's various colleges. In short, the prevalence of BED was 18.8%, with women having a prevalence of 21.4% and men having a prevalence of 15.9%. Even though there is no significant relationship between ND and BED in the bivariate analysis, the multivariate logistic regression analysis demonstrates BED positive students having double the probability of becoming nicotine dependent compared to BED negative students. In the future, more investigations of specific types of eating disorders, including BED, in Saudi Arabia need to be considered; meta-analyses are required to solidify the association between BED and ND. The studies should also involve crucial factors such as family history (BED, BMI, past or current medications) and nicotine dependence of second-hand smoking.

Disclosure

The authors report no conflicts of interest in this work.

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