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Depression, Substance Use, and Demographic Correlates among University Students: A Cross-Sectional Study among Students in Higher Educational Institution

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Main Points

- Among 4059 students, it was found that those who smoke have a higher prevalence of depression (5.4%) than non-smokers (4.4%).
- As per the study results, it was found that males have higher levels of depression compared to females, and lack of pocket money plays an important role in students' depression.
- The study recommends the need for mental health programs to support students who are indulged in substance abuse.
- Students need counseling sessions to handle financial issues.

Abstract

Students studying in higher education institutions are in an important life stage. It is usually the time when many students face pressures, which may lead to substance use disorders and mental health issues. The study aimed to determine the relationship between alcohol consumption, smoking, tobacco use, and depression among university students. A cross-sectional survey was conducted among 4059 university students from multiple higher educational institutions, from June 2022 to January 2023. Data were collected through self-administered questionnaires, including the Patient Health Questionnaire-9 for assessing depression. Associations of substance use (alcohol, smoking, and tobacco) with depression were evaluated using logistic regression analysis, adjusting for demographic variables. The prevalence of depression in the study population was significantly associated with smoking and tobacco use. The odds for depression in smokers were 1.604, with a 95% CI of 1.163 – 2.213, and $p = .004$; and odds ratio of 1.106 with a 95% confidence interval of 0.721 – 1.696 for tobacco users, with $p = .643$. Alcohol consumption, at first, was associated with increased odds of depression among non-drinkers, with an odds ratio of 1.446 and a 95% confidence interval of 1.095 – 1.910 ($p = .008$); however, the association was adjusted for other variables with an odds ratio of 0.772 and $p = .080$. Besides, male students and those who received lower monthly pocket money were more likely to have depressive symptoms. Logistic regression analysis of the three variables of depression shows that gender, smoking, and financial status are predictors of depression. Pocket money is a strong predictor of it ($p < .001$). In this paper, we establish the relationship between substance use and depression in university students. In general, an increased level of depression was always associated with smoking and tobacco use, and the relation between alcohol consumption and depression showed interaction with other psychosocial variables. These results point to the need for targeted mental health interventions within the university setting, dealing with both substance use and depression.

Keywords: Depression, higher educational institution, substance use

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Introduction

Young adults are very susceptible to alcohol consumption, smoking, and tobacco use, which is known globally as one of the public health problems (Health, 2012). The unique lifestyle stage and exposure to various issues are especially the cause of engaging in these behaviors (Blanco et al., 2008). Students then enter university life, which is associated with increased independence, severe academic pressure, and several social changes that foster the initiation and habituation of these rational behaviors (Welsh et al., 2019).

Substance use increases morbidity and mortality among youth, including missed classes, sexual and physical assault, sexually transmitted diseases (STDs), and death. According to the Substance Abuse and Mental Health Services Administration, 30% of adolescents consume alcohol. One in 11 young adults binge drink, making alcohol is the most used substance (Bonsu et al., 2024). In India, it is suggested that the earlier the drinking habit begins, the higher the risk of being a heavy drinker in the future (Soundararajan et al., 2017).

Smoking is considered one of the major causes of premature death, naturally avoidable, with the burden still very significant among the student community, more so in low- and middle-income countries (*The Global Burden of Disease Study at 30 Years | Nature Medicine*, n.d.). While current public health efforts have made smoking relatively less prevalent in some places, it still remains a serious issue among young adults. Products like e-cigarettes have further muddled things. Most students continue to believe they are safer than cigarettes, even though strong evidence to the contrary is emerging on many fronts (Pokhrel et al., 2015).

Tobacco use is also widespread among some student populations, especially smokeless tobacco. This is often a cultural and geographic phenomenon. For example, in India, most youth get and consume smokeless tobacco products. This has serious health effects on the larger population, including a rise in the incidence of heart complications and oral cancers (Gupta & Ray, 2003).

Research concerning aspects of drug use and mental health has been quite extensive, especially in regard to depression. According to recent meta-analyses, between 30% and 50% of students at the college level may have depressive symptoms, hence rating it among the serious mental health problems in general among students at the college level (Ibrahim et al., 2013). One study reported that substance use may both relieve and worsen the depressive symptoms of an individual (Faris et al., 2023). The fact that the relationship goes both ways makes it even more difficult for treatment and prevention. For example, alcohol and nicotine might cause a person to feel depressed or calm down depending upon the amount used and sensitivity (Crocq, 2003).

Researchers have, however, found that substance use can sometimes be utilized to help an individual overcome or even magnify his or her states of depression (Brook et al., 2002). This two-way relationship has made treatment and prevention more difficult because of the complexities involved. Depending on how heavy the use and how sensitive one is to them (Hurley et al., 2012), alcohol and nicotine are capable of depressing a person and calming them down. For example, both alcohol and nicotine might either cause feeling of depression or calm one down, depending on the dosage used and individual sensitivity (Cui et al., 2024).

Demographic variables such as age, sex, socioeconomic status, and cultural background are very influential among others on drug use and its relation to mental health. For example, in terms of how far people use drugs and how rampant the cases of depression are, there exists a difference between men and women. Women tend to report more symptoms of depression and less drug use compared to males (Majcherek et al., 2022). Moreover, the probability of using drugs and the depth of its effect on mental health are affected by some socioeconomic factors, such as family income and level of education. This association between drugs and mental health has rising literature, but more regionally specific studies are still needed to account for dissimilar cultures and socioeconomic circumstances for students elsewhere in the world (Reiss et al., 2019).

As per qualitative research done, it was clear that humiliation and perception are related to the cause of mental health illness and that they have a major influence on decision-making (Jani et al., 2021). Many studies reported that problems like stigma and discrimination are the main reasons for accessing mental health services (Lahariya et al., 2010).

While the literature on drug use and mental health among college students is growing, there is still a need for more regionally specific studies to take into account dissimilar cultures and socioeconomic circumstances for students elsewhere in the world. There are not many recent psychiatric public health studies. Some research articles have problems in methodology or are concentrated on rural populations, use various tools for screening mental health issues, and it is often reported as low. The latest Global Burden of Disease (GBD) study evidenced that one of the greatest problems of mental health issues, such as depression and anxiety, is seen in the study area (Dinakaran et al., 2023).

The present study was undertaken to fill this research gap concerning the relationship between drug use and depression, as measured by Patient Health Questionnaire-9 (PHQ-9), in college students. There are only a few studies or systematic reviews to understand the prevalence of substance abuse in India. As substance abuse is known to be one of the important issues both nationally and internationally (Parmar et al., 2023), this study will explore the current trend in substance abuse usage. Besides, it looks into how demographic factors influence these relationships. This information can help in the design of more effective ways to improve the mental health of students. It is much easier to develop appropriate wellness programs and support services within the university setting if students understand these links, thus better aiding them in solving substance use and mental health problems.

Material and Methods

Sample Methods

It is a cross-sectional study conducted from January 2021 to March 2022. The population under study included university students enrolled in different undergraduate (UG) and postgraduate (PG) programs within multiple higher educational institutions. Five higher educational institutions allowed us to conduct the

survey. The probability proportional to size sampling method was adopted to increase the sample size, and a representative sample was achieved.

A total cumulative method within the Probability Proportionate Sampling (PPS) was used in selecting the study population. Then, simple random sampling was done to determine the required sample subjects in the chosen institutions. A sample size of 4059 students was surveyed for 2 years. In detail, approximately 380 questionnaires were returned incomplete or not filled at all, accounting for a non-response rate of 9.3%.

Inclusion criteria for this study are students above the age of 18 years, currently enrolled in UG and PG programs, able to read and understand English, and those who volunteer to participate by signing informed consent.

Data Collection

Data collection were carried out by giving the questionnaire in hard copy, along with a written consent form and an information sheet about the project. The "Basic student's information," "PHQ-9 Depression Scale," and a section on substance abuse were the three divisions in the questionnaire. An information sheet on the purpose and scope of the research was given to each subject before filling out the questionnaire.

The consent form was then provided to the participants to read and sign in agreement if they were willing to participate. No identifying information of the students was included in the questionnaire to ensure strict confidentiality. Information from only those who gave written consent was considered for this study.

Tools Used

Patient Health Questionnaire-9 Depression Scale was used to quantify the levels of depression among university students. Each item in the PHQ-9 asks the respondent to rate how often they have been bothered by specific problems for the past 2 weeks. Responses are scored on a 4-point Likert scale: 0 = not at all, 1 = several days, 2 = more than half the days, and 3 = nearly every day. Participants circled the number in each item that applied to their experience best.

All individual item scores from the response set given in a provided list were added to generate the total score for the PHQ-9. The total score can range from 0 to 27, with higher scores indicating more severe depressive symptoms. Interpretation of the total score is as follows: 0 – 4, minimal to no depression; 5 – 9, mild depression; 10 – 14, moderate depression; 15 – 19, moderately severe depression; and 20 – 27, severe depression (Kroenke et al., 2016). For the logistic regression, the PHQ-9 was made dichotomous, and those scores below 10 were considered to be normal, while those above 10 were said to be depressed (Manea et al., 2012).

Other variables such as age, sex, family, friends, and substance use (for example, alcohol, smoking, tobacco) were characterized.

Data Analysis

The data were entered and analyzed in Statistical Package for Social Sciences (SPSS) 17.0 (IBM SPSS Corp.; Armonk, NY, USA). More specifically, the independent group's *t*-test was conducted to test the difference in mean PHQ-9 score between the two groups, such as smokers vs. non-smokers and other substance use variables. A one-way analysis of variance (ANOVA) compared the mean PHQ-9 score across multiple groups, like substance use at various levels. Logistic regression analysis was undertaken to investigate demographic factors and substance use behavior with the likelihood of experiencing different levels of depression severity.

Ethics Committee Approval

Ethics committee approval was obtained from the SRM School of Public Health, Institutional Review Board. The research protocol was submitted on October 16, 2020 and went for a full review and after several discussions, the research was approved with protocol number PO/2020/10/02. Informed consent was obtained from the participants (students) before the questionnaire was administered. After written permission from the respondents, the questionnaire was administered.

Results

As high as 76.3% were in the age group 18 – 22 years, while the remaining 23.7% were in the age group of 23 – 26 years. About 67.1% were female, and 32.9% were male respondents. A significant proportion of participants were doing PG degrees, with 88.6% of the sample under PG, while only 11.4% were UG students. Nearly 69.2% of the participants reported a family income above 10,000 INR per month and 30.8% below 10,000 INR.

In response to monthly pocket money, 47.5% of participants mentioned that the pocket money was sufficient, while 36.6% found it inadequate; 15.9% had no pocket money at all. A large majority, 94.3%, never consume alcohol, while 5.7% reported that they do consume alcohol. Similarly, 95.2% of the respondents answered that they do not smoke, while 4.8% answered in the affirmative. Furthermore, nearly all respondents, 97.6%, did not use any tobacco, whereas 2.4% of them reported having consumed tobacco, as shown in Table 1.

Table 2 compares depression prevalence among tobacco, alcohol, and smoking users and their non-user counterparts using chi-square testing. These tests allowed us to investigate the relationship between drug use and depression due to categorical variables. The rates of depression were higher among smokers compared to non-smokers ($p < 0.05$). About 11.6% reported smoking, and females of 1.5%. As high as 4.6% of males reported consuming alcohol, as against 1.4% of females. Smoking was slightly more common in PG students at 5% than in UG students at 3.7%. About 5.9% of the PG students and 4.5% of the UG students consume alcohol. The prevalence of tobacco use was higher among PG students compared to UG students, with percentages of 2.5% vs. 1.5%, respectively.

About 5.4% of the age group 18 – 22 years and 3.1% of the age group 23 – 28 years used to smoke. The older group of 23 – 28 years consumed alcohol in 1.4% of cases compared with 7.1% in the 18 – 22 years group. About 3% in the 18 – 22 years and 0.5% in the 23 – 28 years category use tobacco. Smoking among participants with depression is 5.4%, compared to 4.4% among those without depression (4.4%). Tobacco use is seen in 2.2% of those with depression compared to 2.5% of those without depression.

For this, the odds of depression in male subjects were lower than those in their female counterparts; the unadjusted odds ratio

Table 1.
Demographic Characteristics of the Participants

Variables	Frequency	Percentage (%)
Age classification		
18 – 22 years	3098	76.3
23 – 26 years	961	23.7
Gender		
Male	1335	32.9
Female	2724	67.1
Degree		
UG degree	464	11.4
PG degree	3595	88.6
Family income INR		
Below 10,000	1252	30.8
Above 10,000	2807	69.2
Monthly pocket money	647	15.9
No pocket money	1486	36.6
Not sufficient	1926	47.5
Sufficient		
Alcohol		
No	3827	94.3
Yes	232	5.7
Smoking		
No	3863	95.2
Yes	196	4.8
Tobacco		
No	3962	97.6
Yes	97	2.4

Note: PG = postgraduate; UG = undergraduate.

(OR) was 0.840 with a 95% CI of 0.730 – 0.960, which was statistically significant with a *p*-value of .008. This OR increased to 1.098 for males after adjustment, but the result remained statistically insignificant with a *p*-value of .209.

In the unadjusted model, having sufficient pocket money had lower odds of depression compared with insufficient pocket money, with an OR of 0.790 and a 95% CI of 0.694 – 0.891, and it was statistically significant with $p < .001$. After adjustment, participants with sufficient pocket money had higher odds of depression with an OR of 1.318, and this result remained statistically significant at $p < .001$.

In contrast, participants who never consumed alcohol had increased odds of depression compared to participants who drank, with an unadjusted OR of 1.446 and 95% CI of 1.095 – 1.910, which was statistically significant with $p = .008$. When all variables were adjusted, the non-drinker OR became attenuated to 0.772, and the result approached but did not reach statistical significance with $p = .080$.

Compared to the group 18 – 22 years old, participants aged 23 to 28 had an odds ratio for depression of 1.556 with a 95% confidence interval of 1.345 – 1.800, statistically significant with $p < .001$. After adjustment, this OR reduced to 0.661 for the 23-to-28-year-old age group, and the result remained statistically significant with $p < .001$, as shown in Table 3.

Discussion

A recent systematic review from a sample of 20,165 samples showed the prevalence of usage of substance use such as alcohol and tobacco, to be 27.1% and 21.9%, respectively (Sahu et al., 2022). It is forecasted that tobacco-related mortality and morbidity will increase in the future. According to the National Family Health Survey-5, about 38% of men in the age group 15 – 49 consume tobacco (Singh et al., 2023). The study focuses on finding the prevalence of substance use such as alcohol, smoking, and tobacco use, among students studying in higher education institutions and also exploring the association between demographic factors and depression.

The study aimed to explore the association between demographic factors (gender, age, monthly pocket money, alcohol, smoking, and tobacco consumption) and depression among university students. The research was designed to ensure the confidentiality of the students, enhancing the accuracy of the findings obtained via their voluntary participation. The results of this study provide significant contributions to our understanding of the risk variables linked to depression within this specific demographic.

In our research, smoking and tobacco use were also very prevalent, where both variables had strong associations with depression. Smokers had higher odds of depression, and the association remained even upon adjustment for other variables. This is in line with the literature that identifies smoking not only as a serious risk for physical health but also for mental health. A meta-analysis in 2017 provided evidence of the positive association between smoking and depression (Fluharty et al., 2017). This might also indicate either the probability of nicotine dependence increasing the risk for depression or the likelihood of self-medication through smoking in depressed subjects (El-Sherbiny & Elsary, 2022).

Table 3 was based on the priority accorded to variables with the highest strength of association with depression, as found in the chi-square test, along with those commonly reported in the literature as significant predictors of mental health outcomes. Although we initially considered tobacco and cigarette use, as well as several demographic factors, some weak associations with depression relative to these variables in the present sample led to the eventual exclusion of these other factors. Besides, diagnostics underscored an overlap among some demographic variables and rationalized the exclusion of these variables for stabilizing the model. Given a strong sample size, we decided to focus on retaining variables with unique explanatory power, thus enriching the clarity and interpretability of the model without overfitting it.

The study also found that tobacco use, though less prevalent than smoking, was related to depression in our sample. Similar to smoking, this resilient relationship between tobacco use and depression after adjustment may suggest that tobacco use is a way by which students cope with stress and anxiety. Research supports this statement, indicating that a person who normally uses tobacco tends to experience a relatively higher occurrence of depressive symptoms. This probably results from the pharmacological impacts of nicotine and the social contexts in which tobacco is consumed (Luger et al., 2014).

Table 2.
Demographic Characteristics and Substance Use

S. No.	Variables	Character	Smoking		Alcohol		Tobacco	
1	Gender		Yes (%)	No (%)	Yes	No	Yes	No
		Male	155	1180	195	1140	81	1254
		%	11.60	88.40	14.60	85.40	6.10	93.90
		Female	41	2683	37	2687	16	2708
		%	1.50	98.50	1.40	98.60	0.60	99.40
2	Degree	UG	17	447	21	443	7	457
		%	3.70	96.30	4.50	95.50	1.50	98.50
		PG	179	3416	211	3384	90	3505
		%	−5	95	5.90	94.10	2.50	97.50
3	Age classification	18 – 22 years	166	2932	219	2879	93	3006
		%	5.40	94.60	7.10	92.90	3	97
		23 – 28 years	30	931	13	948	5	956
		%	3.10	96.90	1.40	98.60	0.50	99.50
4	Depression	Depression	92	1623	79	1636	38	1677
		%	5.40	94.60	4.60	95.40	2.20	97.80
		No depression	104	2240	153	2191	59	2285
		%	4.40	95.60	6.50	93.50	2.50	97.50

Note: PG = postgraduate; UG = undergraduate.

Surprisingly, our study showed non-drinkers have higher odds for depression compared with those who consume alcohol. This association changed after adjusting for other variables, like gender, age, and financial factors. The finding opened up the ever-growing debate on the role of alcohol in mental health. Excessive alcohol is generally recognized as a risk factor for depression (Obeid et al., 2020). Our adjusted model thus weakens further and might suggest that alcohol consumption is merely an indicator of broader social and coping mechanisms rather than a direct cause of depression. Consequently, though this may often be correlated with alcohol use and depression, the resultant relationship is influenced by a variety of social and psychological factors (Castillo-Carniglia et al., 2019).

In the unadjusted model, it is shown that giving higher pocket money decreases the risk of depression, but it is negatively associated with the adjusted model, possibly because students who could afford high pocket money may experience more social and academic pressures, as supported by Steare et al. (2023) and Jiménez-Solomon et al. (2022).

This study's findings strongly imply, as the previous studies did, new findings on the complex interplay of substance use and mental health among university students. A study cited the high prevalence of substance use, including alcohol and tobacco, among college students, noting that it significantly correlates with depression and other mental health issues (Auty et al., 2022). These results further underline the importance of considering several factors in understanding the relationship between substance use and depression, namely social environment, financial stress, and coping strategies (Romano et al., 2021). Behavior plays an important role in the coping mechanisms of other students with

Table 3.
Logistic Regression on Risk Factors for Depression

Variable	Category	Unadjusted OR (95% CI)	*p*	Adjusted OR (95% CI	*p*
Gender	Female	Reference	.008	Reference	.209
	Male	0.840 (0.730 – 0.960)		1.098	
Pocket money	In sufficient	Reference	.000	Reference	.000
	Sufficient	0.790 (0.694 – 0.891)		1.318	
Consuming alcohol	Yes	Reference	.008	Reference	.080
	No	1.446 (1.095 – 1.910)		0.772	
Age	18 – 22 years	Reference	.000	Reference	.000
	23 – 28 years	1.556 (1.345 – 1.800)		0.661	

Note: OR = odds ratio.

mental health issues. The statement was validated by several studies in the opposite direction between smoking, tobacco use, and depression (Farooqui et al., 2023).

Male participants had lower odds of depression than females, and this association also decreased after adjustment for other factors. This pattern is, in fact, consistent with the results of several previous studies showing the gender differences associated with depression, usually reporting a higher prevalence among females. A meta-analysis showed that women usually report more depressive symptoms than men, possibly due to a combination of biological, psychological, and social factors (Di Benedetto et al., 2024). However, these adjusted results in this study show that when controlled for variables such as age, financial situation, and substance use, this gender difference in depression might not be so prominent, stipulating their complex interaction (Schuler et al., 2015).

Students aged 23 – 28 years are more likely to have depression than the 18 – 22 year-age group. This is consistent with the literature because it supports that older students in higher institutions of learning, usually PG degree students, compile a lot of stressors that are specific to them, thus having their depression levels increase (Kwaah & Essilfie, 2017).

Students having enough pocket money per month reflected more adjusted odds of depression compared to their similar ones with insufficient pocket money. This finding may seem counterintuitive, but it aligns with other research indicating that financial comfort in life is not the same as being mentally healthy (Jiménez-Solomon et al., 2022). In other situations, students with more money could be under higher academic and social expectations and pressures, and hence, have higher levels of stress and depression (Steare et al., 2023). In addition, having disposable income increases the risk of engaging in risky behaviors, such as substance use, that can lead to an upsurge in mental health problems (Kalungi et al., 2023).

The current study indicator validates that about 40% of depression is expected more extensively than other studies of its kind, which established a high prevalence of depression among students due to conflicts stemming from distinct stressors. Consequently, university students face academic pressures, financial shortages, and social adjustments that raise their risks of developing depressive disorders compared with their non-student counterparts (Ibrahim et al., 2013).

Recent studies affirmed that Coronavirus disease 2019 (COVID-19) pandemic dynamics worsened mental health concerns, accompanied by isolation, school interruption, and uncertain finances that contributed to worsening depressive symptomatology in young adults (Zarowski et al., 2024).

In addition, based on certain socioeconomic and educational pressures on either side of a population, the use of substances as a mechanism for coping with stress creates a confounding bidirectional inclination toward depressive disorders (Auerbach et al., 2018). A combination of academic, social, and pandemic factors likely accounts for the observed higher-than-average rate of depression in the study (Farooqui et al., 2023).

Based on these results, interventions across different factors that promote depression in college students become important. Gender-differentiated interventions may become a necessity because depression has an impact across gender lines. Second, targeted mental health support may be of value to older students, especially when they are transitioning to more advanced stages of their education.

Data Availability Statement: The data that support the findings of this study are available on request from the corresponding author.

Ethics Committee Approval: This study was approved by the Institutional Ethics Committee from SRM Medical College and Research (approval number: PO/2020/10/02). Prior permission was obtained from the Higher Educational Institution for contacting students.

Informed Consent: Written informed consent was obtained from the patients who agreed to take part in the study.

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