Substance Use and Associated Factors Among Medical Students at the University of Gondar, Northwest Ethiopia

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Abstract

Background

The use of substances such as cigarettes, alcohol, and khat has become the rising major public health and socioeconomic problems and more exercised in higher education students. This study was aimed to assess the prevalence and associated factors of substance use among medical students at the University of Gondar, Ethiopia.

Method

A cross-sectional study was employed among medical students at the University of Gondar in the year 2020. All intern and above medical students were recurred and interviewed by using a self-administered questionnaire. Binary logistic regression was used to identify associated factors of current substance use at a p. value < 0.05 in the multivariable model to declare a significant dependent variable.

Results

Out of 277 responded to the interview 91 students (33%, 95% Confidence Interval (CI): 27, 38) were current substance users. Enjoyment (39%) was a major reason for starting substance use. Addiction (82%), liver injury (87%), and lung cancer (87%) were the primary mentioned health risks of khat, alcohol, and cigarettes, respectively. Students age (Adjusted Odds Ratio (AOR) =1.26, 95% CI: 1.03, 1.6), friend/s substance use history (AOR=6.09, 95% CI: 2.29, 16.2), and students with parents history of substance use (AOR=2.36, 95% CI: 1.14, 4.88) were factors significantly associated with the substance use.

Conclusion

One-third of medical students at the University of Gondar were current substance users. Students with increasing age and those who have proximity with peoples who use substances were the independent positively associated factors for substance use.

Introduction

Substance abuse is persistent or irregular or inconsistent use of substances with or without an acceptable therapeutic practice. In recent times substance use has increased greatly throughout the world. A particularly distressing circumstance is that the age of origination into substance use is gradually decreasing (1). Psychoactive constituents such as alcohol, khat, cigarette, and illicit drugs are substances when taken into the body have a main outcome on the brain and can change social, physical, and psychosomatic effects. Individuals relax by the emotional changes in mood and feelings sensed after using psychoactive ingredients. The use of psychoactive ingredients has made an integral part of human society for years but there were significant variances in the nature of substances used and the reasons for their use. The pattern of substance use involves the use of several substances, often with different pharmacological effects(2, 3).
Worldwide 48% (2 billion people) of the total adult individuals use these substances at least occasionally. Likewise, 33% (1.3 billion people) smoke tobacco and 5% of adults (200 million people) use illicit drugs. The pattern of substance use involves the use of multiple substances, often with different pharmacological effects (4). In Sub-Sahara Africa, substance use has intensely increased in recent years. The study done in Tanzania shows that a large percentage of the adults had used tobacco and alcohol over the past 30 days 38.8% and 33.7% respectively (5).

According to the Ethiopian Demographic and Health Survey, 2016 report 46% of men and 35% of women were reported drinking alcohol in their lives. Regarding cigarette smoking and any type of tobacco among women were less than 1%. But 4% of men smoke any type of tobacco (6). While, the prevalence of khat use was estimated at 15%, the highest 64.9% in the southwestern and the lowest 7.8% in the northern part of Ethiopia (7). In the Somalia, Hareri, Afar, and Oromia region khat chewing commonly practice in social activities (8).

Studies assessing the prevalence of increased substance use among medical students in the United States (US) suggest that as many as 58% of medical students may binge drink monthly (9), one in three medical students have used illicit drugs in the past year (10). Substance use typically begins during high school or college and that alcohol and marijuana are the most commonly misused substances (6). A study done in Turkey showed that, amongst the junior and senior medical students, the most common reason reported was drinking alcohol for pleasure, followed by social pressure, and to relax after a tiring day. The same study indicated 17.8 % of residents and 22.5 % of physicians used alcohol to relieve social distress.

Khat chewing, cigarette smoking, and alcohol consumption have also become common practices among high school, college, and university students in Ethiopia (2, 8, 10-12) A study conducted in Mekele University showed that majority of ever khat and cigarette users were continued to use khat (72%) and cigarette (67%) (5). Another study done at the University of Axum also indicated a lifetime prevalence of khat chewing was 28.7%, alcohol drinking 34.5%, and cigarette smoking 9.5%. One more study conducted in Debre Markos, found out the lifetime prevalence of substance used to be 14.1% (13). Similarly, a study done among college students in Gondar revealed a lifetime prevalence of cigarette smoking was 13.1% and 26.7% was chewing khat (12).

People start to use a substance for different reasons such as peer pressure and to have relaxed with peers, as a way to deal with stress and improve pain, parents use substances too, self-medication to deal with mental illness, loss of a loved one, teenage rebellion, to stay active, to activate the mind, to better perform some activities, etc (14). Medical intern and resident students use these substances for different causes including in advance, improving academic, personal pleasure, performance, relieving stress. Though, similar to other health science students, medical interns, and residents expected to fight against substance use and other problems associated with it in the community. Nevertheless, literature indicated that they may not be immune from substance use (15). Separately from other factors, extended staying in the university a maximum of six years, caring big accountability and stress may expose them to the
different substance use and worth to be the focus of a study (15). Substance abuse causes several devastating health, socio-economic, and environmental consequences. The use of alcohol, khat, and tobacco among young people can be harmful, leading to decreased academic performance, include injuries, work and social impairment, violence, cardiovascular disease, chronic diseases, increased risk of contracting HIV and other sexually transmitted diseases, or other psychiatric disorders such as depression, anxiety, and psychosis (16).

The causes of substance use are historically linked to health professionals due to their proximity to the drugs. Medical students are not exempt from the consequences of substance use (17-19). In addition, substance use by medical students highly affects the practice of medicine and patient’s safety because of their dependence on drugs (4, 20, 21). Currently, there is an evidence gap on substance use and associated factors among medical students at the University of Gondar. This study was aimed to assess the prevalence, associated factors, and determines the self-reported health consequences of substance use among medical students.

**Methods**

**Study design, period, and setting:**

A cross-sectional study was conducted among medical students in October 2020 at the University of Gondar. The University of Gondar is located in the northwest of Ethiopia which is 727 km far away from the capital city of Ethiopia (Addis Ababa). The university has the oldest medical school in the country. Currently, the college of medicine and health sciences of the University of Gondar trains thousands of medical and health science students. The medical school at the university has hundreds of students in the graduate class (interns) and different specialty programs.

**Study participants:**

In this study, we have used all interns and resident medical students at the University of Gondar in 2020.

**Variables of the study:**

The outcome variable for this study was current substance use; defined as participants who use one or more of the following substances alcohol, khat, cigarette, and illicit drugs in the past 30 days before the day of data collection. While those individuals who use the substance at least once in her/his life was considered as ever substance users. While students socio-demographic characteristics such as residence, sex, age, marital status and, financial support, peer pressure, parental modeling, coming from an area commonly used substance were considered as the explanatory variable.

**Data collection tool and procedure:**

The data was collected by using a structured self-administered questionnaire after developing from a review of existing literature. The questioner was pretested from fifth year medical students and improved
accordingly. Three data collectors were recruited from third-year medical students and well-trained to guide and clarify each question to the respondents. The collected data was checked its completeness upon receiving from the respondents.

**Data processing and analysis:**

The collected data were entered in to Epi-data 4.6.0.2 and exported to SPSS version 20 statistical software for cleaning, coding, recoding, and analysis. Descriptive analysis was executed and presented in text, frequency, percent, table, and graphs. Chi-square assumption for categorical variables was employed to assess the satisfaction of the assumptions. Model fitness was assessed by using the Hosmer-Lemeshow goodness of fit test. Then, bivariable binary logistic regression was run and those variables with p. value less than 0.2 were fitted in the multivariable binary logistic regression. And, those variables with a p. value of less than 0.05 with an adjusted odds ratio at 95% confidence interval in the multivariable model were declared as statistical significance independent variables associated with the current substance use.

**ETHICAL CLEARANCE**

The study was conducted after obtaining the ethical clearance letter from the ethical review committee of the School of Medicine, College of Medicine and Health Sciences, University of Gondar. Study participants were informed and personal identifiers like names were omitted and their response was kept in lock cabinet.

**Results**

**Socio-demographic characteristics:**

A total of 277 intern and resident medical students were found voluntary to respond in this study. Of these 186 (67.1%) were male. The majority of respondents were single (87.7%), urban dwellers (76.5%), and Orthodox Christian followers (71.8%). Similarly, 57% (158) of participants got financial support from their families. About thirty-two percent (91) participants had family head occupations employed by a governmental organization. The majority of respondents had family financial support (57%). About sixty-eight percent (191) of participants had friends who use a substance. Similarly, 129 (46.6%) respondents came from an area where the substance is commonly used and 60 (21.6%) participants came from families who had a history of substance use (Table 1).
Table 1
Socio-demographic characteristics of medical student (N = 277) at the University of Gondar, 2020.

| Variables                | Categories      | Current substance use |
|--------------------------|-----------------|-----------------------|
|                          |                 | Total (%)  | Yes (%)  | No (%)  |
| Sex                      | Male            | 186(67%)  | 69(25%)  | 117(42%)|
|                          | Female          | 91(33%)   | 22(8%)   | 69(25%) |
| Marital status           | Single          | 243(87%)  | 76(27%)  | 167(60%)|
|                          | Divorced        | 692%      | 4(1%)    | 2(1%)   |
|                          | Widowed         | 4(1%)     | 0        | 4(1%)   |
|                          | Separated       | 3(0.6%)   | 2(0.4%)  | 1(0.2%) |
|                          | Married         | 21(7%)    | 9(3%)    | 12(4%)  |
| Residency                | Urban           | 212(77%)  | 75(28%)  | 137(49%)|
|                          | Rural           | 65(23%)   | 16(6%)   | 49(18%) |
| Regional state           | Tigray          | 18(7%)    | 7(3%)    | 11(4%)  |
|                          | Afar            | 4(1%)     | 1(0.4%)  | 3(0.6%) |
|                          | Amhara          | 107(39%)  | 29911%   | 78(28%) |
|                          | Oromia          | 26(9%)    | 10(3%)   | 16(6%)  |
|                          | SNNP            | 15(5%)    | 7(25)    | 8(3%)   |
|                          | Addis Ababa     | 100(36%)  | 34(12%)  | 66(24%) |
| Family head occupation   | Government employed | 91(33%)  | 32(12%)  | 59(21%) |
|                          | Own private business | 86(31%)  | 34(12%)  | 52(19%) |
|                          | Private employed | 35(13%)   | 13(5%)   | 22(8%)  |
|                          | Farmer          | 45(16%)   | 8(3%)    | 37(13%) |
|                          | House wife      | 30(11%)   | 14(5%)   | 16(6%)  |
| Specialization           | Internal medicine | 82(30%)  | 17(6%)   | 65(23%) |
|                          | Surgery         | 59(21%)   | 19(7%)   | 40(14%) |
|                          | Gynecology-obstetric | 24(9%)   | 10(4%)   | 14(5%)  |
| Educational status     | Pediatrics | Other | Other |
|------------------------|------------|-------|-------|
| Intern                 | 210(76%)   | 64(23%) | 146(53%) |
| R1                     | 35(13%)    | 11(4%)  | 24(9%)  |
| R2                     | 30(11%)    | 14(5%)  | 16(6%)  |
| Family financial support|            |       |       |
| Yes                    | 158(57%)   | 49(18%) | 109(39%) |
| No                     | 119(43%)   | 42(15%) | 77(28%)  |
| Having a friend who uses a substance | | | |
| Yes                    | 191(69%)   | 85(31%) | 106(38%) |
| No                     | 86(31%)    | 6(2%)   | 80(29%)  |
| Coming from an area where a substance is commonly used | | | |
| Yes                    | 129(46%)   | 65(23.4%) | 64(22.6%) |
| No                     | 148(53%)   | 26(9%)  | 122(44%) |
| Coming from substance use families (parent modeling) | | | |
| Yes                    | 60(22%)    | 36(13%) | 24(9%)  |
| No                     | 217(78%)   | 55(20%) | 162(80%) |

Perceived health risk and reasons for substance use:

Of all the study participants more than half (52.7%) and nearly one-tenth perceive the harmfulness and beneficiary of substance use, respectively. The rest 146 (38%) was neutral. Addiction 226 (82%), liver injury 241 (87%), and lung cancer 241 (87%) were the primary health risk of khat chewing, alcohol taking, and cigarette smoking, respectively (Table 2).
Table 2
Perceived health risk of substance abuse among medical students at the University of Gondar, 2020.

| Health risk of khat taking                  | Frequency (%) |
|--------------------------------------------|---------------|
| Addiction                                  | Yes 226(82%)  |
| Decrease sexual satisfaction                | Yes 100(36%)  |
| Cancer                                     | Yes 67(24%)   |
| STD                                        | Yes 77(28%)   |
| Stroke                                     | Yes 5(2%)     |

| Health risk of alcohol taking               | Frequency (%) |
|--------------------------------------------|---------------|
| Liver injury                               | Yes 241(87%)  |
| Sexual impotency                           | Yes 119(43%)  |
| Loss of family                             | Yes 131(47%)  |
| Increase CVD                               | Yes 171(62%)  |
| Decrease academic performance              | Yes 153(55%)  |
| STD                                        | Yes 113(41%)  |

| Health risk of cigarette smoking           | Frequency (%) |
|--------------------------------------------|---------------|
| Lung cancer                                | Yes 241(87%)  |
| Cardiovascular disease                     | Yes 204(74%)  |

STD = Sexually transmitted disease, CVD = Cardiovascular disease

Among total study participants, intention to get good work/academic performance (42), in order of preference, need of personal pleasure (30), and stay excite (19) held reasons to get start khat chewing. Besides, the reasons for cigarette smoking were the need for personal pleasure (32), to get relief of tension (15), and to stay awake (14) got the highest preferences. Likewise, among alcohol users need for personal pleasure (76), the need of getting tension-free (40), and peer pressure were strong precipitators for starting it. Personal pleasure was a common precipitator for both cigarette smoking and alcohol use (Fig. 1).

**Prevalence of Substance Abuse:**

The overall prevalence of current substance abuse was 33% (95% CI: 27, 38). It was more prevalent in males 37% (95% CI: 30, 44) than female 24% (95% CI: 30, 44). It was also higher in students who came from parents with substance use (60%, 95% CI: 47, 73). In addition to, the prevalence of substance abuse in urban residents and those who had substance user friend/s were 35% (95% CI: 29, 42) and 45% (95%
CI: 37, 52) respectively. Likewise, the prevalence of substance use among respondents who come from an area where a substance is commonly used was 50% (95% CI: 42, 59). The prevalence of ever substance users was 40% (95% CI: ). From both ever and current substance users alcohol and khat were predominantly abused types of substance and illicit drug use was also reported in both current and ever substance users (Table 3).

| Substance types | Ever substance use (n = 110) | Current substance use(n = 103) |
|----------------|-------------------------------|-------------------------------|
|                | Yes | No    | Yes   | No    |
| Alcohol        | 103(37%) | 174(63%) | 79(28%) | 198(72%) |
| Cigarette      | 40(14%)  | 237(86%) | 38(14%)  | 239(865) |
| Khat           | 56(20%)   | 221(80%) | 51(18%)   | 222(82%) |
| Illicit drugs  | 14(5%)    | 263(95%) | 10(4%)    | 267(96%) |

Among the total current substance users, 31 (30.1%) of them were alcohol-only users and 19 (18.4%) of them were a combination of alcohol, cigarette, and khat users. Besides, from lifetime substance users, 48 of them were alcohol-only users and 23 were a combination of alcohol, khat, and cigarette users (Fig. 2).

**Factors associated with current substance use:**

Students sex, age, ethnicity, residency, family head occupation, educational status, specialization, family financial support, substance user friend/s, parent modeling of substance use, and coming from an area where a substance is commonly used were independent variables that fulfilled the chi-square assumption and fitted with bi-variable binary logistic regression analysis. In the bi-variable binary logistic regression analysis, students sex, age, religion, residency, family head occupation, having a friend who uses a substance, coming from an area where a substance is commonly used, and history of family substance use had a p-value of ≤ 0.2 and fitted in the multivariable binary logistic regression analysis. In multivariable logistic regression analysis backward LR selection method was used. Among the independent variables fitted to multivariable binary logistic regression analysis: Age, friend/s substance use history, parent's substance use modeling, and coming from an area where a substance is commonly used have a significant association with current substance use at a p-value of < 0.05.

As age increases by one year, current substance use increases by twenty-nine percent (AOR = 1.29, 95% CI: 1.04, 1.59). Those students who have a history of substance user friend/s are about six times at more substance abuse than counterparts (AOR = 6.02, 95% CI: 2.39, 15.3). Students who were originated from a substance that was commonly used had two times more likely to use the substance (OR = 2.09, 95% CI: 1.09, 3.99). In addition, those students who came from parents with a history of substance use are
approximately 2.17 times at more substance abuse than those who come from non-substance user families (AOR = 2.17, 95% CI: 1.09, 4.31) (Table 4).

**Table 4**
Bivariable and multivariate binary logistic regression analysis of factors associated with current substance use among medical students at the University of Gondar, 2020.

| Variables                      | Category                      | Current substance use | COR (95%CI)  | AOR (95%CI) |
|-------------------------------|-------------------------------|-----------------------|--------------|-------------|
|                               |                               | Yes                   | 1.36(1.13,1.64) | 1.29(1.04,1.59)* |
| **Age in years**               | Median (IQR)                  | No                    |              |             |
|                               |                               | Yes                   | 10.69(4.45,25.7) | 6.02(2.38,15.3)* |
|                               |                               | No                    | 1            | 1           |
| **Having a friend who uses substance** | yes                           | 85                    |              |             |
|                               |                               | No                    | 6            | 80          |
|                               |                               | Yes                   | 4.77(2.76,8.23) | 2.09(1.09,3.99)* |
|                               |                               | No                    | 26           | 122         |
| **Originate substance is commonly used** | Yes                           | 65                    |              |             |
|                               |                               | No                    | 26           | 122         |
| **Parent modeling**           | Yes                           | 36                    |              |             |
|                               |                               | No                    | 55           | 162         |

Hosmer-Lemeshow goodness of fit test (p. value = 0.744)

**Discussion**

In this study, the prevalence of current substance use was 33% which is similar to the study conducted at Jimma University (22) and Hawassa University (23). But lower than the study done in Axum University and Jimma University which was found to be 44.8% respectively (17) and 72% (15). This variation may be due to differences in study participants characteristics, the college environment and differences in study methodology and period. The prevalence of this study was lower than the study done at Jimma University. The variations observed among these studies may be attributed to the difference in study geography, socio-economic, cultural, and accessibility setting (15).

Concerning the respective types of substances used by the respondents, 28% (79) used alcohol, 18% (51) khat, and 14% (38) had used cigarette while a study done in Haramaya University Showed that alcohol (28%) and khat (20%) utilization pattern were similar to the current study. In this study, the consumption of cigarettes was lower than two other studies done at Haramaya and Jimma University (24, 25). This may be due to the social relationship of both Haramaya and Jimma is strong compared to Gondar which will effect in higher peer influence to get start substance abuse. The study conducted in central India indicated that about 81% of students were cigarette smokers and around 60% of students were also alcohol consumers which were higher than findings of current study this difference may present due to
sample size and family backgrounds differences of respondents as well as variation of study year (26). Current substance users among urban residency were comparable with the study done at Haramaya University (25). In the current study, students who come from urban areas were more substance users than rural areas. This result was consistent with a similar study performed in Kenya (27). This difference would be explained by different characteristics of the urban community, such as population density, built-up business organization, and higher access to substances location.

Enjoyment (39%) was a major reason for starting substance use which is consistent with the study done in central Ethiopia and the prevalence of alcohol taking, khat chewing, and cigarette smoking was higher than the study done at Debre berhan undergraduate students (28). This difference may be because the study participants at Debre berhan were at all students level but in the current study setting medical students were the only respondents all may be passing through learning and social stress due to extended class schedule and lower than the study conducted at American medical students (91%) (29). Under this study, age was an associated factor for substance use which is inconsistent with the study conducted at Jimma University medical interns (15). This inconsistency may be due to study area setting differences resulting in environmental and family background variation. In other studies age was found a significantly associated with substance use (30). In addition, family history of substance use had association with current substance use which is also found a predictor by two other studies (15, 31). Respondents coming from an area where substance is commonly used were found an associated factors for substance use which is similar to other studies conducted at Jimma University medical interns (15, 32). Under this study, having a friend who uses a substance is significantly associated (p < 0.05) with current substance use which is supported by other two studies conducted in Jimma (15, 32). Moreover, the study conducted among at north Shewa high school adolescent students indicated that friend substance use experience had an effect on starting substance (30). Overall, this study revealed that substance abuse was found common among intern and resident medical students at the University of Gondar. The magnitude of this prevalence was comparably similar to other studies. Age, friend/s substance use history, parents’ substance use modeling, and coming from an area where a substance is commonly used were significantly associated with current substance use. So that, substance use is in favor of a multiplicity of precipitators and there may not be a single intervention.

The study was done in one institution so results may not be generalizable to all medical Institutes. This study couldn't rule out differences in students’ actual perceptions and how they have answered the questionnaire. Self-reported use of substances may lead to a low report and underestimate of current substance use pattern.

**Abbreviations**

CI (Confidence-interval), AOR (adjusted odds ratio), COR (crude odds ratio), R (Resident).

**Declarations**
Publication consent: None applicable

Data Availability: the data is available from the lead author with a reasonable request.

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Authors’ contribution: Conceptualize: YSA, GSC, and GMK, Data analysis: YSA, GSC, and GMK, Manuscript writing: YSA, GSC, GMK, ABW, and BSS, revised the manuscript: ABW and BSS, all the authors were edit and approved the final manuscript.

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**Figures**
Figure 1

Precipitators for starting substance use among medical students at the University of Gondar, Northwest Ethiopia
Figure 2

Frequency of current and ever substance use (stratified by each substances) among university of Gondar intern and above medical students, Northwest Ethiopia, 2020