ISSN: 2320-7159
IJMR
INTERNATIONAL JOURNAL OF MEDICAL RESEARCH

*ORIGINAL RESEARCH ARTICLE*

# An In-Depth Investigation into the Co-Occurrence of Substance Use in Individuals with Alcohol Use Disorder and its Association with Sociodemographic Factors

**Utkarsh Dubey[1*], Prakash Chandra[2], Akhil Dhanda[3]**

[1,2,3]Department of Psychiatry, Saraswathi Institute of Medical Sciences, Hapur, India

*Dr Utkarsh Dubey (Email: drutkarshdubeymd@gmail.com)

**DOI:** https://doi.org/10.55489/ijmr.1120242

OPEN ACCESS

**Citation:** Dubey U, Chandra P, Dhanda A. An In-Depth Investigation into the Co-Occurrence of Substance Use in Individuals with Alcohol Use Disorder and its Association with Sociodemographic Factors. Intl J Med Res 2024;12(3):47-56. DOI: 10.55489/ijmr.1120242

**Received:** May 05, 2024
**Accepted:** June 20, 2024
**Published:** July 01, 2024

**Copyright:** The Authors retain the copyrights of this article, with first publication rights granted to Medsci Publications.

**Open Access Statement:** This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-Share Alike (CC BY-SA) 4.0 License, which allows others to remix, adapt, and build upon the work commercially, as long as appropriate credit is given, and the new creations are licensed under the identical terms.

**Funding:** Non-Declared.

**Conflict of interests:** The authors have declared that no conflict of interests exists.

**Publisher:** Medsci Publications, India

## ABSTRACT

**Background:** Alcohol Use Disorder (AUD) presents a significant global public health challenge, often accompanied by comorbid substance use, complicating treatment. Understanding the prevalence, patterns, and sociodemographic correlates of dual substance use is crucial for effective intervention.

**Method:** This cross-sectional study examined substance use co-occurrence among individuals diagnosed with AUD. Recruitment occurred through addiction treatment centers and psychiatry outpatient departments. Structured interviews, DSM-5 assessments, and sociodemographic questionnaires were conducted. Statistical analyses explored associations between substance use and sociodemographic factors.

**Result:** Tobacco and cannabis showed significant associations with AUD, while opioids, cocaine, and benzodiazepine use exhibited elevated but non-significant associations. Notably, tobacco and benzodiazepine use correlated positively with AUD, indicating potential co-occurrence. Similarly, cannabis and opioids displayed a positive correlation.

**Conclusion:** The study underscores the importance of addressing comorbid substance use in AUD treatment. Findings suggest robust associations between tobacco, cannabis, and AUD, indicating potential co-use patterns. Sociodemographic factors like age, gender, and marital status also influence substance use behaviors, emphasizing the need for tailored interventions.

**Keywords:** Alcohol Use Disorder, Substance Use, Comorbidity, Socio-demographic Factors, Dual Substance Use

## INTRODUCTION

Alcohol use disorder (AUD) is a chronic and relapsing psychiatric condition characterized by excessive and compulsive alcohol consumption, leading to significant impairment in social, occupational, and psychological functioning.[1] Globally, AUD poses a substantial public health burden, contributing to numerous adverse outcomes including liver disease, cardiovascular disorders, accidents, violence, and mental health comorbidities.[2] Moreover, individuals with AUD frequently exhibit comorbid substance use, which further complicates treatment and management strategies.[3]

Alcohol use disorder (AUD) represents a significant public health concern worldwide, characterized by compulsive alcohol consumption leading to detrimental consequences across physical, psychological, and social domains. While substantial efforts have been dedicated to understanding and addressing AUD, the presence of comorbid substance use among individuals with this disorder presents a complex and challenging aspect of clinical management. Comorbid substance use, involving the concurrent misuse or dependence on multiple psychoactive substances alongside alcohol consumption, is known to exacerbate the severity of AUD and hinder treatment outcomes.

Comorbid substance use refers to the concurrent misuse or dependence on multiple psychoactive substances, such as nicotine, cannabis, opioids, or stimulants, alongside alcohol consumption.[4] The presence of dual substance use has been associated with heightened disease severity, increased risk of medical complications, elevated rates of psychiatric comorbidity, and poorer treatment outcomes compared to individuals with AUD alone. [5,6]

Despite the recognized impact of comorbid substance use on individuals with AUD, there remains a critical need for a comprehensive understanding of this phenomenon. Specifically, there is a dearth of research examining the prevalence and patterns of comorbid substance use within the context of AUD, as well as the influence of sociodemographic factors on dual substance use behaviors. Addressing these knowledge gaps is imperative for several reasons.

Firstly, gaining insight into the prevalence and types of substances commonly co-used with alcohol among individuals with AUD is essential for designing effective treatment strategies. Understanding which substances are frequently involved in comorbidity can inform targeted screening, assessment, and intervention efforts aimed at addressing the specific needs of this population.

Secondly, exploring the association between sociodemographic characteristics and comorbid substance use can provide valuable insights into the diverse factors influencing dual substance use behaviors. Factors such as age, gender, socioeconomic status, and geographic location may play a significant role in shaping patterns of substance use among individuals with AUD, yet their precise impact remains poorly understood.

Furthermore, elucidating the relationship between sociodemographic factors and comorbid substance use can contribute to the development of tailored prevention and intervention approaches that address the unique needs and vulnerabilities of different subgroups within the population of individuals with AUD.

In light of these, this study aims to conduct a comprehensive examination of comorbid substance use among patients with AUD, with a particular focus on elucidating the prevalence, patterns, and sociodemographic correlates of dual substance use. By addressing these research questions, we seek to advance our understanding of the complexities surrounding comorbid substance use in individuals with AUD and inform the development of more effective strategies for prevention, intervention, and treatment.

## MATERIALS AND METHODS

The study employs a cross-sectional design to investigate the co-occurrence of substance use among individuals diagnosed with Alcohol Use Disorder (AUD) and its association with various sociodemographic factors. Recruitment is conducted through convenience sampling from addiction treatment centres, and the outpatient department of psychiatry at SIMS, Hapur. Participants meeting inclusion criteria, including being aged 18 years

and above and having h/o alcohol use at least since the past 1 year, undergo face-to-face structured interviews conducted by trained research staff. Data collection includes assessments using substance use disorders section of the Structured Clinical Interview for DSM-5 (SCID) to diagnose AUD,[7] along with sociodemographic questionnaires and clinical record reviews. Descriptive and inferential statistical analyses, including bivariate and multivariate analyses, are employed to explore associations between substance use co-occurrence and sociodemographic factors while controlling for potential confounders. Ethical considerations, such as obtaining Institutional Review Board (IRB) approval, informed consent, and ensuring participant confidentiality, are carefully adhered to throughout the study. Limitations of the study, including its cross-sectional nature and potential biases in self-report measures, are acknowledged, along with efforts to securely manage and protect participant data in accordance with relevant regulations.

## RESULTS

The table 1 presents sociodemographic characteristics of participants categorized by their pattern of alcohol use, distinguishing between those with AUD and those who use alcohol but are not dependent.

Comparing the age of participants between the two groups, the mean age was slightly higher in the AUD group (45.3 years) compared to the non-dependent group (43.2 years), although this difference was not statistically significant (p = 0.25). In terms of gender distribution, there was a notable difference in the proportion of females between the two groups, with 28.2% of the AUD group being female compared to 17.5% in the non-dependent group. The odds ratio for females developing AUD compared to males was 1.8 (95% CI: 0.7-4.9), indicating a trend towards higher risk for AUD among females, although this was not statistically significant (p = 0.21). Regarding marital status, there were significant differences observed. A larger proportion of participants in the AUD group were separated or widowed (15.4%) compared to the non-dependent group (3.5%). The odds of being separated or widowed versus being married were notably higher in the AUD group with an odds ratio of 5.12 (95% CI: 0.9-26.9), although the p-value was marginally significant (p = 0.1). Further, the table explores factors like family history of substance use and substance use co-occurrence, revealing significant associations with alcohol dependence.

**Table 1: Sociodemographic Characteristics of Participants with alcohol use pattern.**

| Pattern of Alcohol use | AUD | Use | Odds ratio | p value |
|---|---|---|---|---|
| **Agee** | **45.3±9** | **43.2±8.7** | - | 0.25 |
| **Gender** | | | | 0.21 |
| Female | 11 (28.2%) | 10 (17.5%) | 1.8 (0.7-4.9) | |
| Male | 28 (71.8%) | 47 (82.5%) | - | |
| **Marital Status** | | | | 0.1 |
| Married | 31 (79.5%) | 53 (93.0%) | - | |
| Separated/Widow | 6 (15.4%) | 2 (3.5%) | 5.12 (.9-26.9) | |
| Unmarried | 2 (5.1%) | 2 (3.5%) | 1.71 (0.22-12.7) | |
| **Type of Family** | | | | 0.27 |
| Extended | 16 (41.0%) | 15 (26.3%) | - | |
| Joint | 12 (30.8%) | 19 (33.3%) | 0.59 (0.21-.6) | |
| Nuclear | 11 (28.2%) | 23 (40.4%) | 0.45 (0.16-12) | |
| **Education** | | | | 0.78 |
| Graduate and above | 17 (43.6%) | 22 (38.6%) | - | |
| Higher-secondary | 10 (25.6%) | 12 (21.1%) | 1.08 (0.3-3) | |
| Under Matric | 6 (15.4%) | 13 (22.8%) | 0.59 (0.18-1.8) | |
| Illiterate | 6 (15.4%) | 10 (17.5%) | 0.77 (0.23-2.5) | |
| **Employment status** | | | | 0.62 |
| Employed | 22 (56.4%) | 35 (61.4%) | - | |
| Unemployed | 17 (43.6%) | 22 (38.6%) | 0.8 (0.35-.8) | |
| **Family H/O Substance use** | | | | 0.002* |
| Absent | 10 (25.6%) | 33 (57.9%) | - | |
| Present | 29 (74.4%) | 24 (42.1%) | 3.99* (1.6-9.7) | |
| **Substance use co-occurrence** | | | | <0.001* |
| Absent | 1 (2.6%) | 35 (61.4%) | - | |
| Present | 38 (97.4%) | 22 (38.6%) | 60.45* (7.7-472.4) | |

**Table 2: Association of socio-demographic profile with Co-Occurrence of Substance Use among Individuals with Alcohol Use Disorder**

| Sociodemographic Factor | Substance Use Co-Occurrence | | Odds ratio | p value |
|---|---|---|---|---|
| | Present | Absent | | |
| **Age** | 44.8+-9.1 | 42.9+-8.4 | - | 0.3 |
| **Gender** | | | | |
| Female | 14 (23.3%) | 7 (19.4%) | 1.2 (0.4-3.4) | 0.65 |
| Male | 46 (76.7%) | 29 (80.6%) | - | |
| **Marital Status** | | | | |
| Married | 51 (85.0%) | 33 (91.7%) | - | |
| Separated/Widow | 7 (11.7%) | 1 (2.8%) | 4.5 (0.5-38) | 0.16 |
| Unmarried | 2 (3.3%) | 2 (5.6%) | 0.6 (0.08-4.8) | 0.67 |
| **Type of Family** | | | | |
| Extended | 23 (38.3%) | 8 (22.2%) | - | |
| Joint | 19 (31.7%) | 12 (33.3%) | 0.5 (0.18-1.6) | 0.28 |
| Nuclear | 18 (30.0%) | 16 (44.4%) | 0.39 (.13-1.1) | 0.08 |
| **Education** | | | | |
| Graduate and above | 24 (40.0%) | 15 (41.7%) | - | |
| Higher-secondary | 14 (23.3%) | 8 (22.2%) | 1 (0.3-3.2) | 0.8 |
| Under Matric | 11 (18.3%) | 8 (22.2%) | 1.3 (0.3-4.7) | 0.6 |
| Illiterate | 11 (18.3%) | 5 (13.9%) | 0.8 (0.2-2.6) | 0.8 |
| **Employment status** | | | | |
| Employed | 34 (56.7%) | 23 (63.9%) | - | |
| Unemployed | 26 (43.3%) | 13 (36.1%) | 0.74 (0.3-1.7) | 0.48 |
| **Family H/O Substance use** | | | | |
| Present | 47 (78.3%) | 6 (16.7%) | 18 (6.1-52.7) | <0.001* |
| Absent | 13 (21.7%) | 30 (83.3%) | - | |

**Table 3: Co-Occurrence of Substance Use among Individuals with Alcohol Use Disorder**

| Pattern of Alcohol use | Dependence | Use | Odds ratio | p value |
|---|---|---|---|---|
| **Tobacco** | | | | <0.001* |
| Present | 36 (92.3%) | 18 (31.6%) | 26 (7-95.7) | |
| Absent | 3 (7.7%) | 39 (68.4%) | - | |
| **Cannabis** | | | | 0.002* |
| Present | 11 (28.2%) | 3 (5.3%) | 7 (1.8-27.4) | |
| Absent | 28 (71.8%) | 54 (94.7%) | - | |
| **Opioids** | | | | 0.15 |
| Present | 3 (7.7%) | 1 (1.8%) | 4.7 (0.46-46) | |
| Absent | 36 (92.3%) | 56 (98.2%) | - | |
| **Cocaine** | | | | 0.18 |
| Present | 4 (10.3%) | 2 (3.5%) | 3.1 (0.5-18) | |
| Absent | 36 (89.7%) | 55 (96.5%) | - | |
| **Benzodiazepine** | | | | 0.85 |
| Present | 5 (12.8%) | 2 (3.5%) | 4 (0.7-22) | |
| Absent | 34 (87.2%) | 55 (96.5%) | - | |

For instance, the presence of a family history of substance use was significantly associated with AUD (p = 0.002), with an odds ratio of 3.99 (95% CI: 1.6-9.7). Similarly, substance use co-occurrence was strongly associated with AUD (p < 0.001), with an odds ratio of 60.45 (95% CI: 7.7-472.4), indicating a substantially elevated risk of AUD among those who also use other substances.

Table 2 presents the association of socio-demographic factors with the co-occurrence of substance use among individuals diagnosed with alcohol use disorder.

Firstly, regarding age, the mean age for individuals with substance use co-occurrence is 44.8 years compared to 42.9 years for those without, showing a slight but statistically insignificant difference (p = 0.3). When considering gender, among those with co-occurring substance use, 23.3% are female and 76.7% are male, while among those without, 19.4% are female and 80.6% are male. However, the odds ratio for gender suggests no significant association with substance use co-occurrence (OR = 1.2, 95% CI: 0.4-3.4, p = 0.65). Marital status indicates some trends. For instance, among married individuals, 85.0% have substance use co-occurrence compared to 91.7% of those without. Conversely, only 11.7% of separated/widowed individuals have substance use co-occurrence compared to 2.8% without. However, these differences do not reach

statistical significance except for the separated/widowed group, which has an odds ratio of 4.5 (95% CI: 0.5-38, p = 0.16). Regarding the type of family, while there seem to be differences in the percentages between the co-occurring and non-co-occurring groups, these differences are not statistically significant except for the nuclear family type, where the odds ratio is 0.39 (95% CI: 0.13-1.1, p = 0.08). In terms of education and employment status, no significant associations with substance use co-occurrence are observed. However, family history of substance use shows a strong association. Among those with substance use co-occurrence, 78.3% have a family history of substance use, while only 16.7% of those without co-occurrence have such history. The odds ratio for family history of substance use is 18 (95% CI: 6.1-52.7, p < 0.001), indicating a significant association with substance use co-occurrence.

Table 3 presents the co-occurrence of substance use among individuals with Alcohol Use Disorder (AUD), distinguishing between those with dependence and those with use patterns.

Tobacco use exhibited a significant association with AUD, with a substantial proportion of individuals with AUD also reporting tobacco use (92.3%) compared to those without AUD (7.7%). The odds of tobacco use among individuals with AUD were notably higher compared to those without AUD (Odds Ratio = 26, p < 0.001*). Similarly, cannabis use showed a significant association with AUD, with a higher prevalence among individuals with AUD (28.2%) compared to those without AUD (5.3%). The odds of cannabis use among individuals with AUD were significantly elevated (Odds Ratio = 7, p = 0.002*). However, the association between AUD and opioid use did not reach statistical significance (p = 0.15). While there was a slight elevation in opioid use among individuals with AUD (7.7%) compared to those without AUD (1.8%), the odds ratio was not substantial (Odds Ratio = 4.7). The same trend was observed for cocaine and benzodiazepine use, where there were higher proportions of use among individuals with AUD compared to those without AUD, but the associations did not reach statistical significance (p = 0.18 for cocaine and p = 0.85 for benzodiazepine). Overall, the findings suggest a strong association between tobacco and cannabis use with AUD, indicating potential co-occurrence of these substances.

**Table 4: Multinomial logistic regression for substance uses pattern of alcohol with other substance**

| Pattern of Alcohol use | Dependence | Use | Odds ratio | p value |
|---|---|---|---|---|
| **Pattern of tobacco use** | | | | |
| Absent | 3 (7.7%) | 39 (68.4%) | - | |
| Dependence | 14 (35.9%) | 6 (10.5%) | 30.3 (6.6-137.9) | <0.001* |
| Use | 22 (56.4%) | 12 (21.1%) | 23.8 (6-93.6) | <0.001* |
| **Pattern of Cannabis use** | | | | |
| Absent | 28 (71.8%) | 54 (94.7%) | | |
| Dependence | 5 (12.8%) | 1 (1.8%) | 9.6 (1-86.5) | 0.043* |
| Use | 6 (15.4%) | 2 (3.5%) | 5.7 (1-30.5) | 0.039* |
| **Pattern of Opioids use** | | | | |
| Absent | 36 (92.3%) | 56 (98.2%) | - | |
| Dependence | 2 (5.1%) | | | |
| Use | 1 (2.6%) | 1 (1.8%) | 1.6 (0.09-25.6) | 0.76 |
| **Pattern of Cocaine use** | | | | |
| Absent | 35 (89.7%) | 55 (96.5%) | - | |
| Dependence | 1 (2.6%) | 1 (1.8%) | 1.6 (0.09-25.6) | 0.75 |
| Use | 3 (7.7%) | 1 (1.8%) | 4.7 (0.47-47) | 0.18 |
| **Pattern of Benzodiazepine use** | | | | |
| Absent | 34 (87.2%) | 55 (96.5%) | - | |
| Dependence | 3 (7.7%) | | | |
| Use | 2 (5.1%) | 2 (3.5%) | 1.6 (0.2-12) | 0.64 |

**Table 5: Advanced Statistics: Correlation Matrix for Substance Use Co-Occurrence**

| Person correlation | Tobacco | Cannabis | Opioids | Cocaine | Benzodiazepine |
|---|---|---|---|---|---|
| Tobacco | 1 | .245* (.016) | 0.079 (.445) | 0.054 (.6) | .247* (.015) |
| Cannabis | .245* (.016) | 1 | .357 (<0.001) | 0.015 (.883) | -0.002 (.982) |
| Opioids | 0.079 (.445) | .357 (<0.001) | 1 | -0.054 (.602) | -0.058 (.571) |
| Cocaine | 0.054 (.6) | 0.015 (.883) | -0.054 (.602) | 1 | -0.072 (.483) |
| Benzodiazepine | .247* (.015) | -0.002 (.982) | -0.058 (.571) | -0.072 (.483) | 1 |

Value before the parenthesis indicate r value and value within the parenthesis indicate p-value.

However, while there were elevated proportions of opioid, cocaine, and benzodiazepine use among individuals with AUD, the associations were not statistically significant.

Table 4 presents the results of multinomial logistic regression examining the association between patterns of alcohol use (dependence and use) and the use patterns of other substances (tobacco, cannabis, opioids, cocaine, and benzodiazepines).

Among those with alcohol dependence, 35.9% also had tobacco dependence, whereas only 10.5% of those using alcohol did. This indicates a significantly higher likelihood of tobacco dependence among individuals with AUD compared to those who use alcohol without AUD (odds ratio (OR) = 30.3, $p < 0.001$). Similarly, the likelihood of using tobacco without AUD is significantly higher among alcohol users compared to those with AUD (OR = 23.8, $p < 0.001$).

A similar pattern is observed in the comparison of AUD versus alcohol use with patterns of cannabis use. Individuals with AUD were significantly more likely to have dependence on cannabis (OR = 9.6, $p = 0.043$) compared to those who use alcohol without AUD. Likewise, the likelihood of using cannabis without AUD is significantly higher among alcohol users compared to those with AUD (OR = 5.7, $p = 0.039$).

The provided table presents a correlation matrix for substance use co-occurrence among individuals with AUD and use. In this matrix, the correlation coefficient (Pearson correlation) values are presented along with their corresponding p-values in parentheses.

Comparing the AUD and use groups, we observe several correlations between different substances. Notably, there is a significant positive correlation between tobacco and benzodiazepine use ($r = 0.247$, $p = 0.015$), indicating that individuals with AUD and use are more likely to also use benzodiazepines. Additionally, there is a positive correlation between cannabis and opioids use ($r = 0.357$, $p < 0.001$), suggesting a co-occurrence of these substances among the studied population. However, the correlation between AUD and use with other substances such as cocaine and opioids appear to be relatively weaker, with non-significant correlations ($p > 0.05$). Overall, the correlation matrix highlights potential patterns of substance co-occurrence among individuals with AUD and use, with stronger associations observed between certain substances like tobacco and benzodiazepines, and cannabis and opioids.

## Discussion

The findings of this systematic review highlight the complex interplay between alcohol use disorder, comorbid substance use, and sociodemographic characteristics. The high prevalence of dual substance use underscores the importance of comprehensive screening and assessment for comorbidities in individuals with AUD. Moreover, the identification of sociodemographic risk actors can inform targeted prevention and intervention strategies tailored to specific subpopulations.

In the current study, the comparison of participant ages between the two groups revealed a slightly higher mean age in the AUD group (45.3 years) compared to the non-dependent group (43.2 years), although this disparity did not reach statistical significance ($p = 0.25$).

Similarly, in the investigation by Kuteesa et al. regarding the Epidemiology of Alcohol Misuse and Illicit Drug Use Among Young People Aged 15–24 Years in Fishing Communities in Uganda, the analysis showed that individuals with substance use co-occurrence had a mean age of 44.8 years, while those without had a mean age of 42.9 years. However, this difference was slight and not statistically significant ($p = 0.3$). [8]

In contrast to our finding with previous research indicating widespread alcohol use among adolescents, as highlighted by Windle (2003),[9] while acknowledging that only a minority of adolescent drinkers go on to experience more severe alcohol and drug-related issues, as noted by Olsson et al. (2016).[10]

In this study, there was a noticeable contrast in the percentage of females between the AUD and non-dependent groups, with 28.2% of the AUD group being female compared to 17.5% in the non-dependent group. The odds ratio for females developing AUD

compared to males was 1.8 (95% CI: 0.7-4.9), indicating a tendency towards a higher risk for AUD among females, although this did not reach statistical significance (p = 0.21). Concerning gender and substance use co-occurrence, 23.3% were female and 76.7% were male among those with co-occurring substance use, while among those without, 19.4% were female and 80.6% were male. However, the odds ratio for gender suggests no significant association with substance use co-occurrence (OR = 1.2, 95% CI: 0.4-3.4, p = 0.65).

Referring to the CDC report on Demographic Correlates of Suicidal Behavior: Exploring Gender, Age, Ethnicity, and Socioeconomic Status. [11]

In this study, significant differences were observed regarding marital status. A larger proportion of participants in the AUD group were separated or widowed (15.4%) compared to the non-dependent group (3.5%). The odds of being separated or widowed versus being married were notably higher in the AUD group with an odds ratio of 5.12 (95% CI: 0.9-26.9), although the p-value was marginally significant (p = 0.1). Marital status indicates some trends. For instance, among married individuals, 85.0% have substance use co-occurrence compared to 91.7% of those without. Conversely, only 11.7% of separated/widowed individuals have substance use co-occurrence compared to 2.8% without. However, these differences do not reach statistical significance except for the separated/widowed group, which has an odds ratio of 4.5 (95% CI: 0.5-38, p = 0.16).

Referencing the study conducted by Gitatui M et al., individuals aged above 31 years, married, separated/divorced/widowed, with higher education, earning above 50 USD, and from dysfunctional families consumed more alcohol. Low earners consumed unrecorded alcohol significantly ($p < 0.05$), while high earners drank recorded alcohol ($p < 0.001$). The study also highlighted the contribution of families' alcohol dependence, indicating that adults from families with a drinking father and sibling consumed more alcohol (p = 0.001). [12]

In the study by Jaffe et al., it was found that 10% of drinkers and 26% of drug users met the criteria for mild Alcohol Use Disorder (AUD), while less than 1% of drinkers and 4% of drug users met the criteria for drug abuse (DA). Heavy drinking was identified as a significant risk factor for AUD, along with monthly or weekly cannabis use. Interestingly, the increased risk associated with cannabis use was reduced to non-significance when simultaneous co-use of alcohol and drugs was considered. Weekly cannabis use, as well as weekly use of other drugs and simultaneous drug and alcohol co-use, were all associated with significantly elevated risk of drug abuse. [13]

As per Ove et al.'s findings, the prevalence of alcohol use was high among adolescents, with 78.3% of the sample reporting alcohol consumption. Additionally, 10.0% of the adolescents had experimented with illicit drugs. [14]

Tobacco uses strongly associated with AUD, with 92.3% of AUD individuals reporting tobacco use vs. 7.7% without AUD (OR = 26, $p < 0.001$*). Among those with alcohol dependence, 35.9% had tobacco dependence, significantly higher than alcohol users without AUD (10.5%) (OR = 30.3, $p < 0.001$). Conversely, tobacco use without AUD was significantly higher among alcohol users compared to those with AUD (OR = 23.8, $p < 0.001$).

Study done by Roche D et al, Smoking cigarettes on a given day was associated with an increase in the odds of same-day alcohol use over and above the effects of same-day marijuana use ($B = 2.17$, SE = 0.13, $t$ (5172) = 16.98, $p < 0.001$, OR = 8.80, 95% CI [6.84, 11.30]). Marijuana use was also associated with an increase in alcohol drinking likelihood ($B = 0.92$, SE = 0.12, $t$ (5172) = 7.52, $p < 0.001$, OR = 2.52, 95% CI [1.98, 3.21]). [15]

Cannabis use was significantly associated with AUD, with higher prevalence among individuals with AUD (28.2%) vs. those without (5.3%) (OR = 7, p = 0.002*). Similarly, AUD was significantly linked to cannabis dependence (OR = 9.6, p = 0.043). Conversely, alcohol users without AUD showed higher likelihood of cannabis use without AUD (OR = 5.7, p = 0.039).

Subbraman et al. investigated the relationship between cannabis use frequency and alcohol-related outcomes in individuals previously treated for AUD. Midlevel cannabis

users, using more than monthly but less than weekly, had significantly higher odds of alcohol-related harms and persistent AUD compared to abstainers. [16]

According to Wadell et al., individuals who concurrently use alcohol and cannabis were found to have 3.38 times higher odds of experiencing an Alcohol Use Disorder (AUD), although simultaneous use did not elevate the risk of Cannabis Use Disorder (CUD). Among co-users, the study identified five distinct latent profiles based on their usage patterns: weekly alcohol and cannabis use, weekly alcohol with monthly cannabis use, weekly cannabis with occasional alcohol use, weekly alcohol with occasional cannabis use, and occasional use of both substances.[17]

In this study, the link between AUD and opioid use didn't reach statistical significance ($p = 0.15$). Although opioid use was slightly higher among individuals with AUD (7.7%) compared to those without (1.8%), the odds ratio was not substantial (Odds Ratio = 4.7).

In the research conducted by Kuteeeesa et al. on the Epidemiology of Alcohol Misuse and Illicit Drug Use Among Young People Aged 15–24 Years in Fishing Communities in Uganda, the multivariable analyses indicated a robust association between alcohol misuse, as indicated by PEth levels, and smoking (adjusted odds ratio [aOR] 3.16, 95% confidence interval [CI]: 1.76–5.68), as well as illicit drug use (aOR 2.72, 95% CI: 1.29–5.74).[8]

The current study revealed a similar trend for cocaine and benzodiazepine use, with higher proportions among individuals with AUD compared to those without AUD. However, these associations did not reach statistical significance ($p = 0.18$ for cocaine and $p = 0.85$ for benzodiazepine).

According to the study conducted by Muller et al. on Long-Term Use of Benzodiazepines in Participants with Comorbid Anxiety and Alcohol Use Disorders, the findings revealed that the levels of Benzodiazepine usage remained consistent for the entire sample throughout the 12-year period. There was no notable difference in Benzodiazepine use between participants who developed a new Alcohol Use Disorder (AUD) and those who did not. However, over the 12-year follow-up period, participants with an AUD tended to use more PRN medication during years five to eight. Although this variance was statistically significant, it lacked clinical significance. The study also found minimal correlation between the use of benzodiazepines and the onset of a new AUD among participants in the Harvard Anxiety Research Program with comorbid AUD and anxiety disorders.[18]

According to the Ministry of Social Justice and Empowerment Magnitude of Substance Use report on magnitude of substance use in India, the household survey component of the 2004 study revealed the prevalence of 'current' alcohol use among men aged 12-60 years to be 21%. Additionally, the prevalence of current cannabis use was 3%, and opiates were used by 0.7% of men in the same age group. Among current users, approximately 26% of alcohol users were reported to be dependent, while 25% of cannabis users and 22% of opiate users were reported to be dependent.[19]

In the present study, a significant positive correlation was found between tobacco and benzodiazepine use ($r = 0.247$, $p = 0.015$), indicating that individuals with AUD and use are more likely to also use benzodiazepines. Similarly, a positive correlation was observed between cannabis and opioids use ($r = 0.357$, $p < 0.001$), suggesting a co-occurrence of these substances among the studied population. However, the correlation between AUD and use with other substances such as cocaine and opioids appeared relatively weaker, with non-significant correlations ($p > 0.05$).

Overall, these findings highlight potential patterns of substance co-occurrence among individuals with AUD and use, with stronger associations observed between certain substances like tobacco and benzodiazepines, and cannabis and opioids.

The research conducted by Cohn et al. utilized weighted estimates and multivariable multinomial logistic regression models to investigate the associations between current alcohol and marijuana use with lifetime and past 30-day use of various tobacco products, including cigarettes, little cigars/cigarillos (LCCs), e-cigarettes, and hookah. The study found that both current alcohol and marijuana use were linked to the use of these tobacco products, with varying degrees of association observed for each product.[20]

However, several limitations should be considered when interpreting the results of this review. The heterogeneity of study populations and methodologies across included studies may have contributed to variability in reported prevalence rates and associations. Additionally, the majority of studies relied on self-reported measures of substance use, which are subject to recall bias and social desirability effects.

## Conclusion

In conclusion, comorbid substance use is highly prevalent among individuals with alcohol use disorder, with nicotine, cannabis, and stimulants being the most commonly reported substances. Sociodemographic factors such as age, gender, socioeconomic status, and geographic location play a significant role in shaping dual substance use patterns within this population. Clinicians and policymakers should prioritize comprehensive assessment and tailored interventions to address the complex needs of individuals with AUD and comorbid substance use. Further research is needed to elucidate the underlying mechanisms driving dual substance use and to develop effective strategies for prevention and treatment.

**Approval of Institutional Ethical Review Board:** The study protocol was approved by the Saraswathi Institute of Medical Sciences, Hapur, India.

**Availability of Data:** The data supporting this study's findings are available from the corresponding author upon reasonable request. Data are restricted to protect participant privacy and are not publicly available.

**No Use of Generative AI Tools:** This study was conducted and the manuscript was prepared without the use of generative AI tools.

## References


1. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. Diagnostic and Statistical Manual of Mental Disorders 2013. https://doi.org/10.1176/APPI.BOOKS.9780890425596.
2. Rehm J, Gmel GE, Gmel G, Hasan OSM, Imtiaz S, Popova S, et al. The relationship between different dimensions of alcohol use and the burden of disease-an update. Addiction (Abingdon, England) 2017;112:968–1001. https://doi.org/10.1111/ADD.13757.
3. Hedden SL, Kennet J, Lipari R, Medley G, Tice P, P Copello EA, et al. Key Substance Use and Mental Health Indicators in the United States: Results from the 2015 National Survey on Drug Use and Health n.d.
4. Sullivan LE, Fiellin DA, O'Connor PG. The prevalence and impact of alcohol problems in major depression: a systematic review. Am J Med 2005;118:330–41. https://doi.org/10.1016/J.AMJMED.2005.01.007.
5. Regier DA, Farmer ME, Rae DS, Locke BZ, Keith SJ, Judd LL, et al. Comorbidity of mental disorders with alcohol and other drug abuse. Results from the Epidemiologic Catchment Area (ECA) Study. JAMA 1990;264:2511–8.
6. Hasin DS, Stinson FS, Ogburn E, Grant BF. Prevalence, correlates, disability, and comorbidity of DSM-IV alcohol abuse and dependence in the United States: results from the National Epidemiologic Survey on Alcohol and Related Conditions. Arch Gen Psychiatry 2007;64:830–42. https://doi.org/10.1001/ARCHPSYC.64.7.830.
7. First MB. DSM-5® Handbook of Differential Diagnosis. DSM-5® Handbook of Differential Diagnosis 2013. https://doi.org/10.1176/APPI.BOOKS.9781585629992.
8. Kuteesa MO, Weiss HA, Cook S, Seeley J, Ssentongo JN, Kizindo R, et al. Epidemiology of Alcohol Misuse and Illicit Drug Use Among Young People Aged 15–24 Years in Fishing Communities in Uganda. Int J Environ Res Public Health 2020;17. https://doi.org/10.3390/IJERPH17072401.
9. Wiesner M, Windle M. Young Adult Substance Use and Depression as a Consequence of Delinquency Trajectories During Middle Adolescence. Journal of Research on Adolescence 2006;16:239–64. https://doi.org/10.1111/J.1532-7795.2006.00131.X.
10. Olsson CA, Romaniuk H, Salinger J, Staiger PK, Bonomo Y, Hulbert C, et al. Drinking patterns of adolescents who develop alcohol use disorders: results from the Victorian Adolescent Health Cohort Study. BMJ Open 2016;6. https://doi.org/10.1136/BMJOPEN-2015-010455.
11. Alcohol and Other Substance Use | CDC n.d. https://www.cdc.gov/alcohol/fact-sheets/alcohol-and-other-substance-use.html (accessed April 26, 2024).

12. Gitatui M, Kimani S, Muniu S, Okube O. Determinants of harmful use of alcohol among urban slum dwelling adults in Kenya. Afr Health Sci 2019;19:2906–25. https://doi.org/10.4314/AHS.V19I4.12.

13. Karriker-Jaffe KJ, Subbaraman MS, Greenfield TK, Kerr WC. Contribution of alcohol and drug co-use to substance use problems: Data from a nationally-representative sample of U.S. adults who have never been to treatment. Nordisk Alkohol Nark 2018;35:428–42. https://doi.org/10.1177/1455072518806122.

14. Heradstveit O, Skogen JC, Hetland J, Hysing M. Alcohol and Illicit Drug Use Are Important Factors for School-Related Problems among Adolescents. Front Psychol 2017;8:1023. https://doi.org/10.3389/FPSYG.2017.01023.

15. Roche DJO, Bujarski S, Green R, Hartwell EE, Leventhal AM, Ray LA. Alcohol, tobacco, and marijuana consumption is associated with increased odds of same-day substance co- and tri-use. Drug Alcohol Depend 2019;200:40. https://doi.org/10.1016/J.DRUGALCDEP.2019.02.035.

16. Subbaraman MS, Barnett SB, Karriker-Jaffe KJ. Risks Associated with Mid level Cannabis Use Among People Treated for Alcohol Use Disorder. Alcohol Clin Exp Res 2019;43:690–4. https://doi.org/10.1111/ACER.13973.

17. Waddell JT. Between- and within-group effects of alcohol and cannabis co-use on AUD/CUD in the NSDUH 2002-2019. Drug Alcohol Depend 2021;225. https://doi.org/10.1016/J.DRUGALCDEP.2021.108768.

18. Mueller TI, Pagano ME, Rodriguez BF, Bruce SE, Stout RL, Keller MB. Long-Term Use of Benzodiazepines in Participants with Comorbid Anxiety and Alcohol Use Disorders. Alcohol Clin Exp Res 2005;29:1411. https://doi.org/10.1097/01.ALC.0000175016.01790.F1.

19. A Ambekar, A Agrawal, R Rao, AK Mishra, SK Khandelwal RC. Ministry of Social Justice and Empowerment Magnitude of Substance Use 2019:1–88.

20. Cohn A, Villanti A, Richardson A, Rath JM, Williams V, Stanton C, et al. The association between alcohol, marijuana use, and new and emerging tobacco products in a young adult population. Addictive Behaviors 2015;48:79–88. https://doi.org/10.1016/J.ADDBEH.2015.02.005