AFRICAN JOURNAL OF HEALTH SCIENCES AND MEDICINE
AJHSM (2025)04:01
http://www.du.edu.et/duj

RESEARCH ARTICLE

Assessment of Substance use among adolescents residing in urban and rural areas of Gedeo *Zone*, Southern Ethiopia: A Comparative Cross-Sectional Study

Yohannes Addisu[1*] **and Getachew Nenko**[1]

Received: 04 November 2024

Accepted: 12 February 2025

Published: 30 June 2025

DOI:10.20372/ajhsm.v04i01.01

OPEN ACCESS

Suggested Citation: Addisu Y. and Nenko G. Assessment of Substance use among adolescents residing in urban and rural areas of Gedeo *zone*, Southern Ethiopia: A Comparative Cross-Sectional Study. Afri. J. Heal. Sci. Med; 2025, 04(01).

Copyright: ©2025 Dilla University. This is an open access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Abstract

Background: Evidence from various studies indicates that the initiation and early stages of substance use often begin in adolescence. However, less research has focused on the differences in substance use levels and determinants across distinct social contexts, particularly between urban and rural areas. This study aims to comparatively assess substance use and associated factors among adolescents in urban and rural areas of Gedeo Zone, Southern Ethiopia.

Method: A community-based comparative cross-sectional study was conducted among 2,446 adolescents. The characteristics of respondents, including substance use patterns, were compared between urban and rural adolescents. Data were collected using a structured questionnaire and analyzed with SPSS version 24. Multivariate binary logistic regression analysis was employed to identify factors associated with substance use, using a significance level of $p < 0.05$.

Results: The overall prevalence of substance use among adolescents in this study was 23.3%, with 20.1% among urban adolescents and 26.5% among rural adolescents, indicating a statistically significant difference between the two groups. Parental substance use and having peers who use substances increased the risk of substance use, while an unfavorable attitude toward substance use decreased this risk among both urban and rural adolescents. Additionally, urban adolescents with poor parental control were more likely to engage in substance use.

Conclusion: The level of substance use among adolescents in this study is moderately high. Factors such as peer and parental substance use, attitudes toward substance use, and adolescents' occupations were significantly associated with substance use.

Keywords: Adolescents, Comparative study; Gedeo Zone, Substance use

1 Introduction

Adolescence is one of life's most fascinating and complex life stages [1]. It is a period of transition from childhood to adulthood [2]. Adolescents constitute about one sixth of the world's population [3, 4].

According to WHO Expert Committee on Drug Dependence, drug use is defined as "persistent or sporadic excessive drug use inconsistent with or unrelated to acceptable medical practice" [5]. Harmful drug use among adolescents is a major concern in many countries of the world. The vast majority of people using tobacco today began doing so when they were adolescents [6].

*Correspondence: yohannesaddisu27@gmail.com
[1]School of Public Health, College of Health Sciences & Medicine, Dilla University, Dilla, Ethiopia.

Adolescence is characterized by the onset of unhealthy behaviors and conditions including drinking, smoking and illicit drug use which represent major public health challenges among adolescents [7, 8]. Drug abuse has cumulative social, physical, and mental health on individuals, families, and communities at large [9].

There are factors contributing for substance abuse including socioeconomic status, quality of parenting, peer influence, and biological/inherent liability for drug addiction [10]. Substance use among adolescents is an important social and health problem in Africa and other countries in the world [11, 12]. Many factors and strategies that can help adolescents stay drug free were studied including strong positive connections with parents, other family members, school, and religion; having parents present in the home at key times of the day; and reduced access in the home to illegal substances [13].

Moreover, an adolescent's perception of the risks associated with substance use is an important determinant of whether he or she engages in substance use [16]. However, the difference in level of substance use and its determinants among distinct social contexts including urban and rural alteration were less studied. Thus the current study was planned to address this issue, particularly the difference in level and determinants of substance abuse among urban and rural residence of adolescents in Gedeo Zone, South Ethiopia.

2 Materials and methods

2.1 Study area and design

A community-based comparative cross-sectional study was conducted among adolescents residing in rural and urban areas of Gedeo Zone, Southern Ethiopia, located 362 km from the capital city, Addis Ababa. The Gedeo Zone comprises four towns: Dilla, Wenago, Yirgachafe, and Gedeb, along with nine districts: Dilla Zuria, Wenago, Bule, Yirgachafe Zuria, Gedeb, Kochere, Chelelektu, Chorso, and Raphe. The study was carried out from July 22 to August 28, 2021.

2.2 Population

In this study, the source population included all adolescents aged 12-19 years residing in rural and urban areas of Gedeo Zone. The study population was randomly selected from these adolescents in the chosen urban and rural districts.

2.3 Inclusion criteria

Those adolescent age 12-19 Years old and residing in rural and urban areas of Gedeo Zone.

2.4 Exclusion criteria

Those adolescents who were street children and exposed to very serious health problems during the data collection period were excluded from the study.

2.5 Sampling

2.6 Sample size determination

The sample size was calculated using Epi Info version 7.1, based on a prevalence of 47.5% (the prevalence of chat chewing among adolescents in Ethiopia, EDHS 2016), a power of 80%, a ratio of unexposed to exposed of 1, and an assumed odds ratio of 2. Consequently, the initial calculated sample size was 1,172. After accounting for a design effect of 2 and a 10% non-response rate, the final sample size was adjusted to 2,578.

2.7 Sampling technique and procedure

The study area was stratified into urban and rural regions of Gedeo Zone for comparison. Three rural districts - Chelelektu, Chorso, and Raphe were randomly selected, along with two urban administrative areas: Dilla Town and Yirgacheffe Town. From the rural districts, 26 kebeles (the smallest administrative unit) were selected through simple random sampling: nine kebeles from Chelelektu, eleven from Chorso, and six from Raphe. In the urban areas, six kebeles were selected using the same method: four kebeles from Dilla Town and two from Yirgacheffe Town.

After identifying the study kebeles, a census was conducted to determine the number of adolescents in each kebele, establishing the sampling frame. Households with eligible adolescents were labeled accordingly. Finally, one adolescent from each household was selected using systematic random sampling. If there was more than one eligible adolescent in a household, one respondent was chosen by lottery.

2.8 Data Collection Procedure and Measurement

For data collection, a structured questionnaire was adapted from the Ethiopian Demographic and Health Survey 2011 and other previously published studies. The questionnaire was initially prepared in English and then translated into the local language. To ensure consistency, it was back translated into English by an independent language expert.

The data collection instrument consisted of structured, close-ended questions, along with a few open-ended items. A set of questions addressing the study's objectives was compiled and adapted from previous research and the WHO sexual and reproductive health illustrative questionnaire.

2.9 Operational Definitions

The outcome variable of this study was self-reported. In the Ethiopian Demographic and Health Survey (EDHS), participants were asked about substance use through four questions regarding current smoking habits, including pipes, cigarettes, and other tobacco products, with responses of "no" or "yes". Adolescents were classified as "cigarette or tobacco smokers" if they answered "yes".

Additionally, two questions were posed regarding alcohol consumption and Khat chewing: "During the last 30 days prior to the survey, on how many days did you consume a drink containing alcohol"? and "On how many days did you chew Khat"? Adolescents were classified as "people who drink alcohol" or "people who chew Khat" if they responded, "one or more days" (including occasionally or daily). Those with no history of using these substances were considered "non-users".

Wealth Index: Household assets, including durable and semi-durable goods, were used to describe economic status. The household questionnaire from the Ethiopian Demographic and Health Survey was employed to assess the wealth index. This index was calculated using principal component analysis based on household assets, and respondents' families were classified into three categories according to wealth status: low, medium, and high.

Parental Communication: This was measured using a five-item parent-adolescent communication scale. Items were scored from 1 (never) to 4 (often). Those who scored below the median value were considered to have low parental communication, while those above the median were classified as having high parental communication over the past six months.

2.10 Data Quality Management

Before the actual data collection, the questionnaire was pretested, and a two-day training session was conducted for data collectors and supervisors to ensure a shared understanding of the tool. The final version of the questionnaire was translated into local languages and then back-translated into English to ensure consistency.

A pretest was conducted in the Sidama region, specifically in the Chuko district. Supervisors were responsible for checking the completeness and consistency of the complete questionnaires filled. The overall data collection process was closely monitored by the investigators to maintain data quality.

2.11 Data Analysis Plan

The data template was prepared using EpiData version 3.1, and the data was entered into the system. Completeness checks were conducted to ensure data integrity, and any inconsistencies were verified. The data was then exported to IBM SPSS version 23 for analysis.

Descriptive statistics were calculated to assess the status and patterns of substance use. Binary logistic regression was employed to identify

factors associated with substance use during bivariate analysis. Multivariable logistic regression models were used to evaluate the determinants of substance use. Both unadjusted (crude) and adjusted odds ratios, along with their corresponding 95% confidence intervals, were computed. A p-value of]leq 0.05 was considered statistically significant. The model's fit was assessed using the Hosmer-Lemeshow goodness-of-fit test.

2.12 Ethical consideration

Ethical approval was obtained from the Dilla University College of Health Sciences and Medicine. Written informed consent was obtained from the parents of each study participant prior to the interviews, and the purpose of the study was thoroughly explained in the consent form provided to the parents. Confidentiality of the information collected was assured, and the privacy of the respondents was maintained throughout the study.

3 Results

3.1 Socio-demographic and academic characteristics of the study participants

A total of 2,446 study participants were included in this research, yielding a response rate of 94.9% (1,235 urban and 1,211 rural adolescents). Among these participants, 555 (45.6%) of the urban adolescents and 557 (47.0%) of the rural adolescents were in the late adolescence period, with a mean age of 16 years. The sex distribution of respondents was comparable, with 1,261 (51.6%) males and 1,182 (48.4%) females. Occupationally, more than three-fourths of the respondents from the urban area (961 or 78.8%) were students, while just over half of the participants from the rural area (675 or 56.9%) were students (Table 1).

Table 1 Socio-demographic characteristics of the respondents, Gedeo Zone, South Ethiopia, 2021

Variables		Residence		Total n (%)
		Urban n (%)	Rural n (%)	
Age category	Early adolescence	219 (18.0)	214 (18.1)	433 (18.0)
	Middle adolescence	443 (36.4)	414 (35.0)	857 (35.7)
	Late adolescence	555 (45.6)	556 (47.0)	1111 (46.3)
Occupation	Student	961(78.8)	675(56.9)	1636(67.8)
	Unemployed	76(6.2)	191(16.1)	267(11.1)
	Student and work	46(3.8)	63(5.3)	109(4.5)
	Merchant	57(4.7)	170(14.3)	227(9.5)
	Others	80(6.60)	87(7.3)	167(6.9)
With whom do You live	with parents	961(77.8)	943(77.9)	1904(77.85)
	with relatives	96(7.8)	96(7.9)	192(7.85)
	with other	178(14.4)	172(14.2)	350(14.3)
Wealth index	Lowest	231(18.7)	48(4.0)	279(11.35)
	Second	255(20.6)	118(9.7)	373(15.15)
	Middle	255(20.6)	874(72.2)	1129(15.15)
	Fourth	255(20.6)	118(9.7)	373(15.15)
	Highest	239(19.4)	53(4.4)	292(11.9)
Family size	less than 6	343(32.1)	242(25.6)	5,85(28.85)
	greater than 6	724(67.7)	699(74.0)	1,423(70.85)

3.2 Factors associated with substance use among adolescents

Factors associated with substance use among urban and rural adolescents were assessed using multivariable logistic regression analysis for each group in this study. The analysis revealed that attitude towards substance use, parental substance use, peer substance use, and parental control over adolescents' activities were significantly associated with substance use among urban adolescents.

Urban adolescents with an unfavorable attitude towards substance use were 50% less likely to engage in substance use compared to those with a favorable attitude [AOR: 0.50, 95% CI: (0.25, 0.97)]. Regarding family history, adolescents with family members who used substances were about nine times more likely to use substances themselves [AOR: 9.28, 95% CI: (5.63, 15.31)]. Similarly, adolescents whose peers' used substances were three times more likely to use substances [AOR: 3.16, 95% CI: (1.82, 5.48)].

Parental control over adolescents' activities was also significantly associated with substance use among urban adolescents. Those without family supervision over their activities outside the home were 82% more likely to use substances [AOR: 1.82, 95% CI: (1.05, 3.14)].

For rural adolescents, occupation, attitude towards substance use, parental substance use, and peer substance use were significant predictors of substance use. Specifically, adolescents who were merchants were found to be 62% less likely to use substances compared to those who were students [AOR: 0.38, 95% CI: (0.16, 0.90)]. The likelihood of substance use among rural adolescents decreased by about 80% for those with an unfavorable attitude towards substance use compared to their counterparts [AOR: 0.20, 95% CI: (0.10, 0.43)]. Additionally, adolescents whose parents' used substances were 22 times more likely to use substances themselves [AOR: 22.14, 95% CI: (11.77, 41.63)], and those with substance-using peers were about three times more likely to engage in substance use [AOR: 2.95 CI: (1.67, 5.21)] (Table 2).

Table 2 Factors associated with substance use among adolescents in Gedeo Zone, South Ethiopia 2021.

Background Characteristics	Urban			Rural		
	Substance use No. (%)	COR (95% CI)	AOR (95% CI)	Substance use No. (%)	COR (95% CI)	AOR (95% CI)
Occupation						
Student only	177(19.1)	1	1	194(29.5)	1	1
Unemployed	13(17.6)	0.66(0.39,1.12)	0.55(0.17,1.78)	35(18.5)	1.58(0.92,2.73)	0.74(0.32,1.71)
Student & work	15(34.1)	0.60(0.28,1.31)	1.62(0.50,5.30)	27(45.0)	0.86(0.46,1.62)	3.83(0.94,15.68)
Merchant	11(19.3)	1.45(0.65,3.23)	0.39(0.13,1.17)	29(17.5)	3.09(1.49,6.39)	0.38(0.16,0.90)
Others*	21(26.3)	0.67(0.29,1.53)	0.91(0.39,2.12)	18(20.9)	0.80(0.41,1.54)	0.25(0.09,0.73)
With whom adolescents live						
With parents	174(18.8)	1	1	231(25.1)	1	1
With relatives	21(22.3)	1.25 (0.75-2.08)	0.89(0.33,2.40)	21(22.6)	0.87 (0.52-1.45)	0.69(0.14,3.48)
Other	45(25.9)	1.51 (1.04-2.20)	1.56(0.81,3.02)	62(36.7)	1.73 (1.22-2.45)	0.77(0.34,1.75)
Sexually active						
Yes	98(36.3)	1	1	142(38.4)	1	1
No	142(15.4)	0.32 (0.24 - 0.43)	0.51(0.28,0.91)	172(21.2)	0.43 (0.34 - 0.56)	0.66(0.36,1.20)
Attitude towards substance use						
Favorable	41(35.4)	1	1	83(50.3)	1	1
Unfavorable	182(17.8)	0.40(0.26,0.60)	0.50(0.25,0.97)	207(21.9)	0.28(0.20,0.39)	0.20(0.10,0.43)
Parental Substance use						
Not use substance	34(5.7)	1	1	28(4.3)	1	1
Use substance	89(40.5)	11.33(7.31,17.57)	9.28(5.63,15.31)	148(56.7)	29.24(18.63,45.89)	12.14(11.77,21.63)
Peer use substance						
Not use	126(13.6)	1	1	140(16.6)	1	1
use	90(44.8)	4.89(3.61,6.61)	3.16(1.82,5.48)	130(49.2)	4.89(3.61,6.61)	2.95(1.67,5.21)
Parental supervision						
Yes	136(16.5)	1	1	147(21.3)	1	1
No	78(26.0)	1.78(1.30,2.44)	1.82(1.05,3.14)	99(28.0)	1.44(1.07,1.93)	1.54(0.87, 2.24)

3.3 Discussion

Adolescents' substance use was influenced by various factors, including attitudes toward abusive substances and family-related factors such as familial substance use and parental supervision. These factors were significant contributors to drug use among both urban and rural adolescents.

The overall prevalence of substance use in this study was 23.3%. Reports from various studies worldwide, including other regions in Ethiopia, indicate alarming trends in substance abuse, with prevalence rates ranging from 20% to 50% [21-25]. The 6.7% rate of illicit drug use among adolescents in the current study is relatively lower than the 13.2% prevalence reported in Botswana [26] and the 12% in South Africa [27].

Distinct factors contributed to substance use among rural and urban adolescents in this study. An unfavorable attitude toward substance use significantly reduced the risk of substance use in both groups. This finding aligns with previous research suggesting that positive attitudes toward substance use among adolescents or their significant others increase the likelihood of substance use [28 -30].

The family environment is a critical domain for risk factors related to adolescent substance abuse [32]. Families can expose adolescents to abusive substances either through their own substance use or by providing inadequate supervision. In this study, substance use by family members significantly increased the risk of substance use among both urban and rural adolescents. This finding is supported by studies from various parts of the world, indicating that parental substance use often affects multiple family members across generations [33]. Research has shown that nearly 50% of the risk for substance use among adolescents has familial origins [34]. Behavioral modeling of substance use through exposure to parental substance use early in life contributes to this familial association with substance use disorders [35].

In the current study, parental supervision was found to decrease the risk of substance use among urban adolescents. Evidence from the National Institute on Drug Abuse highlights that lack of parental supervision is a significant risk factor for substance use among adolescents [13]. A study on adolescents' perceptions of substance use in the UAE identified parental involvement as crucial for preventing substance abuse. Strengthening family ties, communication, support, and understanding were viewed as key protective factors that encourage open discussions about substance use [36]. Parenting practices characterized by low levels of supervision, inconsistent discipline, poor problem-solving skills, and low emotional support have been linked to negative psychological and behavioral outcomes in children. High levels of marital conflict or family stress also increase the risk of negative outcomes, including substance abuse [32]. Similarly, a Norwegian population-based study identified family alcohol problems, parental involvement, peer substance use, and household economy as factors associated with adolescent substance use [37].

Peer substance use emerged as a major risk factor for both urban and rural adolescents. Numerous studies emphasize the role of peers in influencing substance use, with findings consistently showing that adolescents who associate with drug-using peers exhibit higher levels of drug use. Having friends who use drugs is a strong predictor of adolescent substance use [32]. Research in the UAE also indicated that peers serve as channels for accessing drugs [36]. Parents and guardians can mitigate this risk by monitoring adolescents' activities and maintaining open lines of communication [38]. A study conducted among adolescents in Mexico found that those with peers who used alcohol and other drugs were more likely to engage in substance use [39]. Similar evidence has been reported in South Africa [40].

3.4 Strengths and Limitations of the Study

This study is community-based and involved a sufficiently representative sample of adolescents recruited through probability sampling methods, allowing for comparisons between different

segments of the adolescent population. However, there are notable limitations to acknowledge. The primary limitation is the exclusion of younger adolescents aged 10-12 years and those living in vulnerable conditions, such as street or homeless adolescents.

3.5 Conclusion and Recommendations

The level of substance use among adolescents in this study is moderately high, with a significant number of adolescents exhibiting poor or no awareness of abusive substances. Adolescents in rural settings were found to be more likely to engage in substance use. Key factors influencing substance use include personal attributes such as attitudes toward abusive substances, family-related factors like familial substance use and parental supervision, and peer substance use.

This study recommends that all relevant stakeholders, including the Gedeo Zone Health Office and the regional health office, should design tailored health education interventions aimed at reducing substance use among adolescents in the Gedeo Zone.

Consent to Publish

Not applicable

Availability of data and material

The data of this study is readily available and could be obtained from the corresponding author on reasonable request at any time.

Competing interests

There is not any competing interest among authors or anyone else.

Funding

The study was funded by Dilla University.

Acknowledgments

The investigators express their sincere gratitude to Dilla University for providing financial support and all necessary assistance. We also extend our heartfelt thanks to the relevant authorities in the study area for their cooperation in facilitating this research. Most importantly, we are deeply grateful to the parents of adolescents and the participants in the study for their invaluable contributions.

References

1. IAWG on RH in Crises, “Chapter 4: Adolescent Reproductive Health”, IAFM, 2010.
2. Adolescent and Youth Reproductive Health. 2012.
3. UNICEF. The state of the world’s children 2011. Adolescence – an age of opportunity. New York; 2011.
4. WHO. Global health estmates 2015: DALYs by cause, age, sex, by country and by region, 2000–2015 [Internet]. Geneva; 2016. Available from: http://www.who.int/healthinfo/global_burden_disease/estmates/en/index2.html
5. WHO. WHO Expert Committee on Drug Dependence. Geneva, Switzerland; 1964.
6. WHO. Adolescents health risks and solutions Fact Sheet. 2017.
7. World Health Organization. Health for the world’s adolescents: A second chance in the second decade. 2014; Available from: http://apps.who.int/%0Aadolescent/second-decade/
8. Henkel D. Unemployment and substance use: A review of the literature (1990-2010). Curr Drug Abus Rev. 2011;4:4–27.
9. Sussman S, Skara S, Ames S. Substance abuse among adolescents. Subst Use Misuse. 2008;43:1802–28.
10. National Institute on Drug Abuse (NIDA). A research-based guide for parents, educators and community leaders. 2^{nd} edition Preventing drug use among children and adolescents. 2nd ed. Bethesda, Maryland, USA; 2010.
11. Nkyi AK. Adolescents’ Use of Alcohol, Tobacco, and Marijuana: The Gateway to Other Drugs. Int. J. Psychol Behav Sci. 2015;5(4):158–68.
12. World Health Organization. Global Status Report on Alcohol and Health 2014. New York; 2014.
13. Robertson EB, David SL, Rao SA. Preventing drug use among children and adolescents. 2^{nd} ed. National Institute on Drug Abuse (NIDA); 2003.
14. Kingston S, Rose M, Cohen-serrins J, Knight E. A Qualitative Study of the Context of Child and Adolescent Substance Use Initiation and Patterns of Use in the First Year for Early and Later Initiators. PLoS One. 2017;12(1):9–16.
15. Heron J, Barker ED, Joinson C, Lewis G, Hickman M, Munafò M, *et al.* Childhood conduct disorder trajectories, prior risk factors and cannabis use at age 16: birth cohort study. Addit Res Rep. 2013;108:2129–38.
16. Substance Abuse and Mental Health Services Administration C for BHS and Q. The NSDUH Report: Trends in Adolescent Substance Use and Perception of Risk from Substance Use. Rockville, MD. Rockville, MD; 2013.

17. Gedeo Zone Health Office. Gedeo Zone health sector growth and transformation plan performance report. 2016.
18. CSA. Ethiopia Demographic and Health Survey 2011 Preliminary Report. Addis Ababa; 2012.
19. Jasani PK, Jadeja YM, Patel NM, Jadeja DY, Shrimali JB, Purani SK. Prevalence of substance abuse among adolescents of urban and rural community in Surendranagar district , Gujarat. Int J Community Med Public Heal. 2019;6(5):1970–4.
20. Mcinnis O, Young M. Urban and rural student substance use. 2015. 1-32 p.
21. Hoyert, D.L. & Xu, J. Deaths: final data from 2011. National Vital Statistics Reports; (2012). 61(6).
22. U.S. Department of Transportation. Young Drivers. DOT HS 812 019. Washington, DC. (2014).
23. Seth P, Sales JM, DiClemente RJ, Wingood GM, Rose E, Patel SN. Longitudinal examination of alcohol use: A predictor of risky sexual behavior and trichomonas vaginalis among AfricanAmerican female adolescents. Sexually Transmitted Diseases. 2011; 38:96-101.
24. Woods-Jaege BA, Jaeger JA, Donenberg GR, Wilson4 HW. The relationship between substance use and sexual health among African American female adolescents. BMJ Open. 2014;23(6):1–15.
25. Mohammed AY. Assessment of substance use and associated factors among high school and preparatory school students of. 2014;2(6):414–9.
26. Letamo G, Bowelo M, Majelantle RG. Prevalence of Substance use and correlates of Multiple Substance use among school going adolescents in Botswana. African J Drug Alcohol Stud. 2016;15(2).
27. Reddy, S. P., James, S., Sewpaul, R., Koopman, F., Funani, N. I., Sifunda, S., *et al.* Umthente Uhlaba Usamila – The 2 nd South African Youth Risk Behaviour Survey 2008. Pretoria; 2010.
28. Taremian F, Yaghubi H, Pairavi H, Hosseini SR, Zafar M, Moloodi R. Risk and protective factors for substance use among Iranian university students: A national study. Subst Abus Treat Prev Policy. Substance Abuse Treatment, Prevention, and Policy; 2018;13(1):1–9.
29. Zaharakis N, *et al.* School, friends, and substance use: gender differences on the influence of attitudes toward school and close friend networks on Cannabis involvement. Prev Sci. 2018;19(2):138–46.
30. Jackson KM, Sher KJ, Schulenberg JE. Conjoint developmental trajectories of young adult alcohol and tobacco use. J Abnorm Psychol. 2005;114(4):612.
31. Mrug S, Gaines J, Su W, Windle M. School-Level Substance Use: Effects on Early Adolescents' Alcohol, Tobacco, and Marijuana Use. J Stud Alcohol Drugs. 2010;71(4):488–95.
32. Nkyi AK. Adolescents' Use of Alcohol, Tobacco, and Marijuana: The Gateway to Other Drugs. 2015;5(4):158–68.
33. Yule A, Wilens T. Familial Influences on Adolescent Substance Use. Psychiatr Times. 2011;28(10).
34. Lynskey MT, Agrawal A, Heath AC. Genetically informative research on adolescent substance use: methods, findings, and challenges. J Am Acad Child Adolesc Psychiatry. 2010;49:1202-1214.
35. Hoffmann JP, Cerbone FG. Parental substance use disorder and the risk of adolescent drug abuse: an event history analysis. Drug Alcohol Depend. 2002 May 1;66(3):255-64. doi: 10.1016/s0376-8716(02)00005-4. PMID: 12062460.
36. Alhyas L, Ozaibi N Al, Elarabi H, El-kashef A, Wanigaratne S, Almarzouqi A, *et al.* Adolescents' perception of substance use and factors influencing its use: a qualitative study in Abu Dhabi. J R Soc Med Open. 2015;6(2):1–12.
37. Enstad F, Pedersen W, Nilsen W, Soest T Von. Addictive Behaviors Reports Predicting early onset of intoxication versus drinking - A population-based prospective study of Norwegian adolescents. Addict Behav Reports [Internet]. Elsevier; 2017;6(August 2016):1–7. Available from: http://dx.doi.org/10.1016/j.abrep.2017.04.002
38. Brody, G. E., Beach, S. R. H., Philibert, R. A., Chen, Y.-f., & Murry, V. M. Prevention effects moderate the association of 5-HTTLPR and youth risk behavior initiation: Gene x environment hypotheses tested via a randomized prevention design. Child Develop.
39. Latimer W, Floyd LJ, Kariis T, Novotna G, Exnerova P, Brien MO. Peer and sibling substance use: predictors of substance use among adolescents in Mexico. 2004;15(4):225–32.
40. Brook JS, Pahl T, Morojele NK, Brook DW. Predictors of Drug Use Among South African Adolescents. J Adolesc Heal. 2006;38(1):26–34.