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A cross-sectional study on the prevalence of drug abuse and the influence of physical activity on it among adolescents in a rural area in Kollam

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Abstract
Introduction: Substance abuse is a global problem that is influenced by social, economic, political and psychosocial factors. Adolescence is the critical period when the first initiation of substance abuse takes place [1]. Physical activity has a positive effect on reducing drug craving in individuals with substance use disorders [13].
Methodology: A cross-sectional study was conducted by selecting school going students of classes 10th, 11th and 12th standard of a higher secondary school in a rural area. 125 students were selected using stratified random sampling technique and data analysed using Jamovi software.
Result: Prevalence of students who engage in outdoor games was found to be 61.6% and those indulge in substance use was found to be 10.4%. Males are doing exercises and outdoor games more than females and it was found to be statistically significant (P<0.001, Odds ratio=6.79). Substance use was also seen more in males than in females which was also statistically significant (P=0.002, Odds ratio=8.19). A significant positive correlation was obtained between days per doing physical activity and substance use (r=0.227, P =0.011).
Conclusion: Students who are doing physical activity a greater number of days in a week are more indulge in using substances and use of substances are there in females also even though the number is less. Measures need to be taken by the authorities to address this situation and students of this age need to be strictly monitored during the time of non-academic activities.

Keywords: Substance use, physical activity, school going students

Introduction

Substance abuse refers to the harmful and hazardous use of psychoactive substances, including alcohol and illicit drugs and its use can lead to dependence syndrome- a cluster of behavioural, cognitive and physiological phenomenon. Recent WHO estimate shows a burden of 2 billion alcoholics, 1.3 billion smokers and 284 million drug users. A recent report of NFHS-5 shows an alcohol consumption of 16.5% in males and 0.6% in females and tobacco usage of 28.5% in males and 5.4% in females [1].

Adolescence is a critical developmental period marked by the formation of healthy habits, decision making abilities, emotional regulation, and coping skills. Nearly 20% of Indian population is adolescent (UNICEF's report, 2011) with 1.2 billion adolescent population in the world [4]. Adolescent mental health issues are influenced by several factors, including poor family and home environments, punitive parenting, bullying, socioeconomic hardships, stigma and lack of access to services [3]. The causes for this bad habit of drugs are poor parental role, peer group influence, low social economic status, and media through advertisements of the products [4]

Substance use leads to definitive socio-economic burden and has become a major public health concern worldwide. In spite of realizing the adverse effects and repercussions of drug use, youth especially the adolescents have a proclivity to continue the habit. Early initiation into substance/drug use is generally associated with a poor prognosis and a lifelong pattern of trickery and irresponsible behaviour [5].

The inverse relationship between aerobic exercise and substance use may be attributed to one of the factors that, exercise could lead to a causal decrease in substance use, either by serving as an alternative, non-drug reinforcer, or by producing functional neuroadaptations that influence an individual's susceptibility to developing a substance use disorder [6].

Schools play a pivotal role not only in the academic development of children but also in shaping their attitudes, beliefs, and behaviors. However, the extent of students' awareness and understanding of the harmful consequences of substance use remains inadequately explored, particularly at the school level. A lack of knowledge and misconceptions about substance abuse may contribute to the initiation of such behaviors at an early age [8]

According to Child Line, in India, an NGO survey revealed that 63.6% of patients coming in for treatment were introduced to drugs at a young age below 15 years. According to another report 13.1% of the people involved in drug and substance abuse in India, are below 20 years [9]. National and regional studies indicate a growing trend in the use of alcohol and other substances among youth, with prevalence rates reported between 23% and 80% in some populations. Kerala, a state traditionally known for its progressive health indicators, is now facing a drug crisis

with the highest rate of drug-related cases in India, outpacing even Punjab, the long-time epicentre of the problem. In 2024 alone, Kerala documented over 27,000 cases under the Narcotic Drugs and Psychotropic Substances (NDPS) Act, more than triple those of Punjab, signalling a pressing need for effective prevention and intervention strategies [11].

A person over 15 years of age consumes about 8.3 litres per annum on an average in the state according to alcohol and drug information centre (ADIC) in India. (Ref.No.2). It was found in a survey organised by Asianet, a leading channel in Kerala, that students between the ages of 13 to 20 are more prone to substance abuse (Ref. No. 9). Operation D Hunt, a special arrangement from the Kerala police department along with the state narcotics cell, has registered 7,308 cases in 2025 [12]. According to the home ministry, 27,701 cases have been registered under the NDPS Act. [12]. Different departments in Kerala, have taken initiatives against substance use and have developed separate projects but unfortunately, they lack effective coordination and hence are far away from the desired outcome [10].

Extracurricular activities promote developmentally appropriate prosocial behaviour of 'preadolescents and adolescents' and reduce the likelihood that individuals will engage in risky behaviour. Students who spend time in extracurricular activities are 49% less likely to use drugs, cigarette smoking, drinking to get drunk. There are studies which shows that some sporting contexts may be a catalyst to engage in risky behaviours like substance use [13]. Due to these contradictory findings exist in literatures, we thought of doing this study.

The objective of the study was to find the prevalence of drug abuse in adolescents of age 14 to 18 years and to find is there any association between habit of doing physical activity and drug abuse among adolescents in the rural area in Kollam district, Kerala. If the student uses any form of substances like drug, tobacco or alcohol during the time we met the student then, he or she will be marked as a person who use substances. Physical activities refer to activities involving bodily movements produced by skeletal muscles that result in energy expenditure [13]. Study population was school going students of tenth, eleventh and twelfth standard of a higher secondary school. Study setting was a nearby coaching centre where, these students come for tuition in morning and evening. A sample size of 136 obtained after calculating sample size using the formula $n= (Z_{\alpha/2})^2 pq/l^2$, with α=5% and $Z_{\alpha/2}$= 1.96, prevalence of substance uses in high school students from a study [9] was 70%. Relative allowable error is fixed as 11% and finally with a response rate of 91.9%, 125 students selected using Stratified random sampling technique. Students were selected from 10^{th}, 11^{th} and 12^{th} standards considering each class as a stratum. Based on the size of students in each stratum using proportional allocation, students were selected from each class. A semi structured questionnaire was used for data collection. Informed verbal consent obtained from the students before data collection. Institutional Research Committee Approval obtained before the start of the study. Data collected was coded and entered in MS Excel and analysed using Jamovi Software Version 2.6.44. Frequency and percentages calculated for Categorical variables. Chi-square test was used for finding the association between the variables.

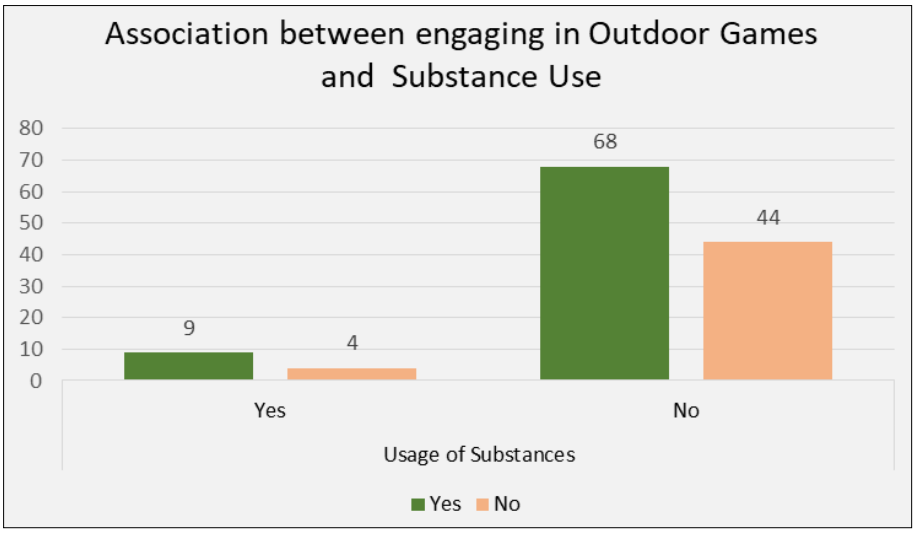
Results

In the study out of 125 students participated 56 (44.8%)were males and 69 (55.2%) were females. 44 students were from 10th standard, 39 from 11th standard and 42 students were from 12th standard. Out of 125 students, 54 (43.2%)were in APL category and 71 (56.8%) were from BPL category of SES. 77 out of 125 (61.6%) engage in outdoor games. 13 out of 125 (10.4%) use any form of substances. 4% (5 out of 125) were having the habit of drinking alcohol. 5 out of 125 (4%) use tobacco products. Among the five students who drink alcohol one was a female and among the five who use tobacco products one was a female. 84 out of 125 (67.2%) engage in aerobic exercises, 57 out of 125 (45.6%) engage in resistance training , 55 out of 125 (44 %) engage in flexibility exercises, 4 out of 125 had negative consequences due to substance use. 5 out of 125 use substances to feel normal or cope up with stress.

Table 1: Bivariate distribution on Substance use and engage in any forms of physical activity

Variables		Substance Use		Chi-square Value (degrees of freedom)	P value	Odd's ratio	Interpretation
		Yes	No				
Engage in Outdoor games	Yes	9	68	0.357 (1)	0.55	1.455	Not Significant
	No	4	44				
Engage in Aerobic Exercise	Yes	10	74	0.622 (1)	0.430	1.717	Not Significant
	No	3	38				
Engage in resistance training	Yes	9	48	3.271(1)	0.071	3	Not Significant
	No	4	64				
Engage in flexibility exercises	Yes	8	47	1.81(1)	0.178	2.212	Not Significant
	No	5	65				

The research question of the study was to find any relationship between substance use and engagement in any form of physical activity. We couldn't find a significant relationship between both the variables were the chi-square value was 0.357 with 1 degrees of freedom and a P value as 0.55>0.05, which is depicted in Graph No.1.No significant relationship was found between substance use and any other form of physical activity they are doing as shown in Table number 1.



Graph 1

Table 2: Bivariate distribution of engage in any forms of Physical activity and Sex

Variables		Sex		Chi-square Value (degrees of freedom)	P value	Odd's ratio	Interpretation
		Male	Female				
Engage in Aerobic Exercise	Yes	44	40	5.95 [1]	0.015	2.66	Significant
	No	12	29				
Engage in resistance training	Yes	31	26	3.89 [1]	0.048	2.05	Significant
	No	25	43				
Engage in flexibility exercises	Yes	25	30	0.017 [1]	0.896	1.04	Not Significant
	No	31	39				
Engage in Outdoor games	Yes	47	30	21.4 [1]	<0.001	6.79	Significant
	No	09	39				
Substance Use	Yes	11	02	9.3 [1]	0.002	8.19	Significant
	No	45	67				
Use of tobacco products	Yes	4	1	2.61 [1]	0.106	5.23	Not Significant
	No	52	68				
Drinking Alcohol	Yes	4	1	2.61 [1]	0.106	5.23	Not Significant
	No	52	68				

Significant association was obtained between sex and engage in aerobic exercise and resistance training with a chi square value of 5.95 with 1 degrees of freedom with a p value of 0.015, odds ratio 2.66 and chi square value of 3.89 with 1 degrees of freedom with a p value of 0.048, odds ratio 2.05 respectively. Association between sex and outdoor Games was also found to be statistically significant with a chi square value of 21.4 with 1 degrees of freedom with a p value less than 0.001, odds ratio 6.79. Significant association was obtained between sex and substance use with a chi square value of 9.3 with 1 degrees of freedom with a p value of 0.002, odds ratio 8.19 as shown in Table Number 2.

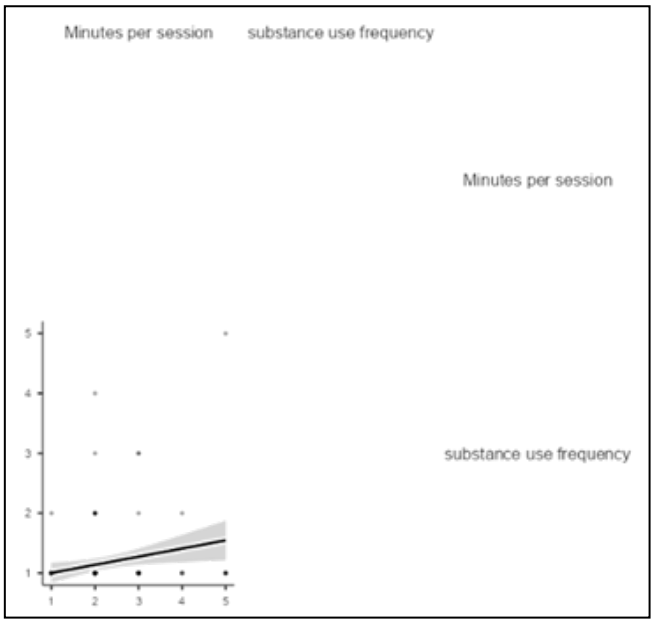
Table 3: Bivariate distribution of Socio-Economic Status and any form of physical activity

Variables		Substance Use		Chi-square Value (degrees of freedom)	P value	Odd's ratio	Interpretation
		Yes	No				
Socio economic status	APL	5	49	0.133 [1]	0.716	<1	Not Significant
	BPL	8	63				
Socio economic status		Aerobic exercise		1.09 [1]	0.297	1.5	Not Significant
		Yes	No				
	APL	39	15				
	BPL	45	26				
Socio economic status		Resistance Training		0.742 [1]	0.389	1.37	Not Significant
		Yes	No				
	APL	27	27				
	BPL	30	41				
Socio economic status		Flexibility Exercise		11.3 [1]	<0.001	3.5	Significant
		Yes	No				
	APL	33	21				
	BPL	22	49				
Socio economic status		Outdoor Games		2.5 [1]	0.113	0.553	Not Significant
		Yes	No				

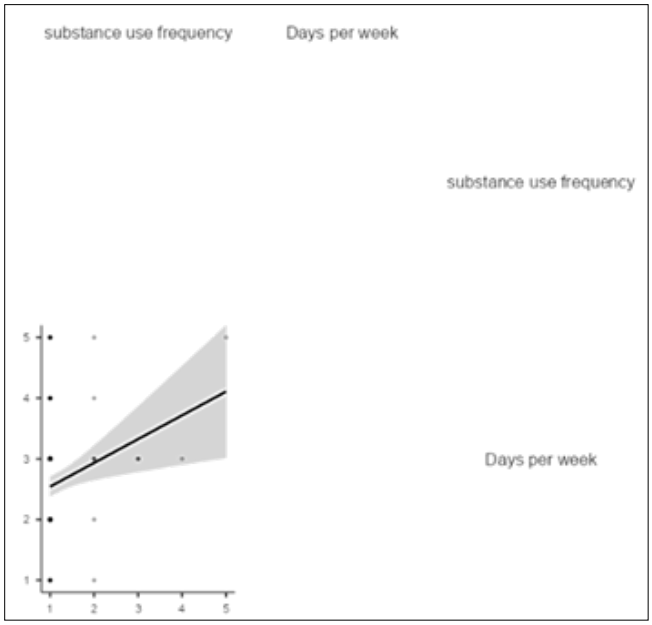
	APL	29	25				
	BPL	48	23				
Socio economic status		Drink Alcohol		0.59 [1]	0.439	2.02	Not Significant
		Yes	No				
	APL	3	51				
	BPL	2	69				
Socio economic status		Use of tobacco products		0.59 [1]	0.439	2.02	Not Significant
		Yes	No				
	APL	3	51				
	BPL	2	69				

There exist significant association between socio economic status and flexibility exercise with a chi square value of 11.3 with 1 degrees of freedom with a p value less than 0.001, odds ratio 3.5. No other significant association was found with Socio economic status and other variables as shown in Table Number 3.

Most of the students do physical activity only 1 to 2 days in a week and majority of them do physical activity one to 30 minutes in a day. There exist positive correlation between doing physical activity in terms of minutes per session and substance use, but it is not found to be statistically significant, where Spearman's Correlation is r= 0.136 with a P-value of 0.13>0.05. Positive Correlation was found between doing physical activity in terms of days per week and substance use, which is found to be statistically significant, where Spearman's Correlation is r= 0.227 with a P-value of 0.011<0.05. Plot of the correlation matrices are as shown below.



Plot of Correlation Matrix between Minutes per session of doing physical activity and Substance Use



Plot of Correlation Matrix between Days per week of doing physical activity and Substance Use

Discussion

The prevalence of using any form of substance use among the students was 10.4% and the prevalence of students engage in outdoor games is 61.6%. No significant association was found between Substance use and habit of doing physical activity, which is the objective of the study. There exist a significant positive correlation between days of doing physical activity in a week and use of substances.

In a study done in Thiruvananthapuram among high school children of 8th, 9th and 10th standard, the prevalence of drinking alcohol was 21% [2]. In a study done in Himachal Pradesh among subjects of age 12 to 25 years it was found that tobacco use is 29.2% followed by alcohol use of 28.2% [5]. In a study done in Elappara panchayat in Idukki district among the high school students of age from 14 to 17 years, it was found that 35 out of 50, nearly 70% of students were using substances [9].

In all these studies the prevalence of substance use was found to be more than the present study , may be because the question asked in the present study was are you currently using any substances. The rural setting of the study may contribute to the fact that the students may not disclose much about their habits.

The prevalence of engaging in outdoor games in the present study was 61.6%. In a study in Ernakulam among school children of 9th and 10th standard, more than 70% of the participants were actively involved in physical activity of moderate-to-vigorous intensity [7] Both the studies shows prevalence somewhat near. In another study done in Thiruvananthapuram among 11th standard students aged 16-18 years it was found that 55.2% of participants engage in moderate physical activity less than three times a week [15].

Engaging in Aerobic exercise, Resistance training and outdoor games were more among males when compared to females in the present study and there exist statistical significant association between outdoor games and sex. In the referred study also there exist more number of males than females, who do physical activity and it was found to be statistically significant also [7]. In another study also male and female students showed a statistically significant

difference ($p < .001$) in their moderate physical activity [15], similar to the present study. May be males are allowed to engage in outdoor games than females due to the societal set up exist in the rural setting in Kerala. Only in flexibility exercise females were more than males. Since the opening of Gyms in rural area seems to be a trend in Kerala and females used to attend these gyms during evening time after school.

There exist no statistical significance between substance use and engaging in aerobic exercise, resistance training, outdoor games and flexibility exercise. There exist no such literature which specifies the relation between Substance use and habit of doing any of the physical activity.

In the present study 4% of students were having the habit of consuming alcohol and using tobacco products. In a study done among male high school students studying in 8th, 9th and 10th standard of three schools in Thiruvananthapuram in 2015, 21% of students were using alcohol [2]. In another study done in Thiruvananthapuram in 2022 among school children of age 13 to 16 years who were pursuing their studies in selected schools in urban and rural area, the prevalence of substance use was found to be 5.47% [3]. In a study done in Himachal Pradesh in 2023 [5] among school children of age 12 to 18 years , it was found that the prevalence of tobacco use is 24% and alcohol use is 20.4% [5]. The result of the present study was somewhat similar to the study [3] done in Thiruvananthapuram, may be Kollam district is the neighbouring district and factors enabling this substance uses were same in both districts. In Himachal Pradesh the availability of these products are more and the social factors persists there may contribute to the wide use of substances.

In the present study, there exist a positive correlation between minutes per session of doing physical activity and substance use, which is not found to be statistically significant. There also exist positive correlation between days per week of doing physical activity and substance use which is statistically significant. In a study done in Romania among school children of age 15 to 16 years , there exist a negative correlation between frequency of physical activity and the intensity of drug use ($r=-0.051$, P value= 0.011) [13]. The reason we got a positive correlation may be the time they spent for physical activity may be the time they use substances as they are away from their houses and the presence of peer group makes it more simple in using substances. That's may be the reason , why the time spent and days spent was positively correlated with substance use, even though the former was not significant statistically. The one who are doing outdoor games is considering it as a gateway for using substances. The real reason is quite vague and is the further scope of the study. Strict monitoring need to be done by local authorities and family members in play grounds and public places where these children plays.

Conclusion

The study was proposed to find any association between Physical activity and use of substances among school going students of age 14 to 18 years in a rural area under the assumption that physical activity may reduce their intention to use substances and it serves as an alternative by producing functional neuroadaptations. There exists an inverse relationship between intensity of doing exercise and use of substances according to a literature. In the present study we got a significant positive correlation between number of days of doing physical activity and substance use. The duration they spent in doing physical activity may be the time they use substances. The students need to be strictly monitored; they should not be left unnoticed while doing outdoor games. Parents and public, need to be vigilant in observing both males and female students, as in the present study females are also using substances even though the number is less. Substance use and sex is found to be significantly associated in the study. More studies need to happen on this matter as very limited literature is available and the quantity, frequency and type of substances used need to be enquired for getting a wider picture of the situation.

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