

Original Article

Understanding the Biological and Social Factors Influencing Drug Addiction

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Abstract - Drug use and dependence are prominent health issues of concern to the general population, especially young adults and adolescents. This research analyzed trends of substance use, awareness of drug-related harms, and perceived social factors among individuals with different experiences of addiction and recovery. The survey was carried out in the form of a cross-sectional survey of 22 respondents, and 19 distinct answers were evaluated following data cleaning. Relationships between variables were analyzed with descriptive statistics and inferential tests such as chi-square tests and Spearman correlation. Results revealed that initiation of substance use was most often in adolescence, and alcohol was the most often used substance. The participants tended to indicate a low level of previous knowledge about drug-related harms, and there was no significant correlation between school-based drug education and the level of knowledge. It was noted that there was a significant correlation between perceived peer pressure and the presence of friends who used substances, which indicates the impact of the social settings. Also, there was a moderate positive relationship between the age of initiation and the age of participants. Although the experiences were different, the majority of the participants were of the view that recovery is possible. These results provide support for the significance of the social context and the significance of early intervention, and imply that the existing educational approaches could be improved.

Keywords - Substance Use Disorder, Neurobiology of Addiction, Psychosocial Factors, Behavioral Dependence.

1. Introduction

Substance Use Disorder (SUD) or drug addiction is a chronic and relapsing brain disorder that is associated with compulsive drug-seeking behavior and continued use despite its damaging effects [1]. It is now acknowledged to be a complicated n disease that is based on maladaptation of the reward, motivation, and self-control systems of the brain. Substance abuse is a major public health issue that has been reported to cause a substantive morbidity and mortality rate in millions of people annually, the presence of which is linked to a broad spectrum of serious health conditions, such as liver disease, cardiovascular conditions, and psychiatric comorbidities, among others [2].

Although addictive substances are diverse (opioids, alcohol, nicotine, and stimulants), they have one similarity in terms of their underlying mechanism: they all interfere with the dopaminergic system of the brain. Dopamine is key in the control of motivation, reward processing, and reinforcement learning [3]. The addictive substances cause dopaminergic activity in the mesolimbic pathway, which results in the reinforcement of drug-taking behavior and the development of neuroadaptive changes in the long-term. The long-term effects of chronic exposure include changes in receptor

sensitivity, dysfunction in the synaptic plasticity, and the dysfunction of the neural circuits, especially the circuits that involve the prefrontal cortex, which play a role in tolerance, withdrawal, and loss of behavioral control [4].

Although the biological processes provide an important basis for understanding addiction, they do not work alone. Genetic predisposition plays a major role in vulnerability to substance use disorders, with estimations on heritability showing a considerable genetic contribution. The changes in the genes that are related to dopamine signaling, especially the Dopamine D2 Receptor (DRD2), have been closely associated with addictive behaviors, sensitivity to rewards, and craving [5]. Moreover, new research has noted the significance of epigenetic and pharmacogenetic mechanisms that help to regulate the responses of individuals to substances and outcomes of treatment [6].

The social and environmental determinants are also important factors in influencing the risk of addiction. Some of the factors that predispose an individual to substance use are chronic stress, bad childhood experiences, poor family dynamics and peer influence [7]. These variables interact with biological vulnerabilities, and they affect neural



mechanisms related to stress and reward, thus strengthening the use of the substance as a maladaptive coping mechanism. The multifactoriality of addiction can be attributed to environmental exposure and genetic predisposition [7].

Such surveys would provide valuable insights in this direction that are consistent with neurobiological and clinical studies, by including people who have had their experience of drug addiction in their lives. These approaches are subjective experiences regarding substance use patterns, initiation and relapse triggers, coping mechanisms and recovery pathways- which are not necessarily comprehensible by experiments alone. The fact that survivor views will be included will help the researchers to better understand the social and psychological contexts of addiction [8]. In addition, survey data can be used to determine obstacles to treatment, support systems, and prognosis of recovery in the long term. These lessons are crucial to the creation of specific prevention and treatment plans, individualized interventions, and effective policies on the health of the population. The integration of biological data with social and experience data, ultimately, will assist in getting a more holistic and sustainable view of substance use disorders and formulate holistic and sustainable interventions.

2. Literature Review

Drug addiction, also known as Substance Use Disorder (SUD), is a chronic and recurrent disease that is typified by compulsive seeking of drugs regardless of the negative effects on the person [9]. This concept of addiction not being a moral or behavioral phenomenon but a complex disorder, the product of the interaction of biological and social factors, is highly emphasized in modern literature. This biopsychosocial approach has taken a central focus in the process of comprehending the development, course and continuation of drug dependence [10].

A natural research focus has been on neurobiological processes that characterize addiction, which are biologically based. The psychoactive substances mainly act on the reward system of the brain, specifically, mesolimbic dopamine system, which consists of the ventral tegmental area, nucleus accumbens, and prefrontal cortex [11]. This pathway is pleasurable to activate and contributes to the stimulation of the repeated use of the drug. With time, there are neuroadaptations to chronic exposure, such as changes in the release of neurotransmitters, sensitivity of receptors and synaptic plasticity. Such alterations are associated with tolerance, withdrawal symptoms and compulsive drug seeking. Further, impairment of the decision-making and inhibitory control of the prefrontal cortex increases addictive behaviors [12].

Genetic determinants are also important in determining addiction susceptibility. Research indicates that genetic

variation can be blamed as the cause of about 40-60 percent of the vulnerability of an individual to substance use disorders [13]. Certain genes linked to dopamine signaling, stress response and impulse control have been implicated.

Further, new studies in epigenetics point to the ability to change gene expression with environmental exposures, such as chronic drug consumption, without changing DNA sequences. These changes in epigenetics may be the reason why addictive behaviors are lifelong and have a high likelihood of relapses even after an extended period of abstinence [14][15].

The developmental factors also contribute further to forming the addiction risk, particularly during adolescence. The person at this age stage is very sensitive to rewards and has not acquired the cognition control mechanisms; a person in this age group will more likely indulge in experimental and risky actions. Substance exposure during such a young age can disrupt the brain maturation process and can put the individual in danger of dependency [16][17].

Social factors are also important in the onset and sustenance of drug addiction, besides biological factors. Family environment is also a very significant issue, where the occurrence of negative childhood experiences such as abuse, neglect and parents' substance abuse has been attributed to high risk. These early life stressors may affect the neurobiological systems and psychological development of these individuals to create a greater predisposition to substance use [18].

Another important determinant is peer influence, especially in the case of adolescents and young adults. According to the social learning theory, people learn to behave in a manner that is observed within their social circles, such as using drugs. Peer pressure, social acceptance and the need to belong may initiate and continue substance use.

In addition, the overall socioeconomic factors, including poverty, unemployment, inadequate access to education and medical services, are linked to high rates of addiction. These situations tend to give rise to the states of chronic stress and limited opportunities that may facilitate the adoption of the use of substances as a coping mechanism [19].

It is important to note that biological and social factors are not independent and are dynamic in relation to each other. Using the case of individuals with genetic predisposition, the condition can only make them addicts when the conditions are high-risk. In a similar manner, chronic social stress may modify brain behavior, especially stress response and reward systems, which predispose one to drug use [20].

In conclusion, the literature shows that addiction to drugs is a complex disorder that is caused by both biological and social factors. These interactions are important to the development of effective prevention and treatment programs that are capable of addressing the neurobiological and social context of addiction.

3. Materials and Methods

This study employed a survey design to examine biological and social factors influencing drug addiction in New Delhi, India. Primary data was collected from 30th December 2025 to 6th January 2026 from the Muskan Foundation in Dwarka. The objective was to examine the various reasons abusers started to use drugs and the type of education they received about drugs. This study was conducted in Dwarka, Sector 19, New Delhi, which was selected because it is one of the only ethical rehabilitation centers in Delhi. New Delhi represents an ideal setting due to the number of youths who are abusing substances that go unnoticed. This study consisted of 22 participants who were all part of the Muskan foundation, which is a rehab center, and started to abuse substances in their youth due to various reasons, including social pressure and lack of education. The collection of data involved me going to the center across 6 days and filling out a form with the participants. I translated the contents of the form into Hindi and jotted down responses. All participants involved provided verbal consent that was informed prior to participation, following an explanation of the study objectives, data confidentiality, and the voluntary nature of involvement. Responses were first recorded on paper forms, then transferred into a digital format for further processing. Microsoft Excel spreadsheets were used to transfer data online to analyze it and create graphs. All participants provided verbal informed consent. They were informed of the study objectives, confidentiality measures, and the voluntary nature of participation. No

personal identifiers were collected; all responses were anonymized. Chi-square and Spearman's correlation tests were carried out on the survey data.

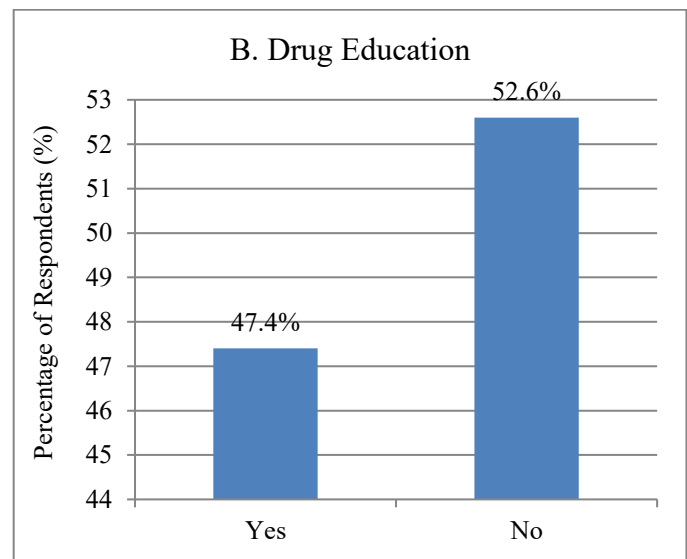
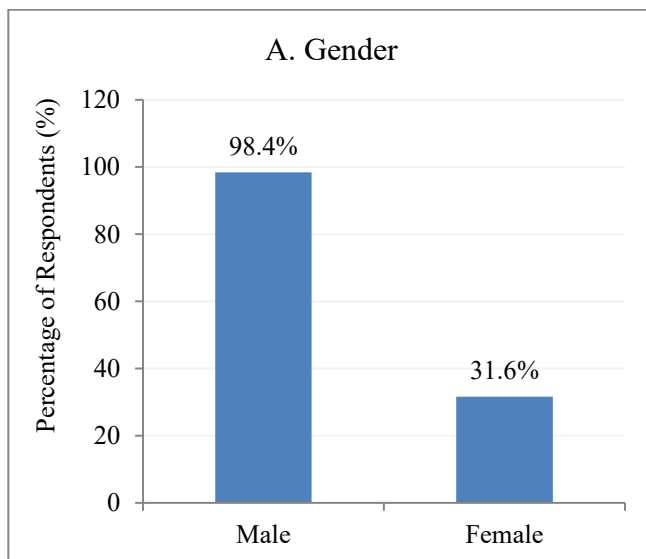
4. Results and Discussion

4.1. Results

The survey provided a total of 22 responses, but three of them were the same and, therefore, were eliminated, leaving 19 distinct participants as the final analytic sample. The age of the participants was between 17 and 60 years, with the average age of 27.8 years ($SD = 10.9$). The sample was predominantly male ($n = 13$, 68.4%), with females comprising 31.6% ($n = 6$). The average age of substance initiation was 17.8 years ($SD = 2.2$), and the initiation generally took place in mid-to-late adolescence.

As far as previous exposure to drug education in school is concerned, 47.4% ($n = 9$) of interviewees said that they received drug education in school, and 52.6% ($n = 10$) said that they never received drug education. Nonetheless, the knowledge about the side effects of drugs before the rehabilitation process was still low in general. Nearly 36.8% ($n = 7$) answered that they did not know anything about it, 36.8% ($n = 7$) answered that they had limited knowledge, and only 21.1% ($n = 4$) answered that they had high levels of knowledge.

Patterns of substance use suggested that the most frequently reported substance was alcohol (47.4% $n=9$), then opioids and opioid-related substances (31.6), and currently nicotine or tobacco products (26.3). Lower percentages stated marijuana (5.3%) and cocaine use (5.3%). Some of the respondents stated that they used polysubstances. Recovery time ranged between a month and 30 years, indicating a great heterogeneity in recovery experiences in the sample.



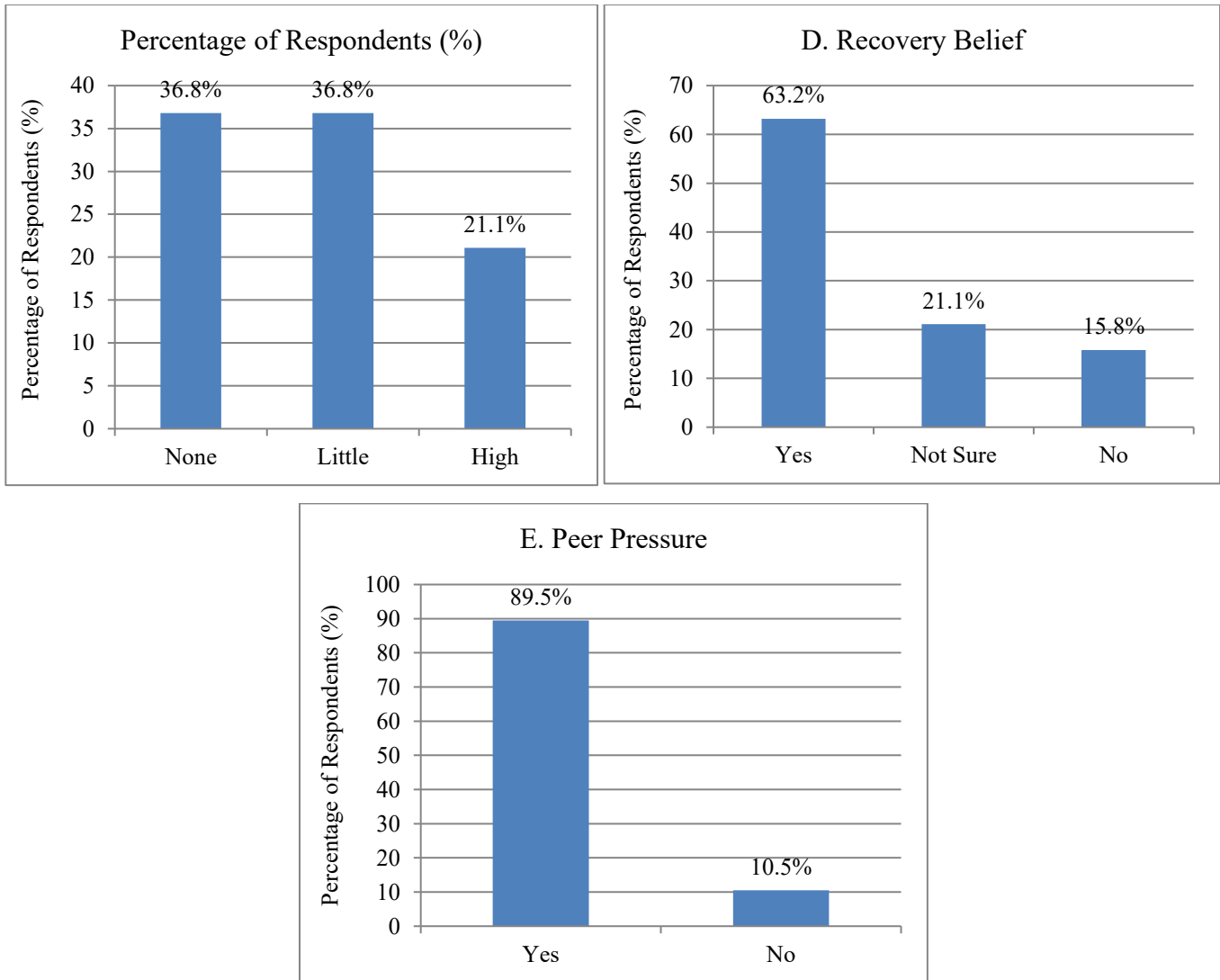


Fig. 1 Dissemination of Participant Characteristics and Beliefs (N = 19)

Panel figure that shows the percentage distribution of the most important demographic traits, levels of knowledge, and beliefs of participants. Gender distribution is shown in Panel A, previous exposure to school-based drug education is shown in Panel B, the level of knowledge about the side effects of drugs is shown in Panel C, the belief about the possibility of recovery is shown in Panel D, and the perceived peer pressure is one of the factors contributing to substance use as shown in Panel E. Values are all given as percentages of the total sample and axes standardized to 0 to 100 per cent so that all panels can be directly compared.

The perceptions about addiction and recovery were also different. While 42.1% (n = 8) believed addiction could be inherited, 36.8% (n = 7) did not, and 21.1% (n = 4) were unsure. Most participants (63.2, n = 12) expressed the opinion that recovery is possible, 21.1% (n = 4) expressed doubt, and 15.8% (n = 3) expressed the view that recovery is not possible. Over one-half of the participants (52.6, n = 10)

thought that social media romanticizes drug use, and 57.9 (n = 11) said that stress makes substance abuse more likely. The peer-related factors were also found to be especially relevant, with 89.5% (n = 17) stating that peer pressure contributed to their substance addiction and the same percentage stating that their friends were also using substances.

Statistical tests were performed on inferential statistics to test the associations between variables of interest. Chi-square tests of independence did not find any statistically significant relationship between gender and the type of primary substance used, $\chi^2(1) = 0.12$, $p > .05$, and thus the use patterns by the different genders were not significantly different. In the same vein, the relationship between the knowledge of drug effects and prior school-based drug education was also not significant, $\chi^2 = 0.89$, $p > .05$, indicating no relationship between formal exposure to drug education and level of perceived knowledge.

Conversely, the perceived peer pressure and the friends using substances showed a statistically significant relationship, $\chi^2 = 6.50$, $p < .05$. The respondents who noted peer pressure as a factor of influence were much more likely to note that their peers were involved in substance use, which supports the role of social settings in addiction.

The rank correlation test by Spearman showed that there was a positive moderate correlation between the age of participants and the age of substance initiation ($\rho = 0.42$, $p < 0.05$), which revealed that the older the participant, the later the substance initiation age, but it was found that the

relationship is moderate positive in nature. There was no statistically significant correlation between prior knowledge of drug effects and belief in recovery ($\rho = 0.30$, $p > 0.05$).

The exploratory logistic regression analysis was used to determine the predictors of belief in recovery by considering the level of knowledge, peer pressure, and perceived stress as risk factors. Findings showed that social variables, especially peer-related factors, showed rather high predictive power in relation to knowledge-based variables, and the majority of predictors were not statistically significant. This insignificance can probably be explained by the small sample size and low statistical power.

Table 1. Summary of Inferential Statistical Tests

Analysis	Variables	Test Statistic	p-value	Interpretation
Chi-square	Gender $\times$ Substance Type	$\chi^2 = 0.12$	$> .05$	Not significant
Chi-square	Education $\times$ Knowledge	$\chi^2 = 0.89$	$> .05$	Not significant
Chi-square	Peer Pressure $\times$ Friends Use	$\chi^2 = 6.50$	$< .05$	Significant
Spearman Correlation	Age $\times$ Age of Initiation	$\rho = .42$	$< .05$	Moderate positive
Spearman Correlation	Knowledge $\times$ Recovery Belief	$\rho = .30$	$> .05$	Not significant

In general, the results show that demographic and educational variables did not reveal any statistical correlation with the substance use behaviors and knowledge level, but social variables, especially those related to peers, revealed a statistically significant correlation with the experiences of addiction.

The results can only be used with caution because the study is exploratory in nature, and the sample size is rather small; the results are not supposed to be used to determine the causal relationships; instead, they would outline some rough patterns that can be used in future studies.

4.2. Discussion

The current research was designed to explore trends in substance use, awareness of drug-related harms, and perceived social factors among addicts and recovery participants who had different experiences of addiction and recovery. The results indicate the critical role of social settings, early onset, and lack of prior knowledge in the development of substance use behaviors, as well as a relatively optimistic perspective of recovery.

Among the most prominent results was the early age of substance initiation, where the majority of the participants stated they first used substances in adolescence. This is in line with the available literature that adolescence is a critical stage in human development that is characterized by heightened susceptibility to risk-taking actions and external factors [21]. Early onset has been again and again linked to an increased risk of substance dependency in adulthood, implying that prevention programs should focus on

intervention of people prior to or during early adolescence and not later [22]. It was also found that participants tended to report low amounts of prior knowledge on the adverse consequences of drugs prior to rehabilitation, with most reporting either no prior knowledge or little prior knowledge. Interestingly, this ignorance was not closely associated with the fact that the respondents had undergone drug education at schools.

This observation raises important questions concerning the effectiveness of current education practices. Past studies have also cast doubt on the effectiveness of the old drug education programs, claiming that most of them do not result in long-term behavior change [23]. It argues that drug education alone might not be enough, and the content, delivery or engagement approaches of such programs could be highly enhanced.

The social influences turned out to be a strong factor in the dataset. Statistically significant correlation was observed between the perceived peer pressure and a friend who used substances, which shows that the individuals who are involved in substance-using social networks are more likely to be pressured into the substance-use behavior. Moreover, almost every respondent said that their friends were using drugs as well, which supports the fact that addiction is not only a personal process but a process that is deeply rooted in social settings [24]. This follows the social learning theory, which assumes that behavior is acquired and strengthened through observation and interaction with other people. Previous researchers have also proved peer substance use to be among the best predictors of individual substance use behaviors.

Besides peer influence, social media was extensively viewed by the participants to have a role in the glamourization of drug use. Although this variable was not tested inferentially, the large number of positive responses is indicative of the possibility that media settings could be contributing to the normalization or even encouragement of substance use behaviors. The emerging research on this topic supports this finding by showing that exposure to substance-related material on digital platforms is capable of altering attitudes and predisposing to experimentation, especially among adolescents.

Although most of the participants had the belief that they could get back on their feet despite the risk factors, most participants believed that recovery was possible. This is a promising result, and it is consistent with recovery-oriented models that focus on resilience, social support, and the possibility of long-term behavioral change. Nonetheless, a significant minority were doubtful or cynical, noting that more support mechanisms, awareness, and available treatment options are needed to support the achievement of recovery [25]. The moderate correlation between age and age of substance initiation indicates that there may be some variation in the pattern of onset in the various age groups. There was, however, no significant correlation between prior knowledge and the belief in recovery, which means that the understanding of drug harms is not always associated with hope of recovery. This may be attributed to the multidimensionality and complexity of addiction, where the perceptions regarding recovery are informed by knowledge, personal experience, social support, and psychology [26].

In general, the results highlight the need to tackle addiction as a social phenomenon. The interventions must not only be concerned with individual knowledge and behavior, but should also be mindful of peer networks, family dynamics and even broader cultural influences such as media representations. Prevention strategies must focus on early intervention, especially in the teenage years, and enhance the quality and effectiveness of educational programs.

The study has a number of limitations that should be mentioned. Small sample size restricts the ability to generalize the results and decreases the inferential analysis statistic power. Also, there is the risk of recall bias and social desirability bias as a result of using self-reported data. The cross-sectional design also restricts the possibility to make causal conclusions. Lastly, the inadequate depth of thematic analysis was limited by the absence of in-depth narrative responses in the qualitative aspect.

Further studies ought to focus on larger and more heterogeneous samples, include longitudinal research designs to get a deeper insight into causal associations, and gather more qualitative information to get deeper insights into lived

experiences. More research on the efficacy of drug education interventions and the impact of digital media on the perception of substance use would also prove useful.

To sum up, this research emphasizes the essential role of social settings, exposure at a young age and lack of knowledge in the comprehension of substance use behaviors. Although the results support the previously existing theories of addiction, they also underscore the importance of more effective, socially informed, and developmentally focused interventions.

5. Conclusion

The study provides an insight into the interaction between knowledge and social interactions on substance use practices among individuals who have experienced the life of addiction and recovery. The findings make it clear that the use of substances is not an individual affair, but rather it is very deeply rooted in social context, particularly peer groups. The strong association of peer pressure with substance use among friends justifies the importance of taking into consideration the social contexts in prevention and intervention.

The findings also show that there is an acute knowledge deficit on the harmful effects of drugs, since a majority of the interviewees say they never knew about the effects of drugs until they were rehabilitated. The inability to establish a correlation between school-based drug education and the degree of knowledge suggests that the existing approaches to education may be insufficient when it comes to informing about the risks of substance use.

This indicates that there is a need to have more interesting, recurring and evidence-based teaching methods. Positively, most of the participants believed that recovery is a possibility, which means that there is hope and strength even among participants who had the experience of substance use. This highlights the significance of recovery-focused interventions, which focus on support networks, treatment availability and positive reinforcement.

On the whole, the research adds to the existing literature that emphasizes the role of early intervention, better education, and the social and environmental aspects of substance use treatment. Although the results are exploratory because of the small sample size, it forms a good basis to be used in future studies and practice during prevention and rehabilitation initiatives.

Conflicts of Interest

There is no potential conflict of interest to disclose.

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