



Substance Use Disorders in Children and Young Adults

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Introduction

Psychoactive substance use is usually initiated in adolescence. As per 2016 estimate, over 25% of the world's population was aged below 14 years and over 15% were aged 15 to 24 years.¹ In India, 42% of the population is said to fall under the age group of 18 years, rendering research in this age group even more important.² Literature suggests that over half of all lifetime cases of psychiatric disorders, including substance use disorders (SUD), start before the age of 14 years.³

As per the United Nations Office on Drugs and Crime World Drug Report (2019), about 0.7% of the world's population have substance use disorder.⁴ Rapid alterations in physiology and neurobiology place the children and adolescents in a particularly vulnerable position. Persons of this age group express greater curiosity and are readily influenced by peers or other social stressors, and these all factors are often leading to substance use or experimentation.^{5,6} The latest UN drug report warns that the COVID pandemic is likely to worsen the drug use and drug cultivation scenario along with greater adverse impact on the poor and marginalized sections.⁴

As per a prevalence study done in 2008, in India 13% of individuals involved in substance abuse are below 20 years of age.⁷ Majority of adults with substance use disorder start drug use during the adolescent phase and age of initiating drugs is also falling progressively.^{7,8} Their substance use, behavioral problems, and crime are interrelated.⁸

Children and adolescents generally have briefer history of substance involvement, they have higher chances of episodic substance use than chronic daily use, with less incidence of progressive disorder, medical complications, and other consequences of protracted use, and with propensity for improvement by early adulthood.⁹ In typology of alcoholism, Babor Type B or Cloninger Type II alcoholism is characteristically seen with earlier age of onset, stronger family history, more severe dependence, and greater impairment in longer runs.¹⁰

They tend to have experimentation with varied types of substances, and consequently having more complicated withdrawal patterns. Substance use in children and adolescents is more often associated with co-occurring psychiatric comorbidity, family disruption, academic problems, problem behaviors, deviance, and peer drug use and their developmental changes also exacerbate the effects of substances.⁹

As per the current evidence, early exposure of addictive substances increases the propensity of SUD in adulthood with more adverse consequences in social, academic, and occupational domains.¹¹ Hence, timely prevention and evidence-based treatment approaches are necessary to prevent long-term adverse social and health consequences.¹²

In this narrative review, we intend to focus on the patterns of drug use, epidemiology, etiology risk factors, and management for substance use amongst those below 18 years of age.

Search Methodology

Electronic databases and manual searching was used for this narrative review. Electronic databases and manual searching of relevant publications or cross-references was done. We searched for published literature of the previous 10 years on PubMed, Cochrane database, and Google Scholar until June 2021. The search terms used were “Childhood OR Adolescent” SUD, prevalence, epidemiology, risk factors, treatment, management, and neurobiology in various combinations. We tried to include as many studies as possible found relevant to our area of interest and have not restricted ourselves to a particular methodology since we intended this review to be a narrative review.

Epidemiology

Global Trends

Although substance use is more commonly seen in the individuals above 18 years of age, but adolescents are particularly vulnerable to use the substances. Alcohol, tobacco, and cannabis are commonly used substances amongst adolescents.

As per the latest UN drug report, use of cannabis among adolescents has increased drastically in the last decade while percentage of adolescents perceiving cannabis as not harmful has increased by around 40%.⁴

As per Monitoring the Future study from the United States, the most common substance used in adolescents is alcohol and over 50% of 18-year-old people report lifetime alcohol use. Cannabis (45%) and cigarettes (31%) are the other commonly used substances in this age group.¹³

As per the latest Health Behavior in School-aged Children survey for European nations and Canada, though alcohol and tobacco use has seen a declining trend, the number of current alcohol and tobacco users is high among 15-year-olds. One in five 15-year-olds (20%) have been drunk twice or more in their lifetime, and almost 1 in 7 (15%) had been drunk in the last 30 days.¹⁴

Use of e-cigarettes or vaping was also found to be a prevalent mode for tobacco use amongst adolescents in 2017 as per literature from the United States and similar findings have been reported by the World Drug Report.⁴

Trends in India

According to National Drug Survey conducted in 2019, the prevalence of current use among adolescents is 1.8% for opioids, 1.3% for alcohol, 1.17% for volatile solvents, and 0.9% for cannabis.¹⁵

As per Global Youth Tobacco Survey (GYTS-4) conducted in 2019, among 80,772 students aged 13 to 15 years, one-fifth of the students ever used any form of the tobacco product and 2.8% students ever used e-cigarette. Current prevalence of tobacco use was 8.5% (smoking tobacco 7.3% and smokeless tobacco 4.1%).¹⁶

A nationwide study was conducted by the National Commission for Prevention of Child Rights in 2013 including 4,000 children aged <18 years from 100 cities of 29 states/ UTs, who had used at least 1 substance (besides tobacco) in the past year. The commonest drugs of abuse were tobacco (83.2%) and alcohol (67.7%). This was followed by cannabis (35.4%), inhalants (34.7%), pharmaceutical opioids (18.1%), sedatives (7.9%), and heroin/smack (7.9 in this age group).¹⁷ The lowest age of onset of use was for tobacco and inhalants at

around 12 years of age, probably because of easy access and availability of these substances. These appeared to be the “gateway” substances for use of other drugs in the future. Substance use seemed to be greater in slum and urban areas as compared to rural areas.¹⁷

Similar pattern was seen amongst girls who formed 4.3% of the population. The type of substance most commonly used varied with the region of the country. For example, Karnataka and Andhra Pradesh reported greater alcohol use in this age group while injectable heroin use was relatively common in Mizoram.¹⁸

Data From Street Children

Children living on the street are at the greatest risk of substance use. All studies done so far revealed high prevalence of substance use in this population. Inhalant use is particularly high, with over 20% prevalence in most studies. As per a meta-analysis of 50 studies from 22 countries, the lifetime prevalence of substance use in street children from India was greater (81%) than global average (overall 60%).¹⁹

An estimated 18 million children live and work on streets in India. Several cross-sectional studies have been done in children and adolescents living in urban slum areas of Karimnagar, Bangalore, Delhi, Ahmednagar, Kolkata, and Guwahati and found 40% to 70% prevalence of substance use in street children. Industrial glues and petrol were found to be used in high proportions, followed by tobacco, alcohol, and cannabis.²⁰⁻²⁵

The substances they use are frequently selected for their low price, widespread availability, and ability to induce a sense of euphoria instantly.¹ Poverty, urbanization, breakdown of families, domestic violence, and child labor were important correlates of substance abuse in street children.¹⁷

Etiology and Risk Factors

Drug exposure in early adolescence can increase the risk of SUD in the long term.²⁶ Factors that lead to early substance use behavior consist of social, cultural, familial, biological, and innate traits. Most of these observations are based on cross-sectional studies, and longitudinal studies on the topic are scanty.²⁷

Biological Factors

Substance use in early age generally interferes with ongoing neurodevelopmental changes and also induce neurobiological alterations that further augment the risk of SUD. In line with the maturation phase, different brain regions are affected by the drug exposure and these modifications further interact with psychosocial

factors. For example, immature prefrontal cortex (PFC) combines with hyper-reactivity of reward salience and stress systems to increase individual's risk for substance use.²⁸

PFC continue maturation till early adulthood and therefore substance use during adolescence can induce changes in PFC activity and PFC projections to subcortical regions, which many persist in adulthood and increases the risk of SUD.²⁹

Adolescents tend to have greater impulsivity because of a lesser control of the PFC control over subcortical and limbic urges. It has been shown that social cues also tend to stimulate the limbic circuitry more in adolescents than in adults. The hormonal changes in an adolescent's body coupled with the environmental stress leads to increased vulnerability of substance use.³⁰

The information provided by the PFC serves as a major source of pathway for inhibitory control over subcortical impulses such as drug use. The nucleus accumbens whose dopamine release increases dramatically with drug use receives decision-making information from the PFC.³¹

Adolescents with an externalizing set of symptoms are at risk and show lower prefrontal activity and cortical thinning as opposed to those with an internalizing set of symptoms who demonstrate a lesser striatal activity. This tends to show that different pathways might be implicated for different set of symptoms.¹¹

Social and Psychological Factors

Predisposing risk factors such as adverse life events including child sexual or physical abuse, attention deficit hyperactivity disorder, conduct disorders, other externalizing disorders, parental substance abuse, criminal history, excess use of screen, social media or pathological internet use, parenting issues like permissive, authoritarian, neglectful parenting, family issues, and so on may lead to early-onset drug use.^{4,11}

As per the World Drug Report (2021), marginalization in society, poor socio-economic status, and low education levels predispose toward drug use and associated adverse consequences.⁴ Experimentation, curiosity, and tendency to succumb to peer pressure comes naturally to this age group.

Externalizing spectrum disorders have been found to be clearly linked with risky behaviors such as substance use. However, association with internalizing spectrum disorder is less clear.¹⁰ Peer influence is a huge factor contributing to substance use behavior, especially amongst adolescents.^{5,6} Substance use has been found to be associated with family history of substance use disorder and parental antisocial personality disorders.^{32,33}

Protective Factors

Strong parental attachment, association with well-resourced communities, psychological well-being, and so on have been associated with less risk for substance use-related problems.¹ There is a consensus that having good affective experiences, communication, authoritative parenting, secure attachments during early childhood, and future orientation improves emotional development, mental health, and prevent risk of drug use.

Substance Use During COVID-19 Pandemic

Substance users have higher risk of getting coronavirus infection, with greater respiratory symptoms and disease severity.³⁴ Depending on the availability, substance use has also increased significantly during COVID pandemic. A study on substance use among 1,054 Canadian adolescents reported increase in alcohol and cannabis use, with significantly ignoring the social distancing and other COVID- related precautions.^{35,36}

Table 1. Screening Tools for Substance-Related Problems in Adolescents.

Tools	Population	Description
Screening to brief intervention (S2BI) ³⁷	Adolescents	Single frequency question for past 1 year's use of tobacco, alcohol, and marijuana (most common in adolescents). Takes less than 120 s.
Brief Screener for Alcohol, Tobacco or other Drugs (BSTAD) ³⁸	Adolescents	Frequency of use questions regarding various substances is asked. Those who report use are further questioned. Take less than 120 s.
Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST) ³⁹	Adolescents, Adults	An 8-item screening tool by WHO. Used to detect and manage substance use and related problems in primary and general medical care settings. Available in many languages.

Alcohol Use Disorders Identification Test (AUDIT) ⁴⁰	Adolescents, Adults	A 10-item screening tool developed by WHO. Used to identify hazardous or harmful alcohol consumption. It is available in 5 languages.
CRAFFT (Car, Relax, Alone, Forget, Family or Friends, Trouble)/ CRAFFT ^{2.141}	Adolescents	A 6-item screening instrument. Test covers alcohol and drugs, and situations that are relevant to adolescents.
(Drug Abuse Screen Test) DAST-A ⁴²	Adolescents	A 28-item DAST for adolescents. A 10-item condensed version is also available. It is a brief, self-report instrument for population screening, clinical case finding, and treatment
Michigan Alcohol Screening Test (MAST) ⁴³	Adults, Adolescents, Seniors	A 25-item instrument providing a general measure of lifetime alcohol problem severity. A 13-item version (Short MAST) and geriatric version (MASTG) are available.
Problem Oriented Screening Instrument for Teenagers (POSIT) ⁴⁴	Adolescents (12-19 years)	The scale has over 130 items. Its 17-item substance use/abuse subscale was found to be reliable and valid with adolescents referred to an assessment service for substance use evaluation.
National Institute on Alcohol Abuse and Alcoholism (NIAAA) Screening Guide ⁴⁵	Older age-specific screening questions (9-11, 11-14, and 14- 18 years of age)	Only 2 questionnaire long and is specific for alcohol-related problems

Screening

World Health Organization (WHO) recommends screening in this population and it should cover severity of substance use, safety issues like vulnerability to abuse of different kinds, and risk of harm to others and self.⁹ It

has been recommended that clinicians including pediatricians familiarize themselves for skills related to screening, referral, and brief intervention.³⁴

Standardized Tools

Standardized screening tools for identifying SUD in adolescents are available and detailed in Table 1. All these tools³⁷⁻⁴⁵ can be used for adolescents while Cut down, Annoyed, Guilty, Eye opener (CAGE)⁴⁶ can only be used for those 16 years and older. Laboratory testing, most commonly urine drug testing, can be used in selected cases.⁴⁴

Comprehensive assessment tools are also available to measure substance use disorder in adolescents such as Personal experience inventory (PEI), Teen-Addiction severity index (TASI), Drug use screening inventory adolescents (DUSI- A), Global appraisal of individual needs (GAIN), Problem recognition questionnaire (PRQ), Comprehensive adolescent severity index for adolescents (CASI-A), Adolescent Problem Severity Index (APSI), Adolescent drug abuse diagnosis (ADAD), Adolescent Drinking Index (ADI), and Customary drinking and drug use record (CDDR).⁹

Drug Testing

Urine, blood, saliva, hair, breath, sweat, and meconium can all act as medium for drug testing. All have different rates and mechanisms for excretion and hence, offer different windows of time for testing. Urine drug testing is by far the most commonly used. Consent from subject is important in all cases except in emergencies.^{47,48}

Prevention

Preventive strategies can be implemented at the level of school, family, and community. Social resistance skills, normative education, and adaptive ways to address the sociocultural and environmental pressures are the basic approaches employed at the levels of schools with mainly teaching them assertiveness, active coping, problem solving, and social skills techniques. Improving family bonding, cohesion, communication, and parental supervision with adaptive parenting practices are key measures employed by parents and family.⁴⁹

Although there is lack of robust evidence for efficacy of specific preventive strategies or screening techniques in children and adolescents.⁵⁰ Studies have looked into parent management intervention in children showing disruptive behavior and also interventions targeting children with particular traits or personality-targeted approaches where emphasis is on coping rather than personality change.

There is consistent but small evidence for family- based interventions for alcohol misuse amongst adolescents. Community-based interventions have also been found to be effective in reducing the amount and frequency of drinking amongst adolescent students.⁵¹

For use of other substances, school-based interventions targeting social influence have shown some efficacy especially with regard to cannabis. For combined substance use, school- based prevention programs emphasizing on assertiveness, personalized feedback, information, self-management, and social skills have been found effective in decreasing cannabis and alcohol use amongst adolescents.⁵²

As per recent Cochrane review, only 3 interventions (unplugged program, life skill training program, and good behavior game) have sufficient evidence for efficacy. These all programs are universal, school-based preventive interventions.⁵³

Mass Media and the Digital Platform

The latest UN drug report also warns of easy availability of drugs and substances through newer platforms such as the “dark net” or drug markets on the Internet to which many in the younger age group can have quick access.⁴

The digital platform like the web, mobile phones, and video games which is frequently accessed by adolescents and youth has also been an area of interest for delivery of substance use prevention and treatment. Since children and adolescents are more connected and approachable through social media and virtual world, cyberspace and other forms of electronic media can play a vital role in spreading awareness about drug abuse, associated issues, and complications along with teaching appropriate skills and measures to prevent substance use.⁸

Use of mobiles to deliver text messages was found to be an effective way to deliver messages regarding alcohol use in 1 study. Mass media campaigns and policy changes are other ways of prevention whose impact

is often studied.⁵⁴ The association between youth's exposure to prodrug media messages and substance use (eg, tobacco and alcohol use) is well documented.⁵⁴ However, there are no systematic studies regarding the same.

Prohibition of Use and Restriction of Sale of Controlled Substances

The Narcotic Drugs and Psychotropic Substances Act, 1985 (NDPS Act) passed by the Indian parliament prohibits cultivation, production, possession, sale, purchase, trade, import, export, use and consumption of narcotic drugs, and psychotropic substances except for medical and scientific purposes in accordance with the law. Prohibition of sale, purchase, and consumption of alcohol is applicable in a number of states in India. Observing dry days on major religious festivals and national holidays such as Republic Day, Independence Day, and Gandhi Jayanti also add to control measures. However, there is no robust evidences to prove that prohibiting use and restricting sale of controlled substances lower the prevalence of use.⁸

Ban on Advertisement Related to Controlled Substance

Adolescents exposed to tobacco advertisements are more likely to smoke than those who are not exposed. Advertisement is responsible for up to 30% of tobacco and alcohol use in adolescents. Unfortunately, not only are messages surrounding alcohol and tobacco products pervasive but they are also persuasive. Therefore, ban on advertisement of alcohol, tobacco, and other substances is a vital approach to curb drug use at early age as well as to prevent substance abuse in later years.^{55,56}

Advertising alcoholic beverages has been banned in India as per the Cable Television Network (Regulation) Amendment Bill, 2000. The Cigarettes and Other Tobacco Products Act, 2003 under Section 5 bans the advertising of the use of cigarettes and other tobacco products. However, surrogate advertising is active on television and digital medium in the absence of clear guidelines.^{8,57}

Competence-Enhancement

Competence-enhancement programs are quite helpful in controlling the rising burden. Social skill training, social resistance skills, and life skill training enhance life skills of this vulnerable population and motivate them to follow more adaptive coping strategies. It also aids to recognize situations where they are likely to experience peer pressure to smoke, drink, or use controlled substances. In India, the inclusion for substance use information as a compulsory component in school curriculum represents a major step taken in this regard.⁵⁸

Behavior Change Communication (BCC)

BCC focuses on behavior change of a person and brings out positive outcomes. In India, there have been continued and sustained efforts by the experts making people aware about different domains of substance use through electronic and print media.^{59,60}

Other Measures

Imparting formal training to health professionals and capacity building programs for identifying indicators, assessment, and management principles of substance use in children and adolescents may prove beneficial in early identification and timely treatment and appropriate liaison and referral. Pediatricians, primary health-care professionals, general physicians, or other professionals who come in contact with children and adolescents should keep a close watch on their psychosocial milieu and developmental issues, which may contribute to the risk of substance use.³⁶

Treatment

Generally, comprehensive assessment and treatment is done at outpatient level. Inpatient treatment should be reserved for individuals with severe dependence, polysubstance dependence, and multiple failed abstinence attempts in the past, significant health complications, minimal family support, distance from treatment facility, or other issues interfering in treatment process.⁹

Comprehensive assessment includes elaborate history of substance use, associated medical complications, psychological issues (eg, attention deficit/hyperactivity disorders, conduct disorder, depression, other disorders, temperament, parenting issues, etc), social, academic, and family issues, detailed mental state examination, assessment of motivation, locus of control, and social support.⁹

In laboratory testing, routine investigation, urine drug screening, and serology for viral markers in subjects with high-risk behaviors should be done routinely along with other investigations for associated conditions. Baseline investigations aid in choosing medications and appropriate consultation with other specialist for comprehensive management.⁹

The need to seek parental consent in this age group because of limited capacity of consent further complicates the picture. Collaboration with school, continuation of formal education, and involvement of community all

need to be considered in treatment planning. Treatment needs to be individualized to the unique individual, and importantly psychoeducation must be imparted with addressing all the components.¹²

Combined pharmacological and psychosocial interventions are considered best wherever appropriate. Children or adolescents with substance-related issues must be included in treatment while discussing the plan of management along with the caregivers.¹² It is important to note that management strategy and treatment course may vary significantly from person to person depending on the type of substance used and the patient profile.

Treatment mainly focuses on psychosocial interventions and these interventions can be individual based, family based, or group psychotherapies. Multimodal and more intensive therapies seem to be more efficacious as compared to brief interventions.⁶¹ Overall, evidence for psychotherapy in children and adolescents for SUD is limited.

There is evidence for ecological family-based treatment, group cognitive-behavioral therapy (CBT), and individual CBT, behavioral family therapy, and motivational enhancement therapy (MET).^{5,6} Combined treatments incorporating above elements and contingency management (CM) is more efficacious.⁵⁴

These psychosocial interventions are fairly comparable with moderate treatment effect size on reduction in substance use, but with relatively low rates of abstinence from about 20% with group MET/CBT or family-based interventions, 30% with individual MET/PC, and to approximately 50% with adding CM and individual MET/PC.⁵³

Additionally, there should be more emphasis on dropout children for their re-entry into school with addressing school readjustment issues to bring them in mainstream, and imparting life skill-based approaches and vocational rehabilitation for comprehensive management.⁹

The use of Internet, computer, and mobile phone technologies, collectively referred to as electronic brief interventions is evolving for adolescent substance use but so far the evidence is limited.^{62,63}

Pharmacological Interventions

Caregivers should provide legal consent for medication use in each case and the child or adolescent should be actively involved in psychoeducation and treatment.¹² To date, only buprenorphine-naloxone possesses FDA

approval for opioid use disorder in youth aged 16 and older. There is some support for use of methadone also but use of opioid agonists should probably be considered only in those with high risk for relapse.⁵⁰

Preliminary evidence exists for the safety and efficacy of naltrexone, disulfiram, ondansetron, and topiramate for alcohol use disorders. For alcohol-related withdrawal, benzodiazepine use is advisable like in the adult population.⁶² For tobacco use disorders, varenicline and bupropion-SR may be tried with close monitoring for psychiatric problems and suicidality. There is some evidence for use of nicotine patch.⁶³ For cannabis use disorders, N-acetylcysteine can be considered based on current literature. Other medications have been studied at least preliminarily for youth alcohol, tobacco, cannabis, and opioid use disorders, yielding mixed results.^{50, 62, 64}

To sum up, evidence is limited for the pharmacological options in children and adolescents, only 3 medications have been tested in adolescents with alcohol and cannabis use disorders and only 2 have warranted further study (ie, naltrexone for alcohol and N-acetylcysteine for cannabis use disorder). The most promising pharmacological agents for adolescents are buprenorphine (for opioid) and bupropion and varenicline (for tobacco).⁶⁶

Conclusion

There is limited research for SUD in children and adolescents. Research and practices in the adult population often guide treatment in the former. Age appropriate psychosocial treatment has shown promising results amongst adolescents but the research evidence is limited.

Adolescents and children seldom present with substance use problems to the health facilities, and consultations generally have long delay and infrequent follow-up. There is a wide treatment gap that exists in terms of those suffering and those who are able to receive adequate treatment, which is more evident in marginalized groups.

Substance use is largely initiated in childhood and adolescence. Amongst the substances, those not legally prohibited and easily available, such as tobacco and alcohol, remain the most commonly used followed by cannabis for almost all regions of the world. Early use of onset is also associated with poorer prognosis and other mental health disorders. This population is also more vulnerable to substance use-related neurobiological changes in the brain besides other psychosocial problems such as delinquency. Early intervention and prevention in this subgroup is therefore essential.

Public awareness, sensitization, and early identification of risk and protective factors is crucial for reducing the risk of substance use in children and adolescents. Preventive intervention should be implemented at universal, selective, or indicated level, to maximize their resilience and adaptive skills prior to the sensitive adolescent period. There is a need for high-quality research and understanding regarding substance use pattern, prevalence, and risk factors in this age group, especially in low- and middle-income countries such as India.

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