

Inhalant Abuse in a Teenager with Depression: A Case Report

P S Vaibhavi¹, B K Shivakumar²

ABSTRACT

Substance use disorders are of rising concern in the current world with trends towards adolescents owing to various developmental changes occurring during this age group. Though alcohol and smoking are commonly studied substance use disorder, inhalants which are easily available are under reported as addictions. The case report presented elaborates the inhalant use disorder by sniffing petrol in the adolescent since 2 years who initially presented with medical complication with pervasive low mood history accounting to persistent depressive disorder. Patient showed improvement in both reduction in inhalant use and decreased low mood on treatment with antidepressants. Screening for inhalant use disorders in adolescents is emphasized for early diagnosis and management of the cases.

KEY WORDS: Inhalant use disorder, Adolescent, Depression.

Introduction

Inhalant use disorders commonly seen in adolescence, has been a matter of concern across the world and is widely under reported mainly attributing to lack of awareness apart from decreased access to mental healthcare facility.^[1] Inhalant Use Disorders has been prevalent in India which has been sporadically reported in the last 2 decades.

Inhalant abuse refers to the intentional inhalation of vapours from commercial products or specific chemical agents to achieve intoxication.^[2,3] Due to short lasting effect, repeated sensation seeking behaviour is seen in the abusers. In Indian literature, the commonly abused inhalants reported are petrol and typewriter print erasing fluid.^[4]

Substance use disorders are commonly associated with mood and anxiety disorders which at times can be substance induced also, as plenty of the

literature illustrates the latter with respect to alcohol use disorders.^[4,5] However there is lack of literature linking inhalation use disorder with depression.

Case Report

A 18yr old boy studying in private college, firstborn to non-consanguineous parents living with parents and younger brother hailing from urban background, presented to hospital with symptoms of fever, cough and difficulty in breathing with extreme tiredness and was diagnosed with pneumonia. Psychiatric reference was given as parents reported to physicians about their son's frequent petrol inhalation behaviour.

History of inhalation of petrol was reported since 2 years. Patient used to like the smell of petrol which he initially started to inhale for approximately 5 mins/day in occasional pattern in the first 3 or 4 months, for 1 to 1 1/2 years. He gradually increased the frequency to once in 1 or 2 months since he used to feel relaxed after inhaling petrol. He continued to inhale petrol 1-2 times a week in the next 6 months during which parents who were then unaware about this behaviour, report 2 episodes of unconscious/unresponsive state at home from which he recovered completely with minimal intervention. Since last 1 month, patient reports craving and increase in inhalant use about 4 to 5 times per week for nearly

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¹Assistant Professor, Department of Psychiatry, Adichunchanagiri Institute of Medical Sciences, B G Nagara, Adichunchanagiri University, Mandya, 571448, Karnataka, India, ²Professor & HOD, Department of Psychiatry, SCMCH & RI, Channapatna Taluk, Ramanagara District, Karnataka, India

Address for correspondence:

P S Vaibhavi, Assistant Professor, Department of Psychiatry, Adichunchanagiri Institute of Medical Sciences, B G Nagara, Adichunchanagiri University, Mandya, 571448, Karnataka, India. E-mail: vaibhavi.ps@gmail.com

10 mints each.

History of low mood was elicited since 2 yrs as reported by parents and patient with stressor in the form of frequent fights among parents due to interpersonal issues (IP) issues. Patient would go away in his bike whenever there would be quarrel among parents and would resort to inhalant use in the neighbourhood and used to return home dull and drowsy. Initially parents were unaware of son's petrol sniffing but noticed pervasive low mood, decreased interaction, low self-esteem & self-confidence, decreasing scholastic performance which was gradually progressing since the last 2 years. Patient also reported sleep disturbances and decreased appetite since the last 6 months.

However, no history of death wishes, or active suicidal thoughts were reported with no history of suicidal attempts or admissions due to excessive petrol sniffing in the past. There was no history of seizures, head injury, other substance use, or symptoms suggestive of delusions or hallucinations. No history suggestive of delayed milestones pointing to Intellectual Disability disorder (IDD), Attention Deficit Hyperactive Disorder (ADHD) or Conduct Disorder (CD) features.

On examination, increased pulse rate 108/min, respiratory rate - 26/min, temperature 101°F and SpO₂ -93% were noted. Chest examination revealed decreased breath sounds at base of the lung. Blood investigations showed haemoglobin levels of 11.2g/dl, total count - 12,300 with raised neutrophil count of 85%. ECG showed sinus tachycardia while the chest X-ray showed bilateral lower field small patchy consolidation.

After one week of medical stabilisation the patient was given the reference for psychiatry consultation prior discharge. Patient was diagnosed with dysthymia (Persistent depressive disorder) with inhalant use disorder and was started on Cap. Fluoxetine 20mg 1-0-0 and Tab clonazepam 0.25 mg was given for 1 week and stopped. Patient has been under regular follow since 3 months with improved mood & sleep and no further use of inhalants.

Discussion

Inhalant abuse disorder is one of the up-surging issue among the adolescents in India which can be attributed to early exposure, easy accessibility of substances, low socioeconomic status, familial

discord, underlying learning disability or other psychiatric morbidity with mean age of occurrence being 19yrs and mean duration of use being 16months.^[1,6] Inhalation abuse can be in the form of solvent abuse, sniffing, huffing, and bagging which is meant to achieve a state of altered consciousness comprising frequently abused inhalants like aliphatic, aromatic hydrocarbons, nitrous oxide, and volatile alkyl nitrites.^[7]

Sniffing Gasoline otherwise known as sniffing petrol is an inhalant abuse. Children are more likely to experience serious side effects from petrol because they absorb more petrol vapours due to a greater surface area in the lungs and higher vapour concentrations.^[8]

Most children who drink or inhale hydrocarbon products and develop hydrocarbon pneumonia/chemical pneumonitis recover fully following treatment. Highly toxic hydrocarbons may lead to rapid respiratory failure and death.^[9] Possible Complications may include any of the following: Pleural effusion (fluid surrounding the lungs) Pneumothorax (collapsed lung from huffing) and secondary bacterial infections. Repeated ingestions may lead to permanent brain damage (including memory, attention and judgment deficits, chronic confusion, dementia, and neuropsychiatric problems), liver damage, and other organ damage.^[10]

Cascade of various neurochemical changes and receptor expression takes place in the brain as a result of chronic substance use. Like alcohol, toluene, which can be referred as a representative molecule for the inhalant group of compounds, act as CNS (central nervous system) depressant though initial use may lead to excitatory effects.^[11]

It has been demonstrated that ethanol and toluene both improve GABA (Gamma-Amino Butyric Acid) ergic transmission, either by boosting GABA release or by improving GABAA receptor activity. Chronic toluene exposure has been linked to reduced GABAA alpha1 subunit expression in the ventral tegmental area (VTA), potentiate serotonin 5HT₃ (5-hydroxytryptamine) function and inhibit the activity of NMDA (N-methyl-D-aspartic acid) receptors.^[12] Up regulation of NR1 (nicotine receptor) and NR2B receptor subunits in the medial prefrontal cortex and NR2B subunits in the nucleus accumbens, suggest an increase in neuronal excitability with continued toluene exposure which can lead to

hyperexcitability/hyper-glutamatergic state during withdrawal similar to that seen in alcohol withdrawal.^[13]

Inhalants like any other substances of abuse exert their ability to modulate mesolimbic dopaminergic activity. The nucleus accumbens (NAc) receives dopaminergic afferents from the ventral tegmental area (VTA), which are essential components of the neuronal circuits regulating arousal, motivation, and reinforcement.^[13] The nucleus accumbens and the VTA both had higher dopamine concentrations after being directly infused with toluene, which may indicate that the VTA is releasing more somatodendritic dopamine as a result of enhanced neuronal activity.^[14] Dysfunction of the mesolimbic dopamine (DA) system has been linked to hedonic deficits and anhedonia which is associated with Major depressive disorder.^[15,16]

A comparative study between cocaine (crack) and inhalant users done in Southern Brazil demonstrated mood disorders with hopelessness and suicidal tendencies in both categories and pointed towards underlying major depressive disorder being frequent in adolescents with inhalant abuse and dependence.^[17] Additional data shows that adult inhalant users who seek therapy had significantly higher rates of major depression, dysthymic disorder, and inhalant-induced depressive disorders.^[18]

Use of SSRIs (Selective serotonin reuptake inhibitors) have been widely researched especially in substance use disorders like alcohol, nicotine, and opioids with comorbid depression.^[19] The patient was treated with antidepressants, optimized doses of Cap. Fluoxetine which is an SSRI and was followed up subsequently for 3 months. Patient is maintaining well with no further episodes of inhalant use, with improved mood and interest in academics.

Conclusion

Inhalant use disorder may present as depression and anxiety as primary complaints or at times with medical complication due to chronic use. Since the age of onset and exposure for inhalants is usually in the adolescence, measures to screen this age group for inhalant use can help in early detection and intervention of the disorder along with coexisting psychiatric comorbidity. Management includes both pharmacotherapy and addressing the underlying psycho-social issues with suitable psychotherapies which can lead to good prognosis.

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