

INHALANT ABUSE – A RISING PUBLIC HEALTH PROBLEM

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DOI: 10.5455/ijmsph.2013.2.146-152 Received Date: 15.10.2012

Accepted Date: 30.10.2012

ABSTRACT

These days inhalant abuse is common in both rural and urban settings. Laymen and professionals alike are negligent of this abuse. It is widely seen in children and can sometimes follow into adulthood too. Children try it out initially due to their anxiousness but later on get addicted to it. Parents are more worried about their children being exposed to drugs like cocaine and marijuana. But the fact is that children are more addicted to the inhalants that are commonly found in household things. Even a single episode of inhalant abuse can result in serious health problems. It can seriously impair the vital organs like heart, brain and kidneys. Repeated abuse is seen due to the elated feel that they experience after its use that resembles alcohol consumption. It produces initial excitation, drowsiness, disinhibiting, wooziness and agitation. In order to prolong the period of intoxication, they abuse repeatedly which in severe cases can even lead to death. Other causes of death can be due to suffocation, seizures, and coma or due to choking. Detoxification programs along with proper support and care from the family and friends will help the abusers to bring back the lost colour in their life. A systemic review of various electronic bibliographic by utilizing suitable search terms were used to obtain the data.

KEY-WORDS: Drug Abuse; Health Problem; Inhalants; Inhalant Abuse

Introduction

Inhalant abuse is a silent epidemic which is on a rise among children and teenagers who are away from family ties. It is usually common in children but can follow an individual into adulthood and can pave way for social and family problems. A broad variety of drugs whose volatile vapors are inhaled in through the nose and trachea are termed as inhalants. They are taken in based on the principle of volatilization which excludes the drugs that are inhaled after burning or heating such as tobacco or crack. The main examples for inhalants include amyl nitrite and toluene. Many of the inhalant drugs available are main constituents in household or industrial products, which are not supposed to be inhaled. The illicit drugs include few recreational drugs which are pharmaceutical products. The tendency to inhale volatile substances due to their intoxicating effect is termed as huffing. It leads to addiction and ultimately causes irreversible changes to the organs.^[1,2]

A systemic review of electronic bibliographic databases like PubMed, Medscape, MD Consult by using the search terms "Inhalant abuse", "Inhalants", "public health" and "Inhalants and abuse" for the period 2000 to 2011 was completed. This search was complemented with review of reference lists of each article and online site searches of relevant journals.

Predisposing Factors

Inhalant abuse is considered to be the fourth worst habit after alcohol, smoking and marijuana use. It is equally prevalent in rural and urban areas. The main reason why it affects the most delicate population that is children is mainly due to their anxiousness for experimentation. It arises mainly due to the compulsion of their friends. Its easy availability, compact packing and low price facilitate its further use. Some of the children use it due to poverty, to overcome hunger and cold. Rest of the children uses it when they have problems at

home from their parents or due to their poor performance in school.^[3,4]

Types of Inhalants

It can be categorized into four which include volatile solvents, gases, nitrates and aerosols. To state a few examples correcting fluid, glue, paint remover and paint thinner which are volatile solvents. In the category of aerosols are deodorants, hair spray, spray paint and vegetable oil cooking spray. The many gases that can be the reason for abuse are ether, chloroform, nitrous oxide and butane. Most of them are intoxicating and Nitrates are an exception in this pain. It is usually used by older teens and adults in the wrong belief that it increases sexual function. It includes cyclohexyl nitrate usually found in room deodorizers, isoamyl or amyl nitrate which is prescribed for cardiac problems. Some of the common terms of inhalants are boppers, climax, gluey, hardware, head cleaner, locker room, moon gas, poor man's pot, poppers and snappers.^[5-7]

Mode of Administration

One of the methods of inhalant abuse is by soaking a rag with the desired inhalant and then stuffing it in their mouths. It is then taken in frequently at a faster rate and hence the term huffing is used. Another way includes inhaling the volatile substance from a container or spraying it directly into mouth. Other method is that of filling the balloons with the desired inhalant and then inhaling it in as the balloon deflates. Bagging is another technique wherein the inhalant is emptied or sprayed into a plastic bag for inhaling. For example gases like nitrous oxide taken from aerosol hairspray and nonstick frying spray or whipped cream aerosol cans are sprayed into plastic bags. Another means of intoxication is by painting the desired material for example correction fluid on the nails and then inhaling it.^[6,8]

Warning Signs for Use of Inhalants

The parents must have good interaction with their children and should be well aware of the friends of their children. The communication gap between

the two can sometimes create trouble. If the parent suspects inhalant abuse then they can look out for the following signs which include strange chemical odors from breath, clothing, clothes dirtied with chemicals or paints, empty spray paint cans or rags soaked with chemicals found to be hidden. The children seemed to be depressed and socially withdrawn. Apart from this child exhibits physical signs of loss of appetite, nausea and vomiting, running nose and red rashes around mouth and nose.^[5]

Clinical Presentation

Lawton and Malmquest (1961) and Wyse (1973) has categorized the development of symptoms into four stages of which the first stage is that of an excitatory stage which has symptoms of feeling elated, increased excitement, exhilaration and drowsiness, hallucinations and also exhibits physical symptoms of sneezing, coughing, increased salivation, light intolerance, nausea and vomiting, flushed skin and weird behavior. The affection of the central nervous system constitutes the second stage, the symptoms of which include perplexity, stupefaction, dullness, loss of self-control, ringing or buzzing in the head, vision being double and unclear, cramps, headache, insensitivity to pain and pallor or paleness. Stage three include the medium central nervous system affections, some of the symptoms are stupor, muscular uncoordination, indistinct speech, depressed reflexes and nystagmus and the last stage four constitutes the late involvement of the central nervous system that include symptoms of unconsciousness that may be accompanied by strange dreams, epileptiform seizures and EEG changes in the brain. The main factor that differentiates alcohol consumption and solvent intoxication is the occurrence of hallucinations in the sniffers. The presence of hallucinations has been reported in gasoline sniffers and toluene sniffers.^[9,10]

Adverse Effects of the Abuse

Adolescents and young adults have found pleasure in using inhalants as they get the high or the elated feel at a cheaper rate since most of the inhalants are constituents of common household things.

Organic solvents have a tendency to be highly attracted to the fatty tissue in the body. It means that they are more soluble in fats than in water. Hence the solvents will get quickly accumulated in the fat cells of the brain, heart, liver and muscles and will be present there for a period of time. Even after a single inhalation, the toxic level will be reached in the nervous system, heart, lungs, liver, kidney and adrenal gland. Detoxification of solvents in a chronic abuser's body can take several weeks due to the increased levels of toxins in the body.^[10,11]

Examples of the harmful effects of inhalants are hazardous of Toluene, which is a constituent of spray paints, glue, wax removers, and fingernail polish. Its inhalation causes loss of hearing, damage to brain, spinal cord, kidney and liver. Another inhalant in common use is trichloroethylene which is quite commonly found in cleaning fluid and correction fluid. Repeated abuse can lead to heart failure and in worst cases death too. The continuous use of Hexane a common ingredient in glue and gasoline can produce effects of blackouts, spasms in limbs and heart failure. Abuse of Benzene can increase the risk for leukemia, injury to bone marrow and can also cause ill effects in the reproductive system. Repeated use of Nitrous oxide which is mainly found in gas cylinders and whipped cream dispensers can produce damage to bone marrow and even produce death. The next inhalant is termed as chlorofluorocarbons (CFC) which is used as a refrigerant and as an aerosol propellant. The people more at risk for exposure are the refrigeration service workers but the deadly effect mostly arises when it is intentionally taken in. Its use is toxic to heart as it causes high blood pressure, heart attacks and abnormal heart rhythms that lead to circulatory collapse. This happens as a result of sudden cooling of airway passages. Some of the other symptoms include severe throat pain, burning sensation in eyes, nose, vomiting of blood, blood in stool, severe abdominal pain and in worst cases even death can happen. The common constituent in cigarette lighters and refills which is Butane, its abuse can increase the heart rate and rhythm which can pave way to death. On the other hand inhalation of nitrites not only increases the heart rate but also enlarges the blood vessels. This abuse is more common in

adults as it increases sexual pleasure. Low levels of vapors from formaldehyde, benzene, butane, propane which are quite commonly found in can or spray paints are released into air daily after first thirty days of application. Surprisingly even after a long time small amount of toxic fumes can leak into air and its inhalation can be harmful to brain. The chronic exposure to paint fumes can produce chronic or terminal problems in the brain. One of such effects is termed as burning brain effect which occurs as a result of exposure to a combination of toxic fumes or heavy metals found in lead based paint or spray paint. Since the toxins in brain causes free radical damage it causes inflammation that produces holes in the blood brain barrier and thus stimulates a burning sensation. Irreversible changes can occur in the central nervous system. Other serious disorders that can develop are Multiple sclerosis, Alzheimer's disease and Brain cancer. Other specific effects of inhalant abuse include cardiac arrhythmia, narcosis, frost bite, weight loss, laryngospasm, imbalance of electrolytes, hepatitis and asphyxiation. The use of the inhalants must be curbed at any cost as the death toll due to this is high in teenagers due to sudden sniffing death syndrome (SSDS). SSDS occurs as a result of heart failure due to an irregular heartbeat that happens as a result of stress or strenuous activity after using inhalants. Inhalant users make the heart easily susceptible to the altered levels of adrenaline. The adrenaline levels get altered mainly because the user might have got frightened when he was caught for his act or due to any activity immediately after the use of drug. Another possible reason for death can be due to suffocation due to high levels of intoxication. The toxic vapor levels inhaled in becomes so high that it takes the place of oxygen in the lungs and brain and ceases breathing. The use of bags to inhale toxic vapours while in small closed areas increases the chance.^[12,13]

Habitual Use of Inhalants

The chronic abuse of inhalants can cause psychological as well as physiological dependence on inhalants. Many of them become addicted to their favourite product or brand to experience its effects. The users would not prefer to substitute

their product with another unless it is not available. Moreover, the chronic abuser will want higher doses of the inhalants due to its effects on the central nervous system. Some of the abusers who had stopped the use for a short period have reportedly had intense cravings at unexpected times making continued abstinence complicated. Chronic abusers have been reported of exhibiting withdrawal symptoms some of which include hand tremors, apprehension, excessive sweating, hallucinations, chills, headaches, abdominal pain and muscular cramps.^[14]

Medical Consequences of Inhalant Abuse

Inhalant abuse is a serious health problem that paves way for many physical and mental problems. Its repeated abuse can cause death due to many reasons like asphyxiation that arises due to high levels of toxic fumes in the body that replace the available oxygen present in the body due to suffocation that is caused as a result of obstruction to the flow of air to lungs when the abuser places the cover over his head to inhale the toxic fumes. The other cause can be convulsions as a result of electric changes in the brain or can be due to coma, when the brain stops to do its important functions. Choking can be another reason that follows after inhalation of vomit after the abuse. In addition to these accidents that arise when the patient is intoxicated also add up to be a reason for death due to inhalant abuse.^[12,13]

Social Consequences of Inhalant Abuse

The history of a chronic inhalant abuser will definitely have a disrupted family. The relationship between the son and the father will be poor. Use of alcohol and drugs will be present in families. The young abuser will feel that he is neglected in his family. They also face problems like low attendance, poor performance in school due to their dislike for school. This becomes the reason for dropout for the young abuser from school. Inhalant abuse has been linked with criminal behaviour that is observed in children. They have high levels of psychopathology, destructive behaviour, and atrocious nature and hence get involved in antisocial activities. The youth under the influence of inhalants are different from other

drug users as the former will be experiencing more problems. They are depressed, apprehensive, feel blamed and hence feel more annoyed than other youth. The youth becomes victims of this abuse due to pressure from friends or relatives who also use inhalants. There is a strong bond between inhalant use and peer drug associations.^[13,14]

Management Methods

The multiplicity and intensity of the problems exhibited by the inhalant abusers are not commonly dealt with in the common substance abuse treatment programs. Chronic inhalant abuse causes many psychosomatic and communal problems. It is always good to consider the regular and chronic abusers to have a dual diagnosis of chemical dependency and psychological illness due to the harmful effects of neurotoxic chemicals on the brain. The common methods used for alcohol and drug treatment are used but a wide range of other issues need to be addressed too. Assessment of many medical complications must be done during physical examination like damage to central nervous system, abnormalities of renal and hepatic lead poisoning, the possibilities of cardiac arrhythmia and pulmonary distress; and nutritional deficiencies. The abuser experiences the lingering effects for a period as the chemicals are stored in the fatty tissues of the body. Hence the period of detoxification need to be prolonged compared to the normal drug abuser. Inhalant abusers are always associated with neurological impairment. It is important to evaluate for any learning difficulties that may hinder with the treatment or add to troublesome behaviour. It would be helpful to undergo a meticulous inspection of the school records or any neurological testing that had been done recently.^[15,16]

The initial phase of the treatment should constitute neurological or neuropsychological testing. The effects of acute intoxication should not be confused with more permanent damage. In order to evaluate the improvement it is vital to repeat the testing in several months. The major factor of any treatment program for the inhalant abuser must be a systematic evaluation of the family strength, makeup and dynamics.

Involvement of family is significant. Focus of treatment can be the therapeutic involvement with the family by providing them with information regarding the drug, parenting and also methods to improve the social skills. The drug and alcohol abuse are quite widespread these days that it is a common thing for the siblings and parents of inhalant abusers. Possibilities for poor communication, physical, emotional and psychosomatic abuses are high. The need of the hour is to evaluate and tackle the issues as soon as possible. High level of sexual abuse has been reported among the inhalant abusers. The children are highly influenced by their peer groups. They often start the use due to compulsion by their friends. Hence the need for exploration of the friends becomes necessary.^[16,17]

The main aim of the treatment should be to discourage company with negative peer groups. This plays a very important role in recovery and abstinence. Treatment programs should include prolonged period of care for the abuser and should also encourage the inhalers for maximum abstinence from the inhalants. Importance must be given for the development of basic life skills. Art, music, drumming, dance and the actions that involve hand and eye are often found to be helpful. Multisensory action is usually promoted by therapeutic recreational actions that help in recovery. The initial phases must be short, brief and informal. The best way to encourage interaction and improve rapport is to opt for walking and talking sessions. In the early stages of treatment abuser's attention span and thinking would be reduced. Hence a continuous assessment of cognition becomes necessary to determine the change in all levels. The treatment indeed takes time as the inhalants persist in the body for a much longer time. Rigorous after care and follow up becomes essential to bring back the child back to life. A significant way in which children can be made aware of its ill effects are by showing them videos, brochures, flip charts depicting messages related to the harmful effects of inhalants. It must include messages that equalize inhalants with poisons or pollutants. They must be encouraged to use products as they are meant to be used. Care must be taken in the grouping of inhalants and also over stressing of the bad effects on the body must be avoided. Including a warning message on the

abused products can be helpful up to an extent. The mental health workers need to have an idea about all aspects of inhalant abuse for providing the abusers with effective treatment.^[15-17]

The treatment for inhalant abuse is difficult compared to alcohol and drug treatment techniques. But many treatment centres apply the same treatment techniques thinking that all chemical dependencies are alike and would respond to these modalities. Due to the interruptions in their thought process sniffers seems to have less logic and resistance power compared to the alcoholics and other drug abusers. But studies state that these problems are reversible depending upon the amount of damage. The sniffers on the other hand do not welcome the idea for treatment. The period of detoxification for chronic abusers must be as long as possible as it takes time for the brain to be free from its effects. The rate of success in long term treatment is less due to lack of family and social support, being engrossed too early in treatment programs and the lack of ability of the abusers to understand and oblige for treatment. The other important thing to be aware of is that the inhalant abusers are quite often stigmatized by the abusers of other drugs thereby making their participation in drug treatment programs very hard and challenging. The treatment was found to be more effective when the treatment staff went to the homes of the abusers where they get to interact with the client and the family together. The treatment staff observed certain common features in most of the youths who came for treatment which are that most of them were not interested to participate in the treatment process, majority were lacking cognition, had lack of confidence, were not mature enough and as a whole the response to treatment were poor. Group therapy in the clinical setup is not successful with the inhalant abusers. Hence counsellors participated with their clients in individual counselling sessions. The motivational level in the sniffers is generally low so in order to make it interesting recreational or action therapy is introduced. The influence that the peer group has on the sniffer is incredible so the main aim must be to provide good company for the client during and after treatment.^[15,16]

The rate of dropout and expulsion rates are on a high in inhalant abusers because of their defiant, uncooperative and unpredictable behaviour. It can only be overcome with patience. The main problem is that the agencies involved do not have a clear cut idea about the problem and is in a dilemma about the treatment technique. The families of the clients play a very important role in the treatment but most of the programs fail to get the families. The problems and needs of the inhalant abuser should be understood for proper intervention and referral. Deaddiction programs must be aimed to move out to the community and also must engage the youth in their natural settings. Proper training must be given to the workers working along with young abusers by using the possessions of youth clubs and schools. All the treatment approaches must be synchronized to get maximum benefit from the resources in the community so as to achieve success. The clinical setting must be warm, open with enough space for proper interaction and recreation. Reversion is quite common among sniffers. The abusers may sometimes exhibit recidivist behaviour which must be beard up to an extent to continue treatment. Due to the prolonged use of inhalants the cognitive abilities of the abuser is impaired and hence the cognitive demands for the typical recovery are often beyond the understanding of most of the abusers. The other problem is that most of the inhalant abusers do not think that they are drug addicts. The counsellor must be a case manager who deal with behavioural therapy and developmental concepts quite well as they have to face several problems. Due to the cognitive impairment, treatment can often be annoying and ineffective. The best method that can be suggested is early education of teachers, parents and health professionals about the danger signs so that expert help can be provided when needed.^[17]

Treatment Considerations

Usually inhalant abusers go unnoticed and their use also seems to be unobserved as the abusers opt for treatment very rarely. It is the responsibility of the staff to make use of estimation and intake procedures, be aware of the dangers and complications of the abuse and he must have

precise protocol for treatment. There must be a good understanding of the distinctiveness of the abuser and the various social, educational, physical and cognitive problems that they face. This is done in order to make sure that inhalant abuse information is elicited. The person having conversation with the abuser must have an idea of the products that may be used; they must also know how and why the abusers use it. A meticulous review must be done for neurological and physical damage caused by the abuse. The initial step in the assessment process is to evaluate physical damage and the other tests for cognitive and neurologic evaluation can even be done after detoxification.^[15,16]

The main aim of the treatment must be to do detoxification when the planning for treatment begins. Detoxification is planned initially mainly due to toxic effects of the chemicals that linger in the fat cells for weeks or months. This will adversely affect the cognitive ability of the abuser and will also decrease his interest to participate in the treatment program. More importantly treatment will take time due to the chronic effects of the inhalants hence a particular period cannot be prescribed for the treatment. The longer the treatment the better it would be for the abuser. One of the methods of treatment that is talk therapy will not be helpful for those abusers with poor impulse control and those who have cognition problems. Group therapy cannot be implemented initially as the other abusers do not prefer inhalant abusers in their group. The treatment should be done after assessing the range of neurocognitive functioning so that treatment can be provided accordingly. During the course of treatment scholastic activities must be developed which encourages the patient to get involved in the activities of school. In a complete treatment plan professional and corporeal therapy should be included wherever indicated. A significant part of the treatment is care that should be given after treatment. Proper care and support must be given to the patient as the period after detoxification is very delicate.^[16,17]

Conclusion

In our day today life everyone is exposed to inhalants in house, school and workplace. But none

of them expect these products to be used as drugs by their children. The harm is expected to be done when a product is inhaled intentionally. It is quite common in teenagers and young adults as they are easily influenced. Moreover most of the inhalants are easily available in every household. It causes addiction and irreversible changes in important vital organs that can turn out to be fatal to the user. Timely support and care can help in detoxification and can bring the patient back into life. It is the responsibility of each and every citizen to stop this abuse which is at an alarmingly high rate as the children of today are the future of our country.

ACKNOWLEDGEMENT

We deeply express our profound and sincere gratitude to Manipal University and staffs of Department of Pharmacy Practice, MCOPS for the valuable guidance and encouragement.

REFERENCES

1. Lubman DI, Yucel M, Lawrence AJ. Inhalant abuse among adolescents: Neurobiological considerations. *Br J Pharmacol* 2008;154(2):316-26.
2. Wu LT, Ringwalt CL. Inhalant use and disorders among adults in the United States. *Drug Alcohol Depend* 2006; 85(1):1-11.
3. Wu LT, Howard MO, Pilowsky DJ. Substance use disorders among inhalant users: Results from the national epidemiologic survey on alcohol and related conditions. *Addict Behav* 2008;33(7):968-73.
4. Pisetsky EM, Chao YM, Dierker LC, May AM, Striegel-Moore RH. Disordered eating and substance use in high school students: Results from the Youth Risk Behavior Surveillance System. *Int J Eat Disord* 2008;41(5):464-70.
5. Balster RL, Cruz SL, Howard MO, Dell CA, Cottler LB. Classification of abused inhalants. *Addiction* 2009; 104(6):878-82.
6. Linden CH. Volatile substances of abuse. *Emerg Med Clin North Am* 1990;8(3):559-78.
7. Medina-Mora ME, Real T. Epidemiology of inhalant use. *Curr Opin Psychiatry* 2008;21(3):247-51.
8. Sakai JT, Hall SK, Mikulich-Gilbertson SK, Crowley TJ. Inhalant use, abuse, and dependence among adolescent patients: commonly comorbid problems. *J Am Acad Child Adolesc Psychiatry* 2004;43(9):1080-8.
9. Hall MT, Edwards JD, Howard MO. Accidental deaths due to inhalant misuse in North Carolina: 2000-2008. *Subst Use Misuse* 2010; 45(9):1330-9.
10. Hall MT, Howard MO. Nitrite inhalant abuse in antisocial youth: prevalence, patterns, and predictors. *J Psychoactive Drugs* 2009; 41(2):135-43.
11. Thiesen FV, Noto AR, Barros HM. Laboratory diagnosis of toluene-based inhalants abuse. *Clin Toxicol (Phila)*.2007; 45(5):557-62.
12. Kurtzman TL, Otsuka KN, Wahl RA. Inhalant abuse by adolescents. *J Adolesc Health* 2001; 28(3) :170-80.
13. Muller AA, Muller GF. Inhalant abuse. *J Emerg Nurs* 2006;32(5):447-8.
14. Deas D, Brown ES. Adolescent substance abuse and psychiatric comorbidities. *J Clin Psychiatry* 2006; 67(7):e02.
15. Anderson CE, Loomis GA. Recognition and Prevention of Inhalant Abuse. *Am Fam Physician* 2003;68(5):869-74.
16. Shen YC. Treatment of inhalant dependence with lamotrigine. *Prog Neuropsychopharmacol Biol Psychiatry* 2007; 31(3):769-71.
17. Marsolek MR, White NC, Litovitz TL. Inhalant abuse: Monitoring trends by using poison control data, 1993-2008. *Pediatrics* 2010;125 (5):906-13.

Cite this article as: Sekhar S, Vyas N, Rajesh V, Suhaj A. Inhalant Abuse- A Rising Public Health Problem. *Int J Med Sci Public Health* 2013; 2:146-152.

Source of Support: Nil

Conflict of interest: None declared