

MEDICAL COMPLICATIONS ASSOCIATED WITH SOLVENT ABUSE: A CASE REPORT

MUHAMMAD ASLAM KHAN¹, NOSHI IRAM ZAMAN²

Medicare Hospital, Attock City Pakistan^{1,2}

Correspondence: Muhammad Aslam Khan, **Email:** medicare_atk@yahoo.com

ABSTRACT

Solvent inhalation is a prevalent form of drug abuse amongst adolescents. Despite being a dangerous and potentially fatal form of substance abuse, its manifestations are often overlooked. Chronic and long-standing use may have systemic effects resulting in cardiac, renal, neurological and hematological complications. This case report describes the case of an adolescent girl, brought by her parents for psychological counseling in the context of abusing solvents over the past four years.

On physical examination she was grossly anemic with significant weight loss. On mental state examination she had low mood, poor appetite, and disturbed short term memory. Bone marrow examination confirmed bone marrow suppression which is a recognized complication of long standing solvent abuse.

KEYWORDS

Substance abuse, solvent abuse, bone marrow suppression.

INTRODUCTION

Solvent or Inhalant abuse is a prevalent form of substance abuse amongst adolescents. Survey results among American school and college students show that nearly 20% of the group have experimented with some form of solvents at least once by the time they are in Grade.⁸ In the United States the mean age of the first time user of solvents is 13 years.¹ A study on prevalence of solvent abuse among street children in Pakistan reported that solvent abuse is one of the biggest problem plaguing street children in Pakistan. Reportedly Pakistan has one of the largest communities of solvent abusing street children, estimated to be around 27,000 street children in the four provincial capitals of the country: Karachi, Lahore, Peshawar, and Quetta. According to United Nations Office on Drugs and Crimes (2004) 90% of the street children in these four cities were abusing volatile substances.² Khan (2007) observed that "Samad Bond", commonly available form of glue, is frequently abused by the Pakistani street children.³ Sherman et al. (2005) conducted a study on street children in Lahore, Pakistan and reported that 73.4% children were involved in current glue sniffing and 93.0% of those children were reportedly abusing it on daily basis.⁴

A wide variety of chemicals may be used as inhalants. These include household cleaning agents, propellants, glue, paint thinners, lighter fluid, adhesives and paints etc. The active ingredients/ chemicals in these products are hydrocarbons, mostly those of the aromatic group. These include butane, toluene, n-hexane, ethylene, carbon tetrachloride, benzene, ethyl chloride etc. Usually three ways of delivery are used; directly inhaling from the container called "sniffing", or soaking a piece of cloth in the solvent and inhaling the vapors called "huffing" or pouring the substance in a plastic bag and breathing in the vapors known as "bagging".⁵

Inhalants are lipophilic substances. These are readily absorbed from the lung parenchyma, enter the blood stream and cross the blood brain barrier producing euphoria and altered mental state within seconds. Acute toxicity pertaining to the central nervous System can cause hallucinations, coma, ataxia, convulsions and behavioral disturbances.⁶ Long standing abuse of solvents may result in cardiac, neurological, hepatic, renal and hematological abnormalities. Chronic abuse of inhalants may cause bone marrow suppression leading to anemia, leukopenia and thrombocytopenia and hemolysis in some cases.⁷

The criteria for inhalant abuse, intoxication and dependence are outlined in the Diagnostic and Statistical Manual of Mental disorders, 4th ed. (DSM-IV). It states, "Clinically significant maladaptive behavior or psychogenic changes (e.g. belligerence, assaultiveness, apathy, impaired judgment, impaired social or occupational functioning) that developed during, or shortly after, use or exposure to volatile inhalants." The diagnosis of solvent abuse is difficult because signs and symptoms of its use are often subtle. Thus a detailed history and a high index of suspicion are required for disembarking on such diagnoses. No specific laboratory tests are available for confirmation of the diagnosis. Treatment is mostly supportive because no particular antidote for solvent abuse is available. We describe a case in which a young girl developed medical complications secondary to solvent abuse.

CASE REPORT

A 16 years old girl was referred to the medical Out-patients Department by a clinical psychologist with five days history of fever and cough with chest pain. Fever was remittent in nature and increased gradually in severity over the past few days. Cough was mainly dry with scanty phlegm and accompanied with pleuritic chest pain which increased with deep inspiration and coughing. On examination she was febrile, ashen and toxic looking. Temperature was 103 F. She was grossly pale and asthenic. She was not cyanosed or jaundiced. There were no palpable lymph nodes in the cervical, axillary or inguinal regions. Additionally there were no hepatosplenomegaly. Examination of the chest revealed wide spread crackles over both lung fields with few scattered wheezes. A working diagnosis of anemia with bilateral bronchopneumonia was made and she was hospitalized. Mental state examination at the time of presentation showed that she was confused and disoriented in time and place.

About four weeks earlier the girl was brought by her parents for psychological counseling with history of low mood, poor appetite, weight loss, dizziness, and headache. Close inquiry revealed intermittent history of solvent abuse. She was the 2nd born among two brothers and two sisters. She studied till 6th grade, after which she left school. She belongs to a muslim, lower socioeconomic class, punjabi speaking family with a nuclear family set-up.

Over the past few months her mother had observed that her daughter was gradually becoming weak and losing weight. She had episodic headaches, with occasional dizzy spells. She complained of tiredness, easy fatigability and loss of interest in day-to-day work. Her mother had noticed that at times she would become confused with slurred speech and staggering gait. On a number of occasions the mother inquired about her problem but to no avail, until one morning when she saw her sniffing from the tube of 'Samad Bond' (active ingredient—toluene and n-hexane), a form of adhesive glue available under this name in the local market. On probing she confessed that she had been abusing this chemical for the past four years.

On hospitalization her baseline investigations were done. Complete Blood Count (CBC) showed depression of all the three cell lines, revealing bone marrow suppression, which is a well recognized sequel of solvent abuse. Her chest X-ray showed scattered fluffy shadowing in both lung fields. Bone marrow examination confirmed the bone marrow suppression. A final medical diagnosis of primary bone marrow suppression with bilateral bronchopneumonia was made and treatment started accordingly. Broad spectrum antibiotics and steroids along with other symptomatic and supportive treatment were given.

During hospitalization her psychological counseling sessions were also continued. She responded well to multidisciplinary treatment approach and was discharged in a satisfactory condition after two weeks. She was

followed up in the medical outdoor for general health assessment. She followed up for psychological sessions at regular intervals for six months duration. During psychological counseling sessions goals planned for current case included resolving her ambivalent feelings about engaging in treatment and quitting solvent abuse, developing problem solving skills, and interpersonal skills. The theme of Motivational Interviewing was used to facilitate her in overcoming the problems successfully by nurturing personal growth, aspiration and self motivation.⁸ Few sessions were also conducted with her family members in order to psycho-educate them.

DISCUSSION

Although inhalant abuse is quite prevalent in young children and adolescents of poor socio-economic background with little parental supervision, it is an under-recognized form of substance abuse. Since the inhalants which are commonly abused are relatively inexpensive, present in the common household items and freely available in the market, children and adolescents have easy access to them. This is one of the reasons why solvent abuse is prevalent in this age group. Iqbal (2008) reported that street children in Pakistan, who were initially involved in glue sniffing, later on switched to hard drugs like heroine.⁹

The exact mechanism of action of these inhalants is unknown but two theories are considered; either there is generalized slowing of axonal ion channel transport, or there is potentiation of hyper polarization of GABA receptors. Inhalant abuse produces a state of euphoria similar to that produced by other illicit drugs.

Long standing abuse of inhalants can damage one or more organ system. Cardiac, renal, neurological or hepatobiliary system may be affected. Persistent and unrelenting abuse of inhalants may cause bone marrow suppression leading to anemia, leukopenia and thrombocytopenia and hemolysis in some cases.¹⁰ In this particular case the bone marrow was suppressed resulting in suppression of all the three cell lines leading to anemia, leukopenia and thrombocytopenia. Fortunately thrombocytopenia was not critical in this case and there was no evidence of hemolysis. Leukopenia results in poor defense mechanism. Bilateral bronchopneumonia in this young girl was the sequel of the leukopenia.

The amount and duration of the inhalant abuse is directly proportional to the adverse effects on all the organ systems and bone marrow. There is a positive correlation between the amount of solvent abused per day and level of hemoglobin and hematocrit changes.¹¹

Every study, no matter how well planned it may be, has some limitations. While case reports are usually documented with comprehensive and in-depth information, the findings can't be generalized to a diverse population.

CONCLUSION & RECOMMENDATIONS

A multidisciplinary treatment approach works better with

complete cessation of the solvent abuse. More research is needed on the volatile substance abuse (VSA) at the National level in order to address this alarming issue in a more effective manner.

REFERENCES

1. McGarvey, E., L., Clavet, G., J., Mason, W., & Wait, D. (1999). Adolescent Inhalant Abuse; Environments of Use. *American Journal of Drug and Alcohol abuse*. 25, 731- 41.
2. United Nations office of the drugs and crime. (2004). *Solvent abuse among street children in Pakistan*. Islamabad: UNODC.
3. Khan, W. (2007). Pakistan street kids plagued by glue sniffing. Online available, Last accessed on May 21, 2014. <http://www.reuters.com/article/2007/01/08/idUSISL114216>
4. Sherman, Susan S; Plitt, Sabrina; Hassan, Salman. (2005). Drug Use, Street Survival, and Risk Behaviours Among Street Children in Lahore, Pakistan. *Journal of Urban*
5. Bennet, M., E., Walters, S., T., Miller, J., H., & Wodall, W., G. (2000). Relationship of Early Inhalant Use to Substance Use in College Students. *Journal of Substance Abuse*. 12: 227-40.
6. King, MD et al. (1981). *British Medical Journal (Clinical Research ed.)* 283 (6292) : 663-665.
7. Broussard, L., A. (2000). The Role of the Laboratory in Detecting Inhalant Abuse. *Clinical & Laboratory Science*, 13, 205-9.
8. Miller, W., R. (1983). Motivational Interviewing. *Behavioral Psychotherapy*, 11, (2), p, 147-172.
9. Iqbal, S. (2008). Street Children: An Overlooked Issue in Pakistan. *Child Abuse Review*. 17(1), 201-209.
10. Lorence, J. D. (2003). Inhalant Abuse In Pediatric Population: A Persistent Challenge. *Current Opinion in Pediatrics* 15, 204-9.
11. Omer, D., Tiraje, C., & Turkay, D. (2007). Hematological and Biochemical Changes in Volatile Substance Abusing street children in Istanbul. *Turkish Journal of Hematology* 24, 52-56.