

A Comparative Study of Treatment-seeking Inhalant Abusers Across Two Cohorts from a Tertiary Care Center in India

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ABSTRACT

Context: Inhalant abuse is the deliberate inhalation of a volatile substance to achieve an altered mental state. Inhalants continue to be a poorly recognizable risk for morbidity and mortality globally. **Aims:** The current study explores the pattern of inhalant abuse across different year groups among the individuals seeking treatment from the de-addiction center of a tertiary care hospital. **Settings and Design:** The study was conducted at a tertiary care multi-specialty hospital. **Materials and Methods:** The current study is a chart review of the cases with inhalant abuse/dependence presenting to the clinic. All the treatment records of the de-addiction clinic were reviewed and information was gathered regarding patients with inhalant abuse/dependence. The comparisons have been made across two different year groups. The two groups were compared for various continuous and categorical variables using the independent sample *t* test and χ^2 test/Fisher's exact test, respectively. The level of statistical significance was kept at $P < 0.05$ for all these tests. **Results:** The two study groups have been found comparable for various socio-demographic and inhalant use patterns. **Conclusions:** The findings of the current study suggest that the pattern and parameters associated with inhalant use among those presenting to a tertiary care drug dependence center tend to remain stable.

Key words: Drug dependence, inhalant abuse, inhalant dependence

INTRODUCTION

Inhalant abuse is the deliberate inhalation of a volatile substance to achieve an altered mental state.^[1]

Inhalants continue to be a poorly recognizable risk for morbidity and mortality globally.^[2] However, their

abuse has been reported from different regions of the world. These substances assume a greater significance as most of the users tend to be younger—children and adolescents. Monitoring the Future survey found the lifetime prevalence of inhalant use to be 20.5%, 18.3% and 15.2% in 8th, 9th and 10th grade students, respectively. Studies from US have found the peak age of inhalant abuse to be 14–15 years. The onset has been reported among children as young as 5 or 6 years. Another common observation is a decline in use at 17–19 years of age, but it can continue into adulthood.^[3]

Based on their pharmacological actions, inhalants could be grouped as volatile solvents (toluene, acetone, methylene chloride, ethyl acetate), fuels (butane, propane, gasoline), anesthetics (ether, halothane,

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enflurane), nitrous oxide (laughing gas), and volatile alkyl nitrites (cyclohexyl nitrite, isobutyl nitrite, butyl nitrite).^[3]

The current study explores the pattern of inhalant abuse across different year groups among the individuals seeking treatment from the de-addiction center of a tertiary care hospital. The Department of Psychiatry and De-addiction provides out-patient as well as in-patient services for substance abuse related problems. The previous reports on inhalant use from India have been from Das *et al.*,^[4] Pahwa *et al.*^[5] and Shah *et al.*,^[6] In the current study, we aim at exploring the change in pattern of correlates of inhalant abuse among patients presenting to drug dependence treatment center of the hospital.

MATERIALS AND METHODS

The study was conducted at a tertiary level multi-specialty hospital. The study reports finding of the chart review of the subjects seeking treatment from the drug dependence treatment clinic. The patients presenting to the treatment clinic are assessed in detail and offered an individualized management plan.

The current study is a chart review of the cases with inhalant abuse/dependence presenting to the clinic. All the treatment records of the de-addiction clinic were reviewed and information was gathered regarding patients with inhalant abuse/dependence.

Information was collected on the socio-demographic parameters including the age, sex, marital status, educational level, occupation, income, family type, religion, place of residence, and support system, among others.

Information was also gathered on the substance use profile of the patients. This included the type of substances, duration of use, reason for initiation, amount used, type of inhalant used, family history of substance abuse/dependence, history of psychiatric illness, and level of impairment due to inhalant use.

The previous quit attempts and reasons for seeking treatment were also looked into.

We aimed at exploring the change in the pattern and correlates of inhalant abuse among treatment seekers. For this purpose, we used two groups: Pre 2009, and 2009 and beyond. The socio-demographic profile of these subjects has been presented elsewhere by us.^[7] These groups have been labeled as Group I and Group II, respectively. The two groups were compared for various continuous and categorical variables using the

independent sample *t* test and χ^2 test/Fisher's exact test, respectively. The level of statistical significance was kept at $P < 0.05$ for all these tests.

RESULTS

A total of 36 inhalant using subjects were included in the study. Both the groups had 18 subjects each.

Socio-demographic profile

The study included records of a total of 36 subjects. The mean age of the subjects in group I (16.56 $SD \pm 4.63$) and group II (15.83 $SD \pm 3.35$) was comparable ($t = 0.53$, $P = 0.59$). All the study subjects were males. The two groups did not differ in the socio-demographic variables including marital status ($\chi^2 = 1.03$, $df = 1$, $P = 1.00$), educational qualification (Cramer's $V = 0.46$, $df = 4$, $P = 0.10$), employment status (Cramer's $V = 0.17$, $df = 2$, $P = 0.59$), place of residence ($\chi^2 = 0.00$, $df = 1$, $P = 1.00$), family type ($\chi^2 = 0.07$, $df = 1$, $P = 0.91$), and being earning member of the family ($\chi^2 = 0.80$, $df = 1$, $P = 0.37$) [Table 1].

Table 1: In-between group comparisons for the socio-demographic variables

Variable	Group I	Group II	χ^2	df	P value
Marital status					
Married	1	0	1.03 [#]	1	1.0
Unmarried	17	18			
Education					
Illiterate	3	1	0.46 [^]	4	0.10
Primary	1	7			
High school	9	5			
Senior secondary	4	5			
Graduation	1	0			
Employment status					
Employed	2	4	0.17 [^]	2	0.59
Unemployed	6	4			
Student	10	10			
Place of residence					
Rural	1	1	0.00	1	1.00
Urban	17	17			
Family type					
Nuclear	13	14	0.07	2	0.91
Joint	4	3			
Living alone	1	1			
Socioeconomic status					
Lower	12	18	6.17 [#]	1	0.01*
Middle	5	0			
Earning member of family					
Yes	2	4	0.80	1	0.37
No	16	14			

[#]Fisher's exact test used; [^]Cramer's V test used; *Statistically significant at $P < 0.05$

However, all the subjects in Group II were of lower socioeconomic status as compared to 66% members of Group I.

Inhalant use parameters

The mean age of initiation of inhalant use was 14.11 years (SD±4.77) for Group I and 13.27 years (SD±4.12) for Group II. It was comparable for the two groups ($t=0.56$, $P=0.57$). Similarly, the duration of inhalant use prior to coming to the treatment center ($t=0.01$, $P=0.99$) and amount of inhalant used per day ($t=1.57$, $P=0.12$) were also comparable for the two groups [Table 2].

Most common reason for the first use of inhalant in both the groups was experimentation ($\chi^2=0.00$, $df=1$, $P=1.00$). Similarly, the two groups did not differ in the source of information on inhalants ($\chi^2=1.03$, $df=1$, $P=0.31$). The main source of information for both the groups was friends. The two groups did not differ in the pattern of inhalant use ($\chi^2=1.33$, $df=1$, $P=0.25$), with dependent patent being the most common for both the groups. The groups were also comparable in inhalant being the first substance used by the subjects ($\chi^2=3.27$, $df=1$, $P=0.07$). However, a significantly higher proportion of subjects in Group I used inhalant as the only substance of abuse ($\chi^2=5.60$, $df=1$, $P=0.02$).

The two groups were comparable in the order of preference for inhalants (Cramer's $V=0.38$, $df=1$, $P=0.08$), with inhalants being the most preferred substance in both the groups. Route of intake for inhalants was also comparable between the two groups (Cramer's $V=0.30$, $df=1$, $P=0.35$).

Effects of inhalant use and withdrawal

Groups I and II were found to be comparable in the effects following inhalant use [Tables 3 and 4]. No differences were observed in immediate intoxication following use ($\chi^2=0.80$, $df=1$, $P=0.66$), giddiness ($\chi^2=2.11$, $df=1$, $P=0.49$), perceptual disturbance ($\chi^2=0.00$, $df=1$, $P=1.00$), unsteadiness ($\chi^2=0.00$, $df=1$, $P=1.00$), unconsciousness ($\chi^2=1.18$, $df=1$, $P=0.47$), delirium ($\chi^2=2.11$, $df=1$, $P=0.49$) and light-headedness ($\chi^2=0.00$, $df=1$, $P=1.00$).

Also, the two groups did not differ with respect to various withdrawal features of inhalant use. No differences were observed in craving ($\chi^2=2.11$, $df=1$, $P=0.49$), irritability ($\chi^2=1.03$, $df=1$, $P=1.00$), restlessness ($\chi^2=3.27$, $df=1$, $P=0.23$), insomnia ($\chi^2=3.27$, $df=1$, $P=0.23$), tingling ($\chi^2=0.11$, $df=1$, $P=1.00$), headache ($\chi^2=0.23$, $df=1$, $P=1.00$), poor concentration ($\chi^2=1.03$, $df=1$, $P=1.00$), and body ache ($\chi^2=2.79$, $df=1$, $P=0.18$).

Family history

Groups I and II were found to be comparable in the rate of family history of substance use ($\chi^2=1.33$, $df=1$, $P=0.25$). Also, the nature of substance abused by family members was comparable between the two groups ($\chi^2=1.00$, $df=5$, $P=0.11$).

Treatment seeking

The two groups did not differ in history of prior abstinence attempts ($\chi^2=0.80$, $df=1$, $P=0.66$). Majority were seeking treatment for the first time. The two groups were also comparable in the main reason for treatment seeking ($\chi^2=1.13$, $df=1$, $P=0.60$). It was family pressure for almost all the subjects.

Co-morbidity

The groups were comparable for the presence ($\chi^2=0.47$, $df=1$, $P=0.73$) as well as type (Cramer's $V=0.45$, $df=2$, $P=0.23$) of psychiatric co-morbidity. Most common psychiatric co-morbidity was conduct disorder followed by depression.

DISCUSSION

The study was conducted at a tertiary level multi-specialty hospital. We compared the pattern and parameters associated with inhalant use among patients seeking treatment before and after the year 2009.

The research on inhalants remains limited. One of the reasons for this is the relatively hidden nature of inhalant abuse problem. Another reason is the disdain for inhalant abuse.

The findings of the current study suggest that there is little change in the patterns and parameters associated with inhalant abuse among those presenting to the

Table 2: In-between group comparisons for substance use variables

	Groups	n	Mean	Std. deviation	Std. error mean	t Value	P value
Age of initiation	Group I	18	14.11	4.77	1.12	0.56	0.57
	Group II	18	13.27	4.12	0.97		
Duration of inhalant use (in months)	Group I	18	27.05	24.67	5.81	0.01	0.99
	Group II	18	27.16	29.98	7.06		
Amount used per day (bottles)	Group I	18	3.77	1.83	0.43	1.57	0.12
	Group II	18	3.00	1.02	0.24		

Table 3: In-between group comparisons for family history and inhalant use parameters

Variable	Group I	Group II	χ^2	df	P value
Family history of substance use					
Yes	6	3	1.33	1	0.25
No	12	15			
Family history of substance use – type of substance used					
Alcohol	0	1	1 [#]	5	0.11
Cannabis	0	1			
Inhalant	1	0			
Alcohol and tobacco	4	0			
Alcohol, tobacco and inhalant	1	0			
Alcohol, tobacco and opioid	0	1			
Reason of initiation of inhalant use by patient					
Experimental	17	17	0.00	1	1.00
Others	1	1			
Source of information about inhalants					
Friends	17	18	1.03	1	0.31
Others	1	0			
Pattern of use					
Abuse	3	6	1.33	1	0.25
Dependence	15	12			
Inhalant being the first substance used					
Yes	15	10	3.27	1	0.07
No	3	8			
Inhalant being the only substance used					
Yes	11	4	5.60	1	0.02*
No	7	14			
Order of preference for inhalant					
First	15	9	0.38	2	0.08
Second	3	7			
Others	0	2			
Route of intake					
Snuffing	13	16	0.30	3	0.35
Bagging	1	0			
Snuffing and huffing	2	2			
Huffing and bagging	2	0			
Prior abstinence attempts					
Yes	4	2	0.80 [#]	1	0.66
No	14	16			
Reason for seeking treatment					
Family pressure	17	15	1.13 [#]	1	0.60
Self-motivated	1	3			
Psychiatric co-morbidity					
Yes	8	6	0.47	1	0.73
No	10	12			
Type of psychiatric co-morbidity					
Conduct disorder	5	6	0.45 [^]	2	0.24
Depression	2	0			
Others	1	0			

[#]Fisher's exact test used; [^]Cramer's V test used; *Statistically significant at $P < 0.05$

treatment services in tertiary care settings. The subjects were comparable in the socio-demographic variables (except for socioeconomic status). The mean age of

Table 4: In-between group comparisons for inhalant use and withdrawal effects

Variable	Group I	Group II	χ^2	df	P value
Inhalant use effects					
Immediate intoxication following use					
Yes	16	14	0.80 [#]	1	0.66
No	2	4			
Giddiness					
Yes	16	18	2.11 [#]	1	0.49
No	2	0			
Perceptual disturbance					
Yes	18	18			
No	0	0			
Unsteadiness					
Yes	18	18			
No	0	0			
Unconsciousness					
Yes	4	7	1.18 [#]	1	0.47
No	14	11			
Delirium					
Yes	2	0	2.11 [#]	1	0.49
No	16	18			
Light-headedness					
Yes	18	18			
No	0	0			
Inhalant withdrawal effects					
Craving					
Yes	18	16	2.11 [#]	1	0.49
No	0	2			
Irritability					
Yes	18	17	1.03 [#]	1	1.00
No	0	1			
Restlessness					
Yes	18	15	3.27 [#]	1	0.23
No	0	3			
Insomnia					
Yes	18	15	3.27 [#]	1	0.23
No	0	3			
Tingling					
Yes	9	8	0.11	1	1.00
No	9	10			
Headache					
Yes	16	15	0.23 [#]	1	1.00
No	2	3			
Poor concentration					
Yes	18	17	1.03 [#]	1	1
No	0	1			
Body ache					
Yes	12	2	2.79 [#]	1	0.18
No	6	17			

[#]Fisher's exact test used; [^]Cramer's V test used; *Statistically significant at $P < 0.05$

initiation of inhalants, the duration of use, route of use, and preference for inhalants were also similar between the two groups.

The pattern of psychiatric co-morbidity and the family history of substance use were also similar across the

years. Additionally, the effects experienced following inhalant use and the withdrawal features were also similar. The findings of the current study suggest that the pattern and parameters associated with inhalant use tend to remain stable across the years.

Monitoring the Future surveys in US have found the abuse and dependence rates of inhalants by 8th, 10th and 12th graders from the year 2005 to 2009 to be relatively stable.^[8]

Similarly, inhalant abuse cases registered with the police between January 1983 and June 1990 in Malaysia totaled 988. The number of cases reported in 1983 was 101, rising to a peak of 204 in 1986 and declining to 74 in 1989.^[9] In New Zealand, solvent abuse has remained stable over the last few years.^[10] The Canadian Addiction Survey noted that 1.3% of Canadians of 15 years of age and older reported lifetime use of inhalants in 2004, compared with 0.8% in 1994.^[11]

Some of the risk factors of initiation of inhalant abuse reported in literature include dropping out of school, physical or sexual abuse or neglect, being homeless and unemployment.^[12,13] In the developing world, inhalants are reportedly abused to relieve symptoms of hunger.^[14]

Different routes of inhalant use include sniffing or snorting (direct inhalation of fumes), bagging (from a plastic or paper bag), huffing (from a rag or cloth soaked in the substance held over the mouth or nose), glading (from air freshener aerosols), and dusting (direct spraying of aerosol cleaners into the mouth or nose).^[15]

Some of the commonly reported effects of inhalant use include stimulation, disinhibition, euphoria, hallucinations, followed by a general depression including slurred speech and disturbed gait, dizziness, disorientation, and drowsiness or sleep.^[16]

A high lifetime prevalence of Diagnostic and Statistical Manual for Mental Disorders-IV (DSM-IV) mood (48%), anxiety (36%), and personality (45%) disorders has been observed among adult inhalant users.^[17]

We have carried out the comparative analysis of the pattern and parameters associated with inhalant abuse among those seeking treatment in a tertiary care setting across two year groups. It is important to study the time trends of substance of abuse. This helps understand the change in prevalence and patterns of use of different psychoactive substances. Such information is essential to plan appropriate management and prevention strategies.

Limitations and future directions

There are certain limitations of the current study.

We have employed a chart review methodology. It would be interesting to follow up these individuals prospectively in order to assess the changes over time. Also, it is imperative to conduct multi-center studies.

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