

## **Volatile Substance Use Within Aged Population of Ahwaz City / Iran, Epidemiologic View**

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**Abstract:** Volatile and solvent abuse is one of addictions and has been studied before. Also, increasing aged population (3.1%) compared with natural growth of Iranian population (1.2%) has been as problematic issues for Iranian gerontologists. The study investigated the volatile substance use and epidemiology of it among increasing aged population of Ahwaz city (Iran) during 2010. Research method is description-exploration with the use of questionnaire, clinical interview and survey of medicine dossiers and clinical reports which mentioned by volunteer clients. Statistical community is all elderly at Ahwaz city. 74 dossiers were considered via random sampling, 74 Elder volunteer clients were interviewed and they replied to senior scale of inhalant abuse (SSIA). Signification of Hypothesis was considered significant relation between age and SSIA. This relation was very significant to opium's derivations: Codeine, Morphine, Amphetamines and etc. Interviews showed psychological dependent due to appeal them to solvent abuse. Kind of abuse among elderly was sniffing and huffing. It was suggested to avoid of this new drug abuse, to control behaviour and interaction of these addicted and their behaviour development. It's better to applied control on distribution of solvents and inhaled materials, also in recommending medical drugs by geriatrics.

**Key words:** Volatile Substance Misuse • Epidemiology • Inhalants • Aged Citizens • Ahwaz City • Iran

### **INTRODUCTION**

The study is conducted to evaluate the situation of inhalant and solvent abuse as soft addictive drugs among aged people. The issue primarily rises whenever such drugs are easily available in the society. The users are generally more inclined to these materials when they are made aware of their addictiveness, which naturally results in a higher demand for such drugs. Consequently, due attention must be paid to this issue considering the addictive potentiality and ease of availability.

Interestingly, these materials including chemical drugs and solvents are easily accessible due to the fact that the purchase can be simply made in markets and drug stores for common usages in art, cosmetic, health and medical consumptions. Also, inhalants and volatile substances are more prone to be abused for the first time at an earlier age than other addictive substances. The reason can be associated with the low cost of these chemical materials and unproblematic availability from the home and school to community and public arena [1].

It is noteworthy that most research conducted in this area, peripherally classify substance abuse either as inhalant and solvent abuse or the so called 'volatile substance abuse' (VSA) even though they attend to this issue as a major research problem [2]. Insufficient considerations to this issue might raise ambiguity of its definition. 'Glue sniffing', 'huffing', 'inhalant abuse', 'solvent abuse' and 'volatile substance abuse (VSA)' are common terms used to refer to "the deliberate inhalation of a volatile substance" [2].

According to the twenty-third annual report of the Volatile Substance Abuse (VSA) Mortality Project [2], these materials such as gas, aerosol propellants, solvents in glue and other solvents help "to achieve a change in mental state." The present authors deem it necessary for every research to define the VSA and/or solvent abuse regarding this issue. It must be noted that the terms inhalant, solvent and volatile replace each other in this study.

Another issue to be dealt with is the unlimited and easy access to these materials, which leads to widespread

and facilitated use among teenagers, youths and adults [3]. Nowadays, one of the main global and national challenges for our community is drug abuse and addiction, which is an undeniable threat for both society and its members. It would be too much of simplification and understatement if we narrow down drug abuse and addiction to famous drugs, namely Marijuana (Hemp), Opium, Heroin and other well-known new drugs (Ecstasy). To recap, two of the main factors of addiction are the facility of use and the availability of drugs [4].

One certain characteristic of addiction is the abuser's need for a constant increase of dosage. It begins from a simply low level of destructive drug abuse and ends in a fatal overdose. Excessive drug abuse naturally culminates in the annihilation of personality, health and individual life. The social context is obviously a vital factor in this matter.

Spreading social issues and growing population pyramid of the aged parallel each other in expansion. The addicted person may begin with heavy and mortal opiates and select the most dangerous abuse method. The age structure of abusers' population is in rising process of change [5, 6], which implies that social issues rise as the age of abusers' population increase.

The context factors of drug abuse are stated by former studies as low level of family control, living in dangerous and high risk areas and the observation of patterns of drug abuse in family, community and peer groups. Remarkably, studies performed on the background of drug abuse mostly target adolescents and teenagers. As a result, prospected research are recommended to focus on drug abuse among adulthood and aged [7, 8].

Another tendency towards drug abuse can be associated with life course stability for elder adults generally accompanied with factors such as income sufficiency and the deterioration of health [9]. The present study aims to explore medical drugs, inhalants and solvent abuse epidemiologically among senior citizens of 60 years of age and above in Ahwaz city in the southwest of Iran.

## Literature

**Solvent/inhalant Abuse; a Kind of Substance Abuse:** Inhalant of material steams has historical background. Ancient Greeks used that for rebating psychic disorders [10]. Notwithstanding, in history of abusing of drugs, "opium was smoked. Smoking opium was called *Chandu* or *Maddak* [its instrument for this kind

named *Bafour* in Iran] and was prepared in a peculiar way in many of our villages [and in Iran too]" as Aggrawa [11]. Spreading abuse of solvents and inhalants (e.g. steam of gasoline) came back to new era while 1950s in US and deploying in recent decades. For example in all countries misusing inhalant drugs diverts as issue for health and medical system [12-14].

**Situation of Abusers-misusers:** These drugs are as first candidate for misusing depend to especial situation of inhalant and solvent drugs i.e. cheap price and facility to purchasing. Also according to National Children's Bureau of US (NCB) epidemiological using them would be high in slam and poor regions (NCB, 2007). Age of beginning misusing usually upon most papers is in 9-12 years old and progress meanwhile adolescence [1, 15-19].

It reduces in adulthood after 35 years old, but increases again in elderly period. Also, most research states that majority of inhalant and solvent abusers are men [19-23].

Even though, substance use among women and men independent from ethnic, rural and social background that is going to increase [22, 24, 25] and SAMHSA [10] has reported that between 1992 and 2008, there was increasing USA female ab/misusers in aged 50 or older from 18.1 to 25.1 percent but in substance abuse .

Data record 37% morality between teenagers who are 14-18 years old has arisen from inhalant abuse and of 36% aged, especially medical drugs too [10, 26-28]. Also, According to the 2008 National Survey on Drug Use and Health (NSDUH), there were 729,000 persons aged 12 or older who had used inhalants for the first time within the past 12 months [16].

**Variety Inhalants and Solvent Materials:** Inhalants and solvents are variety products and chemical materials in everyday life and called volatiles too. As MIAPTF reports "there are more than 1,400 common items that can be huffed, including many that can be easily accessed in the kitchen, garage, office and in other places" [28].

They are more and various groups of products included in hundreds of household and industrial products. From paint thinner, glue, gasoline, paint, correcting fluid and felt-tip markers to Aerosol, spray cans, liquefied-gas propellant, hairspray, spray paint, spray deodorants, cooking sprays i.e. ether, variety sprays, liquid colours, Tyner, cleaners, liquid of correction pen, gasoline, oil, fixtures, gas of lighter, clean gels, perfume liquid, cosmetics, Toluene, brimstone and others [2, 18, 28-31].

According to Burk [18] volatile substances are classified into solvents/volatile chemicals, gases, aerosols and nitrites (typically e.g. Amyl Nitrite also known as 'poppers' or 'snappers' and Butyl Nitrite known as 'Rush', 'Locker Room' or 'Climax').

**Kind of Ab/misuse:** Abusing inhalants and solvents are various and depend on chemical materials abusing them would be different. Most papers have illustrated this issue within teenagers and juveniles without imagining for adults and aged. All research has the same viewpoint that these materials are abused via sniffing and huffing by nose and mouth.

**Sniffing:** Breathe in inhalants/solvents directly from a container with the nose and mouth.

**Huffing:** Immerse their shirt sleeve, towel and/or doily with solvents cover their nose and mouth or into their mouth to breathe the volatile substances.

**Bagging:** Cover their head and/or mouth/nose into the bag that is contained by inhalants [32-35].

**Symptoms of Abuse:** American Psychiatric Association has classified inhalant and solvent abuse and misuse as 'Substance-Related Disorders' in DSM-IV-TR (2000) and mention: "The Substance-Related Disorders include disorders related to the taking of a drug of abuse (including alcohol), to the side effects of a medication and to toxin exposure" [36].

Usual and common symptoms of inhalant and solvent abuse are similar to other common and famous drug abuse and addiction in poisoning body [37].

Most symptoms are i.e. vertigo, pathologic nystagmus, imbalance, vocal disorder, walking disorder, drowsiness, slow reaction formation, psychomotor slowness, psychasthenia, vision disorder e.g. squint and tunnel vision and disorder of twilight vision, mania, anaesthesia, sensitivity of skin and nose and bad smell of mouth and breath [15, 38].

Inhalant and solvent abusers' walking and mobility may be erratic, his/her speech is lazy, dress, hair and gesture are unusual and frowzy. These individuals lose their relish (Anorexia) and take Diarrhoea [36].

Social symptoms of them are social isolation, social exclusion, reducing social actions and participation especially within adults [15, 20, 39].

According to Burk [18] followings are common and known symptoms of VSA which effect immediately on

abusers: hallucinations, disorientation, distortion of perception, dizziness, emotional volatility, cognitive impairment, tremor, loss of coordination, nausea, excitation, irregular heartbeat, diminished sensitivity to pain, depressed central nervous system functions, decrease in circulatory oxygen, Inefficient respiratory process, Impairment of hippocampus and memory, lower volume of inhaled oxygen, irregular heart rhythm, severe headache, reduced cognitive abilities; and so the followings are long-term effects of VSA: brain damage, reduced kidney function, impaired motor coordination, damage to muscles, including the heart, loss/impaired vision, damage to neurons' myelin sheath, lung function reduced, muscle tremor, hearing loss/deafness, numbness in extremities, destruction of liver tissue, slurred speech, Impairment of bone marrow, decreased sensory capacities and memory loss.

#### **Effective Mechanism of Inhalant/solvent Drugs:**

Inhalants are absorbed rapidly by lung system and receive to brain. These materials can effect on flourish characteristic of dendrite's curtain and can vitally trace into neurotransmitters' function of inhalants named GABA (with inhibitory effects). Even though, effect on vital characteristic of dendrite's curtain resulted from passage of time into elderly and end of life course. Inhibitor level of GABA increases during sleeping and is a factor in relaxation and narcotic sense [1].

Indeed, there are different neurotransmitters than GABA in some materials those have stimulus characteristic. Their symptoms spring after minutes depend to kind, measure and quality of consumption. Their dosage is between half an hour to several hours [1].

According to Oxford Psychiatry Handbook (OPH) [38, 40], these materials are classified into part of slackers of central nervous system (CNS) and could affect permanently. Astonishingly, someone abuses inhalants in long time and measure; it may result to brain atrophy, destruction of cerebellum, disorders in cranium nerves, reducing IQ, temporal lobe Epilepsy and adoption within young pregnant women.

OPH [27, 28] stated some materials and volatile substances (inhalants, solvents) e.g. Methyl-chloride may convert to Carbon Monoxide due to metabolism. This may intense function of cardiovascular system, especially among aged. This situation could lead to dying named *Sudden Snuffing Death* results from high chaotic in heart working and Anoxia. Some records state asphyxia and death due to take head into plastic pocket while solvent abuse.

Upon more recants report by NIDA [41], the inhalants and volatile substances have significant relation with high risk sexual behaviour too. Accordingly, "an added risk for people who abuse nitrites, mainly older adolescents and adults, arises from the reason they use the drug. [As they acclaim that enhances] sexual pleasure. Thus, use of nitrites is associated with unsafe [and high risk] sexual practices that increase the risk of contracting or transmitting infectious diseases such as HIV/AIDS and hepatitis" as NIDA reports recently.

**Reasons and Risk Factors for Solvent and Inhalant Abusing:** CB [1], NIDA [16], Burk [18], Dishion *et al.* [42] and most research learnt that children, young and adult people abuse solvent and inhalant substances for a variety of causes, including:

- Low self-esteem and poor self-image and resulting self-harm,
- Difficult family relationships,
- Lack of support through traumatic events and transitions,
- Peer influence in pressure to be part of a gang or a group,
- Bullying, violence and other abuse,
- Short-acting effects,
- Hard to detect them as hazards and dangerous materials,
- Unrecognized hazards,
- Opportunity, accessibility and availability,
- Satisfy a youthful need to experiment,
- The power of peer pressure,
- Medical/psychological factors especially mood disorders: need to be aware of the effects of bereavement and divorce on young people, any mental or physical stresses associated with school or adolescence and how they might cope with these,
- The boredom and depression especially for aged and adults,
- To shock,
- Some individual and social problems i.e. socially isolated, single, divorced, widowhood, separated, substance abuse in earlier life (especially for aged and adults), history of alcoholism in family and parents,

- Losses such as a declined welfare and economic status, the death of his/her spouse or nearest friends and deterioration of health,
- Social activity and impetuosity

**Methodology:** The study is exploring and descriptive method and use especial questionnaire and some dossiers.

**Instrumentation:** Three kind of data gathering were conducted as well. Reading medical dossiers of aged, no structural interview and making the questionnaire in 20 items with dual (even-odd) despondence as Senior Scale of Inhalant Abuse (SSIA) about physical, psychic and social issues of aged inhalant-solvent abusers. Reliability of SSIA upon Cronbach's alpha is well adjusted ( $\alpha=.74$ ,  $\rho=.001$ ). Correlation of these three methods had been reliable ( $r^2= 53\%$ ,  $\rho=.0012$ ) [43-45].

**Socio-demographic Background of the Study:** With a population of 75 million, a natural growth rate of 1.08 percent and domestic production as measured by GDP<sup>1</sup> of \$115 billion, Iran was the second most populous country with the second-largest economy in the Middle East in end of year 2006 [46].

The nation is the second-largest OPEC<sup>2</sup> oil producer and, has the world's second-largest reserves of gas. The literacy rate is more than 79 per cent and, the structure of the school system is 8 years of compulsory primary and lower secondary education as well as three years of optional upper secondary education. There are approximately 18 million students in the school and about 1.7 million in the universities [46].

According to the World Bank Report [46] and ISCC [47], Iran has emphasized on human development and social protection with good progress to date. For example, from early 1970s to 2001, primary school enrolment rates increased from 60 to 90 per cent and, the portion of the population living under the poverty line decreased significantly from 47 per cent in 1978 to 16 per cent in 1999. However, data show an increase of elder population from 1.3 per cent in 1997 to 2.8 per cent in 2007, which states an increase in DR (dependency ratio) above 55 years old among Iranian Citizens.

Likewise, as shown by Khuzistan Census in 2007, the DR has increased more than national data (1.6 to 3.1% according those years) [47]. The community of this survey is elder population above 60 years old<sup>3</sup> in Ahwaz,

<sup>1</sup>Gross Domestic Product (GDP)

<sup>2</sup>The Organization of the Petroleum Exporting Countries (OPEC)

<sup>3</sup>The age of official retirement from public-private sections is 60 years old upon articles of Economic-Civil Low regarding the outset of old age.

Table 1: Population of aged dwellers in main counties upon KSCC and ISCC in 2007

Main Cities	Total Population	Aged Population	Aged Population in Rural Area		Aged Population in Urban Area	
			Male	Female	Male	Female
Abadan	277261	36318	1336	1359	5695	6052
Ahwaz	1338126	160018	6143	5747	26891	25454
Mah Shahr-Port	252587	42917	1029	917	4256	4227
Behbahan	175373	23642	2141	1902	4491	4653
Dezful	401558	50712	3533	2882	8734	7902
Sum of main cities	2444905	313607	14182	12807	50067	48288
Province	4274979	539880	53316	42824	84810	76536

Source: [46 , 47]

Table 2: Descriptive data of basic variables among aged samples %, n= 74

Variables	Age		Literacy					Job status		Disease			Addiction			
	55-65	>66	Illiteracy	Elementary	High school	Graduated	Retiree	Public sect.	Private sect.	Diabetic	Cardio-vascular	Respiratory	Kidney	Yes	No	
Mean	64	36	71	21	5	2	83	5	2	52	17	21	10	32	51	
Variables	Income per month		Gender		Materials		Marital status			SSIA						
	=300\$	>301\$	Male	Female	Solvents	Inhalants	Drugs	Living alone	Widowed	Divorced	Time of marriage	Living alone	Mean	SD	Md	n.
Mean	63	37	83	16	67	21	11	52	56	0.7	41	54	26	4	38	74

Table 3: Details of SSIA among aged samples %, n= 74

Severity of use	Low (20-25)	Median (26-30)	High (31-35)	Very high (36-40)
MD	57	32	8	2
Kind of misusing	Sniffing	Huffing	Bagging	Others
Female	32	43	4	15
Male	39	48	9	4

provincial capital of Khuzistan province in south west of country near Iraq/Iran borderline and north of Persian Gulf. Based on KSCC annual report 2007, between years census of 1997 to 2007, Ahwaz district has higher ratio of aged persons among cities in Khuzistan province (3.1 per cent in total aged population of province). All data are based on KSCC and ISCC annual reports in 2007 [46, 47].

**The Community and Sampling:** The community of the study is all aged clients 60 years old and above who have referred to local clinic and caring centres in Ahwaz city and has had records and dossiers that states to inhalant abuse. According to table 1, Total elderly population of Ahwaz city in recent national census is 160018 aged (total population= 1338126, aged population in 2017= 206844, aged population in rural area= 6143 for male and 5747 for female, age pop. in urban area= 26891 for male and 25454 for female) [46, 47].

Ahwaz city is provincial capital of Khuzistan province in south west of Iran and near Iraq border line. Seventy four seniors were sampled randomly and 74 dossiers which found in the rehabilitation clinic and centres were studied. Items of SSIA were extracted from them.

## Findings

**Descriptive Data:** According to table 2, the descriptive findings of basic variables are tabulated after gathering data among aged samples.

Table 2 mentions 64 per cent of samples have 55 years old to 65, 71% are illiterate, 83 per cent are retirees, 52 per cent live alone and in separate home without their children, all them have chronic diseases that majority have given Diabetes (52%), mead time of marriage and living with spouse was 41 years old, 56 per cent were widowed, majority of aged was poor and have revenue less than 300 US dollar per month, 32% of aged have told they had had post record of addiction to one of drugs. Also, 13 per cent of them have not answered to this question. Finally, 83 per cent of them are male.

Epidemiology of abused materials states solvents are most common misused within them (52%). Mead score of SSIA among elder samples illustrates the epidemiology of solvent and inhalant abuse among them is not too dangerous (mean=26, mode=38 and SD=4) upon respondent scale of SSIA. Based on table 3, details of SSIA are stated:

Notwithstanding, less distribution of the problem within aged should not map this misunderstand that the

solvent and inhalant abuse could not be as issue for elderly and in Gerontology. This phenomenon has bio-psycho-social structure especially when that had been issue for in end of life course. Need to emphasis these materials are free to access and purchase in everyday life and could be transfer into problem for society. Even though, "they were not included in the survey because they were no longer members of households" as NIDA has stated [16:26].

#### Test Hypothesis:

- First hypothesis: significant relationship between age and inhalant abuse was rejected ( $X^2=.535$ ,  $p=.341$ ,  $df=73$ ).
- Second hypothesis: significant relationship between gender and inhalant abuse was accepted ( $\Phi=.021$ ,  $p=.141$ ,  $df=72$ ).
- Third hypothesis: significant relationship between widowhood and inhalant abuse was accepted ( $\Phi=.0041$ ,  $p=.274$ ,  $df=72$ ).
- Fourth hypothesis: significant relationship between income and inhalant abuse was rejected ( $X^2=.749$ ,  $p=.136$ ,  $df=73$ ).
- Fifth hypothesis: significant relationship between divorce and inhalant abuse was accepted ( $X^2=.007$ ,  $p=.049$ ,  $df=73$ ).
- Sixth hypothesis: significant relationship between literacy and inhalant abuse was rejected ( $t=.725$ ,  $p=.257$ ,  $df=73$ ).
- Seventh hypothesis: significant relationship between time of marriage and inhalant abuse was accepted ( $t=.0021$ ,  $p=.172$ ,  $df=73$ ).
- Eighth hypothesis: significant relationship between living alone and inhalant abuse was rejected ( $\Phi=.354$ ,  $p=.021$ ,  $df=72$ ).
- Ninth hypothesis: significant relationship between having chronic disease and inhalant abuse was accepted ( $\Phi=.307$ ,  $p=.371$ ,  $df=72$ ).
- Tenth hypothesis: significant relationship between kind of job and inhalant abuse was rejected ( $X^2=.231$ ,  $p=.002$ ,  $df=73$ ).
- Eleventh hypothesis: significant relationship between addiction and inhalant abuse was accepted ( $X^2=.0025$ ,  $p=.406$ ,  $df=73$ ).
- Twelfth hypothesis: significant relationship between kind of drug addiction and inhalant abuse was accepted ( $t=.033$ ,  $p=.367$ ,  $df=73$ ).
- Thirteenth hypothesis: significant relationship within three kinds of data collection was accepted ( $X^2=.251$ ,  $p=.151$ ,  $df=73$ ).

#### DISCUSSION AND CONCLUSION

There are more research those state to solvent and inhalant abuse and variety of chemical materials as substance abuse [2, 5, 48].

Similarly, controlled and ordered places i.e. prisons, garrisons, nursing home and caring centres that 'power' and 'order' control even nutrition and consumption behaviour [6, 9].

The study aimed to explore and illustrate new dimension in addition behaviour e.g. inhalant and solvent abuses to chemical and medical drugs, industrial glues, alcoholic and chemical solvents which are abundance in our everyday life. This essay with records of 74 medical dossiers, interview with aged who have inhalant-solvent abuse in their profiles and conducting a scale about inhalant abuse 'SSIA' found that the variables of age, income, literacy, living alone, job status and time of marriage have not significant relationship with SSIA items. Severity test of C stated that between SSIA and consumption of opium's alkaloids has high significant relation. Most known opium's alkaloids are Codeine, Morphine, Apomorphine, Oxymorphone, Narcotine, Heroine, Hydromorphone, Papaverine, Narseine and Amphetamines [49].

Accordingly, Aggrawal [50] reported that "Alkaloids are very bitter-tasting chemicals. A peculiar fact is that the molecules of all alkaloids are ring-shaped and all contain an atom of nitrogen. All alkaloids are poisonous in nature although, when taken in very small quantities, they act as valuable drugs".

These kinds of opium have more psychic addiction than physical of it. As a matter of fact, psychotherapy and counselling services for the kinds of addicts could be difficult and challengeable. Acceptance of the eleventh hypothesis states to this issue about situation of inhalant abuse within aged. Besides, majority of aged sample had addicted to some second derivative of opium e.g. morphine and codeine as records in their medical dossiers had noted.

In other words, findings state to some issues. First of all, according to Asadollahi [51], Seth and coworkers [52] and Spoth and his colleagues [53] control and ordering consumption of medical drugs i.e. amphetamines, morphine and codeine need to more concentrate.

The second, the policies and caring should present at the physical dependency and bodily addiction of opium about prevention of epidemic solvent abuse. In that, changing consumption behavior of elderly into alkaloids and as a result into new drug abuse (inhalants, volatiles, chemical drugs and solvents) will be controlled and ordered.

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