

Sociodemographic Profile of Intravenous Drug Users in Lahore - A Retrospective Study

SYED HAMAD RASOOL¹, MARIAM ARIF², MUSHTAQ AHMED³

ABSTRACT

Aim: The aim was to study the association between socio-demographic profile and intravenous drug abuse and to assess the seroprevalence of viral infections in them.

Material and method: The study was conducted from January to December 2009 in all surgical departments of Mayo Hospital, Lahore. Data of all intravenous drug users who presented to the surgical departments through emergency for treatment was collected. This comprised of their socio-demographic profile and results of blood tests for HIV, Hepatitis B and Hepatitis C infections.

Results: The mean age of intravenous drug users was 38 years. All were males (100%). Majority was unmarried (75%), illiterate (52.5%) and unemployed (77.5%). 95% belonged to lower socioeconomic group. The most common reason for injecting drugs was peer pressure (42.5%) while the most common infected site due to repeated injections was groin (80%). Majority of addicts used heroin (87.5%). The seroprevalence of HCV infection was 42%, HBV infection 35% and HIV 10% respectively.

Conclusion: The government should control illegal drug trafficking and develop strategies to prevent use of illicit drugs by its people.

Keywords: Intravenous drug user, socio- demographic factors, Heroin, HIV

INTRODUCTION

Humans have used drugs of one sort or another for thousands of years. Wine has been used from the time of early Egyptians; narcotics from 4000 B.C.; and medicinal use of marijuana dates back to 2737 B.C. in China¹.

Substance abuse, also known as drug abuse, is a patterned use of a substance (drug) in which the user consumes the substance in amounts or with methods which are harmful to themselves or others². Addiction is the continued use of a substance, such as heroin or another drug until a person develops a physical or psychological need for it. It is defined as repeated failures to refrain from drug use despite prior resolutions to do so^{3,4}. Dependence is a state in which a person requires a steady concentration of a particular substance to avoid experiencing withdrawal symptoms. Addiction is an uncontrolled harmful habit⁵. Abuse of a wide range of substances can occur. The most common groups are opioids, including prescription analgesics like morphine and demerol and illegal substances such as heroin; benzodiazapines and sedatives; stimulants; cannabinoid drugs such as marijuana and hashish;

cocaine; hallucinogens; inhalants; alcohol; and cigarettes, cigars, and other tobacco products^{6,7}.

Drug abuse may lead to punishment for criminal offences in addition to possible physical, social, and psychological harm, both strongly depending on local jurisdiction⁸. It may cause health problems, social problems, morbidity, physical injuries, unprotected sex, violence deaths, vehicular accidents, murders, suicides, physical dependence or psychological addiction⁹. Most governments have designed legislation to criminalize illegal use of drugs. Even for simple possession, legal punishment can be quite severe (including death penalty in some countries). Laws vary across countries, and even within them, and have fluctuated widely throughout history².

According to the recent studies, there is an increasing shift from oral route or inhalation to injectable drugs use among addicts, which is quite alarming^{10,11}. Most individuals who inject drugs use intravenous route, but subcutaneous injection (i.e., "skin-popping") is also common, and intramuscular injection may occur unintentionally when the vein or the subcutaneous space is missed. Intravenous drug abuse is associated with many local and systemic complications besides the transmission of infectious diseases via needle sharing and sexual activity. The most commonly injected drug is heroin, but amphetamines, buprenorphine, benzodiazepines, barbiturates, cocaine, and methamphetamine also are injected. Any water-soluble drug may be injected.

Senior Registrar Surgical Unit IV Services Hospital, Lahore¹; Assistant Professor Forensic Medicine & Toxicology department FMH College of Medicine and Dentistry, Lahore²; Assistant Professor Forensic Medicine & Toxicology department, Nishtar Medical College, Multan³
Correspondence to Dr. Mariam Arif, Assistant Professor, E-mail: kemc51@yahoo.com

Morbidity and mortality may be due to infections secondary to injecting drug use, adulterants added to the drug mixture, drug itself, drug overdose, or violence associated with drug use¹².

Substance abuse is an enormous public health problem worldwide. According to World Drug Report 2013 by UNODC, 14.0 million people between the ages of 15 and 64 are estimated to be injecting drugs globally¹³. The United Nations Office on Drugs and Crime reported that an approximate 13 million people used injection drugs worldwide in 2003, with 130 countries providing information and 78% residing in developing countries^{14,15,16}. About 8.8 million are in Eastern Europe and Central, South, and Southeast Asia. About 1 million are in Latin America. Worldwide, 39.5 million people are living with HIV/AIDS. Of that number, 2-3 million use injection drugs. Besides direct transmission of HIV, injecting drug use also contributes to the spread of HIV infection by perinatal transmission and by sexual contact with individuals who do not inject drugs¹⁷. Injecting drug use is also associated with increased levels of high-risk sexual behavior. Worldwide, 40-60% of individuals who use injection drugs are estimated to be positive for hepatitis B, and 60-70% are positive for hepatitis C virus (HCV). HCV rates are high even in countries with low HIV seroprevalence¹².

In Pakistan, almost 5.8 per cent of the adult population, approximately 6.4 million persons or one in every 27 persons is using drugs while nearly 25 per cent of the youth population is involved in some form of drug abuse. Cannabis is the most commonly used drug in Pakistan (4.03 million [3.6%] individuals aged 15–64 years). Other commonly used drugs included opiates (1.02 million [0.9%]), heroin (813 000 [0.7%]), and painkillers (1.69 million [1.5%]). There are 420,000 people who inject drugs in Pakistan, which represents 0.4% population. 73% of the regular opiate users who injected drugs reported sharing a syringe¹⁸.

In Pakistan, with a burgeoning population, rampant unemployment, paucity of social safety nets, and bleak prospects for young people, problem of drug abuse is escalating beyond control; there are both a demand and a seamless supply. Pakistan has no dearth of law enforcement agencies; there are laws, policies, and systems in place, but unfortunately, with many flaws. Regulatory graft is deeply pervasive; there are institutionalized incentives for inattention to measures that can compel accountability. These governance practices do not auger well for any effort aimed at curbing the drug abuse¹⁹. Since large quantities of illicit substances are smuggled across oceans and continents daily, maritime trafficking poses a particularly knotty challenge for the authorities¹³.

Further, it is probable that drug trafficking from Afghanistan, to and through Pakistan, leads to increased incidence of opium and heroin use in Pakistan despite the fact that most drugs are intended for higher value markets in other countries^{11,18}. It is true that any country with this status cannot avoid drug use among its population²⁰. Treatment of individuals who use injection drugs may be complicated by social and political barriers to treatment and by a lack of resources for public health approaches to treatment¹².

Different studies have shown significant correlation between socio-demographic factors and injecting drug use in developed countries. There is a need to replicate these studies in developing countries where there is dearth of scientific literature and socioeconomic factors associated with drug dependence and intravenous drug abuse are more prevalent¹¹.

OBJECTIVE

The aim was to analyze the association between socio-demographic profile and intravenous drug abuse and to evaluate the seroprevalence of viral infections in them.

MATERIAL AND METHOD:

The study was conducted from January to December 2009 in all surgical departments of Mayo Hospital Lahore. All intravenous drug users who presented to all surgical departments through emergency for treatment of complications arising due to chronic use of injectable drugs of addiction were included in the study. The demographic data like age, sex, marital status education, employment status, socioeconomic status, reason for starting intravenous drug use, site of injection, type of drug used was collected. Their blood samples were tested for viral markers (HIV, Hepatitis B and Hepatitis C). The data was statistically analyzed using SPSS version 18.

RESULTS

In our study, age ranged from 24 years to 52 years, mean age was 38 years and standard deviation was 6.7. Therefore, intravenous drug abusers mostly belonged to younger age group as shown in Table 1 and figure 1. All cases were males 40 (100%). No female addict was found in our study (Table 2). Majority of addicts were unmarried 30 (75%) while 9 were married (22.5%) and 1 had separated from his wife (2.5%) as shown in table 3. Nearly half of them were illiterate 21(52.5%), one fourth had only primary education 10 (25%) while similar proportion of cases had education up to matric and intermediate 3

(7.5%). Those with BA/ BSc (2.5%) or other qualification (5%) were least in number (Table 4). Out of 40 cases, 31(77.5%) were unemployed while 9 (22.5%) had jobs shown in table 5. Majority of addicts belonged to lower socioeconomic group 38(95%). Only 2 cases (5%) were from middle class whereas none were reported from elite class of the society (Table 6).

The commonest reason for starting intravenous drug use was peer pressure 17(42.5%) followed by desire to get quick and light response 12(30%), cheap to inject 4(10%), curiosity 3(7.5%), family related stress 2(5%) in decreasing order of frequency. Both work and academic related stress showed least frequency 1(2.5%) as shown in table 7. The most common injection site infected due to repeated injections was groin 32(80%) followed by cubital fossa 6(15%) and popliteal fossa 2(5%) in decreasing order of frequency as shown in table 8. Heroin was the most common drug injected by 35 addicts (87.5%) while nalbuphine injections were used by 5 addicts (12.5%) as shown in table 9. They had a very high rate of viral diseases. The incidence of Hepatitis C was 42.5% (17cases) while that of Hepatitis B was 35% (14 cases). Above all, the most dangerous communicable Virus i.e., HIV (Human Immunodeficiency Virus) was found in 4 cases (10%) as shown in table 10.

Fig. 1

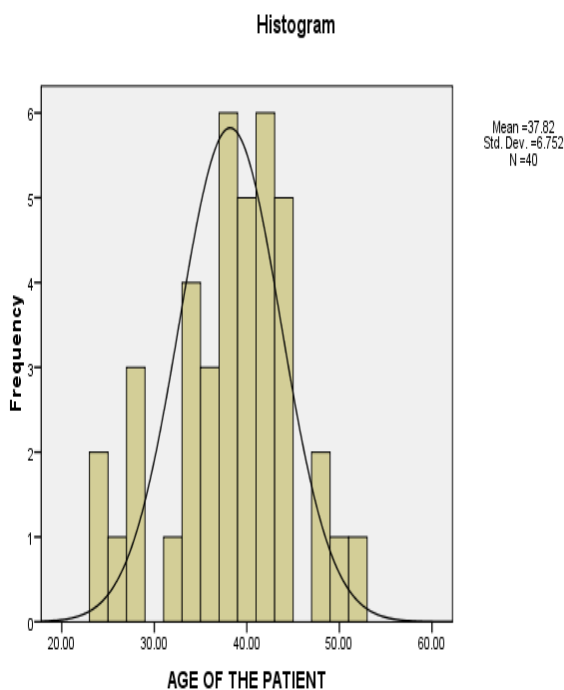


Table 1: Age of the patients

N	
Valid	40
Missing	0
Mean	37.8250
Median	38.5000
Std. Deviation	6.75159
Range	28.00
Minimum	24.00
Maximum	52.00

Table 2: Distribution of intravenous drug addicts according to gender

Gender	n	%age
Male	40	100
Female	0	0
Total	40	100

Table 3. Marital status of intravenous drug addicts

Marital status	n	%age
Unmarried	30	75
Married	9	22.5
Divorced	0	0
Separated	1	2.5
Total	40	100

Table 4: Educational status of intravenous drug addicts

Educational status	n	%age
None	21	52.5
Primary school	10	25
Matric	3	7.5
FA/ FSc	3	7.5
BA/ BSc	1	2.5
Other	2	5
Total	40	100

Table 5: Employment status of intravenous drug addicts

Employment status	n	%age
Employed	9	22.5
Unemployed	31	77.5
Total	40	100

Table 6. Socioeconomic status of intravenous drug addicts

Socioeconomic status	n	%age
Lower class	38	95
Middle class	2	5
Upper class	0	0

Table 7: Reason for starting intravenous drug use

Reason	n	%age
Peer pressure	17	42.5
Family related stress	2	5
Work related stress	1	2.5
Academic stress	1	2.5
Curiosity	3	7.5
Cheap to inject	4	10
Quick and better fix	12	30

Table 8: Infected injection sites

Site	n	%age
Groin	32	80
Cubital fossa	6	15
Popliteal fossa	2	5

Table 9: Types of drugs injected

Drug of abuse	n	%age
Heroin	35	87.5
Nalbuphine	5	12.5
Total	40	100

Table 10: Seroprevalence of viral infections in intravenous drug addicts

Reason	N	%age
Anti HBS		
+VE	14	35
-VE	26	65
Total	40	100
Anti HCV		
+VE	17	42
-VE	23	57.5
Total	40	100
HIV		
+VE	4	10
-VE	36	90
Total	40	100

DISCUSSION

Illicit drugs continue to jeopardize the health and welfare of people throughout the world. They represent a clear threat to the stability and security of entire region and to the economic and social development. In so many ways, illicit drugs, crime and development are interrelated. Drug dependence is often exacerbated by low social and economic development, and drug trafficking, along with many other forms of transnational organized crime, undermines human development¹³. The problem of drug abuse poses a serious threat to the health, economic and social well being of the individuals. Almost every country is facing this problem. It has resulted in increase in crime and violence, HIV infection and collapse of social infrastructure²¹.

Younger age group was most vulnerable to intravenous drug use in our study (mean age 38 years). Kumar et al (2013)²² reported the most common age group involved in substance abuse was 31-40 years with incidence of 31.3% (26 cases). Majority (76.9%) belonged to the age group 21-40 years in a study in Peshawar¹¹. Compton et al²³ showed that the rate of abuse and dependence was generally greater among men aged 18 to 44 years. The median age was 35 years in study by Solomon S.S. et al²⁴. All these studies supported our findings. Since most drug users are in the productive age group, the loss in terms of human potential is

immense as the damage to the physical, psychological, moral and intellectual growth of the youth is very high.

All intravenous drug addicts were males (100%) in our study. This male predilection was also reported by Farooq et al¹¹ and Kumar et al²² who quoted that all of the intravenous drug users were males. Mohammadzadeh et al²⁵, studied 50 patients of drug abuse, out of which 88% were males and 12% were females, thus in accordance with our study. The reason for increased prevalence of intravenous drug abuse in males is due to high rate of use of heroin in them which is the most commonly injected drug in our society. On the contrary, women more likely to resort to less prevalent practice of non- medicinal use of prescription opiates. This has been documented by other author as well thus accounting for more number of intravenous male addicts²⁶.

As regards marital status, 75% of the addicts were unmarried. In congruence with this finding, Mahmoud²⁷, El sheikh et al²⁸ and Kumar et al²² have found that 62.8%, 66.7% and 74.7% of the addicts in their study samples were single. The finding is expected since the future of the addict person is destroyed rendering his chance of getting married meager, especially in conservative communities, where addiction is considered as a social stigma. Also, in case he gets married, the physical, psychological, and financial problems associated with this habit of intravenous drug use would certainly lead to unstable marital life, which will soon culminate in divorce.

According to the present study, about half of the cases were illiterate (52.5%) and 27% had education below matric which is in line with the literacy rate of the country in general. These results are consistent with other studies as well¹¹. Prajapati et al²⁹ also reported that substance abuse was higher (75.8%) in less educated people (secondary or below). These findings point to the untoward effects of drug addiction on education of the affected person, with subsequent negative effects on his future life, job opportunities, and career.

In our study, only 22.5% had jobs while 77.5% were unemployed. This is in agreement with study by El sheikh et al²⁸ who reported that majority (75.2%) of the addicts were jobless. Also, Farooq et al¹¹ noted that 32.7% were currently employed. This high rate of unemployment among addicts is quite plausible. It is attributed to their inability to commit themselves to any regular activity, along with their irresponsible behavior that makes them unable to sustain a job for a long time. Moreover, they do not have a level of education required to be eligible for competitive jobs. It is alarming in way that more than 2/3 were either dependent on the family or obtaining money through

illegal means. The same was reported by Agha et al in a study carried out in Karachi in 2003³⁰.

95% of addicts belonged to lower socioeconomic class in our study. However, Farooq et al¹¹ found that intravenous drug users belonged predominately to the middle socioeconomic group which is in contrast to our findings. But at the same time, it increases our concern about how the socioeconomic needs of the family will be met, in this situation.

Peer pressure (42.5%) and “quick and better fix”(30%) were the two major motivations for switching over to intravenous route found in our study. These observations are very much in line with the motivating factors reported in different studies in general^{11, 29, 31}.

Groin was the most common injection site infected due to repeated injections where as cubital fossa was involved in 15% cases and popliteal fossa in 5% cases. Similar pattern was noted by Mohammadzadeh et al²⁵ who showed that 80% of the patients had an infected injection site in the groin, 12% in the cubital fossa, and 8% in other sites. Moreover, the sites of involvement were restricted to the femoral (86.7%) and brachial (13.3%) areas in another study³².

Among illicit drugs, heroin use had the highest incidence (87.5%) while prescription opiates were used by 12.5% addicts. Comparable incidence of illicit drugs has been quoted by other authors. Solomon et al²⁴ reported that the most common drug injected was heroin (80%). However, the level of heroin consumption was lower in other studies. According to Lakhanpal et al²¹ 40.9% drug addicts used heroin and 9.9% other opiates. Heroin was injected by 54% addicts in study by Hickmann et al³³. The higher incidence of heroin use in our study may be due to the reason that it is the most common illicit drug injected in our society. Furthermore, it can be attributed to the losses, hardship, and poverty experienced by millions of Pakistanis. Also, it is probable that drug trafficking from Afghanistan, to and through Pakistan, leads to increased levels of opium and heroin use in Pakistan.

42% I/V drug users were Hepatitis C positive, 35% Hepatitis B positive while HIV infection was found in 10% drug addicts. The prevalence of HIV was 10.7%, HCV infection 34.5%, and HBV infection 50.7% in a study in Tehran³⁴. Saraswathi et al³⁵ found that there was a higher prevalence of HCV infection (61.2%) as compared to HIV infection (30%). Moreover, Solomon et al²⁴ noted that the prevalence HIV, anti-HCV and HBsAg was 25.3%, 55.5% and 10.3% respectively. All these studies are in agreement with our results. This increased incidence of viral infections in intravenous drug users

is probably due to sharing of needles, improper storage and unsatisfactory cleaning methods.

CONCLUSION

The incidence of intravenous drug abuse is more in young, unmarried, illiterate males of low socioeconomic group. Majority start injecting drugs under peer pressure. Heroin is the most common drug used. Viral infections are more prevalent due to needle sharing habit.

There is need to control illegal drug trafficking, provide peer education especially to the young generation to prevent use of illicit drugs, mobilize community resources for funding programs on drug abuse prevention and control over sale of narcotic drugs over the counter for non medicinal use. Prevention is best aimed at teenagers and young adults aged 18-24 who are at very high risk for substance experimentation. Prevention programs should include an education component that outlines the risks and consequences of substance use and a training component that gives advice on how to resist peer pressure to use drugs. Furthermore, prevention programs should work to identify and target children who are at relatively higher risk for substance abuse. This group includes victims of physical or sexual abuse, children of parents who have a history of substance abuse, and children with poor school performance and/or attention deficit disorder. These children may require more intensive intervention. Moreover, treatment facilities and rehabilitation centers should be improved all over the country.

REFERENCES

1. Rasool SH. Outcome of Femoral Vessel Ligation in Femoral Pseudoaneuysm in Intravenous Drug Abusers. [FCPS dissertation] Karachi 2009: CPSP.
2. Substance abuse – Wikipedia, the free encyclopedia. Available online at: http://en.wikipedia.org/wiki/Substance_abuse
3. Rogers PJ, Smit HJ. Food craving and food “addiction”: a critical review of the evidence from a biopsychosocial_perspective. *Pharmacol Biochem Behav* 2000; 66: 3-14.
4. Ahmed SH .The science of making drug-addicted animals. *Neuroscience* 2012; 211: 107-125.
5. Bell J. Pharmacological Maintenance Treatments of Opiate Addiction. *Br J Clin Pharmacol* 2012.
6. Obembe S. Practical Skills and Clinical Management of Alcoholism & Drug Addiction. Elsevier 2012.
7. Rush B, Martin G, Corea L, Rotondi NK. Engaging stakeholders in review and recommendations for models of outcome monitoring for substance abuse treatment. *Subst Use Misuse* 2012; 47: 1293-1302.
8. Mosby's Medical, Nursing, & Allied Health Dictionary. Sixth Edition. Drug abuse definition 2002, p. 552. Nursing diagnoses, p. 2109. ISBN 0-323-01430-5

9. Burke PJ, O'Sullivan J, Vaughan BL. "Adolescent substance use: brief interventions by emergency care providers". *Pediatr Emerg Care* 2005; 21(11): 770–6
10. Altaf A, Shah SA, Memon A. Follow up study to assess and evaluate knowledge, attitude and high risk behaviors and prevalence of HIV, HBV, HCV and Syphilis among IDUS at Burns Road DIC, Karachi. 2003; External report submitted to UNODC
11. Farooq S, Akhtar J, Azeemi MH, Nazar Z, Khan SA. Sociodemographic Characteristics and Clinical Presentation of I/V Drug Users brought to a Tertiary Care Treatment Centre. *JPMI* 2006;20(1):3-7.
12. Baciewicz GJ. Injecting Drug Use- e-Medicine-Medscape available online at: <http://emedicine.medscape.com/article/286976-overview#showall>
13. United Nations office for Drugs and Crime and Pakistan, Ministry of Narcotics Control .World Drug Report 2013. Available online at https://www.unodc.org/unodc/secured/wdr/wdr2013/World_Drug_Report_2013.pdf
14. Tun W, Vu L, Adebajo SB, Abiodun L, Sheehy M, Karlyn A, et al. Population-based prevalence of hepatitis B and C virus, HIV, syphilis, gonorrhoea and chlamydia in male injection drug users in Lagos, Nigeria. *Int J STD AIDS* 2013;[Medline].
15. Eskandarieh S, Nikfarjam A, Tarjoman T, Nasehi A, Jafari F, Saberi-Zafarghandi MB. Descriptive Aspects of Injection Drug Users in Iran's National Harm Reduction Program by Methadone Maintenance Treatment. *Iran J Public Health*. 2013; 42(6):588- 93.
16. Petersen Z, Myers B, van Hout MC, Plüddemann A, Parry C. Availability of HIV prevention and treatment services for people who inject drugs: findings from 21 countries. *Harm Reduct J* 2013; 10:13.
17. Doherty MC, Garfein RS, Monterroso E. Correlates of HIV infection among young adult short-term injection drug users. *AIDS* 2000; 14(6):717-26.
18. Drug Use in Pakistan 2013 Technical Summary Report .Available online at https://www.unodc.org/documents/pakistan/2013.03.01ab_Summary_Report_Drug_Use_in_Pakistan_SvdV_v1.pdf
19. Yaqub F. Pakistan's drug problem. *The Lancet* 2013; 381(9884): 2153 – 2154
20. Drug abuse in Pakistan: Results from the 2000 National assessment. Anti narcotic Force, Govt. of Pakistan Supported by United Nations office for Drug control and crime prevention,2002.
21. Lakhanpal P, Agnihotri AK. Drug Abuse An International Problem: A Short Review With Special Reference To African Continent., *Ind J Forensic Med & Toxi* 2007;1(1):7-12
22. Kumar N, Kanchan T, Unnikrishnan B, Thapar R, Mithra P, et al. Profile of Substance Use among Patients Attending De-Addiction Centres in a Coastal City of Southern India. *PLoS ONE* 2013; 8(2): e57824. doi:10.1371/journal.pone.0057824
23. Compton WM, Thomas YF, Stinson FS, Grant BF. Prevalence, correlates, disability, and co morbidity of DSM-IV drug abuse and dependence in the United States: results from the national epidemiologic survey on alcohol and related conditions. *Arch Gen Psychiatry* 2007; 64(5):566-76.
24. Solomon SS, Desai M, Srikrishnan AK, Thamburaj E, Vasudevan CK et al. The Profile of Injection Drug Users in Chennai, India: Identification of Risk Behaviours and Implications for Interventions, *Subst Use Misuse* 2010 ; 45(3): 354–367
25. Mohammadzadeh MA, Akbar MH, Mehr SE. Vascular Lesions in Intravascular Drug Abusers in Guilan, North of Iran. *Arch Irani Med* 2007;10(4): 522 – 524.
26. Simoni-Wastila L, Ritter G, Strickler G. Gender and other factors associated with the nonmedical use of abusable prescription drugs. *Subst Use Misuse* 2004;39(1):1–23
27. Mahmoud MAR, Al-Sanousi RBM, Abdelwahab SI. Behavioral Modification Program (BMP): Role of Socio-Demographic Characteristics of Adult Drug Abusers in Saudi Arabia. *Clin Exp Pharmacol* 2013; 3(3): 1-5
28. El-Sheikh Sel-G, Bashir TZ. High-risk relapse situations and self-efficacy: comparison between alcoholics and heroin addicts. *Addict Behav* 2004; 29: 753-758.
29. Prajapati A, Thakkar J, Parikh S, Bala DV. A study of socio-demographic profile of substance abusers other than tobacco abuse attending a de-addiction centre in Ahmedabad City. *Int J Med Sci Public Health* 2013; 2(4): 931-934
30. Agha A, Parviz S, Younas M, Fatimi Z. Socio-economic and demographic factors associated with injecting drug use among drug users in Karachi, Pakistan. *J Pak Med Assoc* 2003;11:511-6.
31. Niaz U, Siddiqui SS, Hussain S, Hussain H, Ahmad S. A survey of psychosocial correlates of drug abuse in young adults aged 16-21 in Karachi. Identifying the high risk population to target intervention strategies. *Pak J Med Sci* 2005; 21 (3): 271-7.
32. Burke AP, Jarvelainen H, Kolodgie FD, Goel A , Wight TN, et al. Superficial pseudo aneurysms: clinicopathologic aspects and involvement of extracellular matrix proteoglycans .*Mod pathol* 2004 ; 17:482-488 .
33. Hickman M, Seaman S, De Angelis D. Estimating the Relative Incidence of Heroin Use: Application of a Method for Adjusting Observed Reports of First Visits to Specialized Drug Treatment Agencies. *Am J of Epidemiology* 2000;153 (7): 632-641
34. Movaghar AR, Razaghi EM, Izadian ES, Esmaeili MA. HIV, Hepatitis B virus, Hepatitis C virus Co-infection Among Injecting Drug Users in Tehran, Iran. *Int J Inf Diseases* 2010;14 (1) :28–33
35. Saraswathi K, Dutta A. Study of Human Immunodeficiency Virus and HCV infections in intravenous drug users in Mumbai. *Indian J Med Microbiol* 2007 ;25 (2):174-5.