NON-INVASIVE INVESTIGATIONS IN HEROIN USERS AND NON-USERS-A CASE CONTROL STUDY

Azhar Mahmood Kayani, Nausheen Bakht*, Waseem Kiani**, Syed Shahid Nafees Zaidi, Hajira Akbar, Irum Abid***

Armed Forces Institute of Cardiology/ National University of Medical Sciences (NUMS) Rawalpindi Pakistan, *Combined Military Hospital Bahawalpur/ National University of Medical Sciences (NUMS) Pakistan, **Wah Medical College, Wah/ National University of Medical Sciences (NUMS) Pakistan, ***Army Medical College/ National University of Medical Sciences (NUMS) Rawalpindi Pakistan

ABSTRACT

Objective: To compare heroin users with their age and gender matched relatives as regards non-invasive investigations like chest x-ray, electrocardiography (ECG) and 2D-echocardiography.

Study Design: Case control study.

Place and Duration of Study: Armed Forces Institute of Cardiology-National Institute of Heart Diseases, Rawalpindi, from Feb 2010 to Jul 2010.

Material and Methods: Sixty one heroin users (cases) and their 100 non-substance abuser age and gender matched relatives (controls) were included through non-probability consecutive sampling. Chest x-ray (CXR), 12-lead electrocardiography (ECG) and two-dimensional echocardiography (2D-ECHO) were done of each one and the result was interpreted by respected consultants. The data were analyzed on SPSS version 15. Descriptive statistics of mean and standard deviation (SD) were described for quantitative variables while frequency and percentages for qualitative variables. Independent samples t-test compared quantitative variables while for qualitative variables chi-square test was used. Ninety five percent confidence intervals were calculated for all variables.

Results: Statistically significant differences were noted between cases and controls as regards chest X-ray. A total of 10% cases had findings consistent with tuberculosis (TB) as compared to 3% controls (p=0.045). There was however no cardiac abnormality in any study subject. Significant 12-lead ECG findings other than normal were noticed in 12 (19.7%) heroin users as compared to 10 (10%) controls (p=0.083). In 12 lead ECG, the predominant finding was t wave inversion in leads AVF and III. According to 2D-echocardiography (2D-echo) reports, 15 (24.6%) heroin users (cases) and 17 (17%) controls had abnormal findings (p=0.242). We report no vegetations on any cardiac valve.

Conclusion: On radiological and cardiac parameters, heroin users are a different population as compared to the non-heroin users. The knowledge about variations on non-invasive investigations not only helps the healthcare workers to optimize treatment regarding rehabilitation but also facilitate diagnosis and treatment.

Keywords: Chest x-ray (CXR), Electro cardiogram (ECG), Heroin addiction, Pulmonary arterial hypertension (PAP), Tricuspid regurgitation (TR), 2D-echocardiography (2D-echo).

INTRODUCTION

Pakistan is home to 1-1.5 million all-type addicts. Of these approximately 6,28,000 are opiate users and 4,82,000 consume heroin[1,2]. Globally 15 million people are illicit opiate users, of which 9.2 million people consume heroin[3]. Consumption of addictive substances in Pakistan and its neighbouring countries differs from its western counterparts due to myriad of social, economical, cultural and political reasons. The drug use spectrum in Pakistan continues to change[4], but opium and hashish, still largely define the addiction scene.

This study aims to compare the drug using and drug fee populations on radiological and cardiac parameters. Keeping the extensive consumption of illicit substances in view, it is important that medics and paramedics should

suspect more incidence of tuberculosis (TB) in drug users and so thoroughly evaluate and treat them. Medical personnel should also brush up their skills in evolving measures to curtail TB spread from drug users in the community[5].

MATERIAL AND METHODS

This case-control study was carried out from February to July 2010. The project was a joint venture of Armed Force Institute of Cardiology/ National Institute of Heart Diseases (AFIC/

obtaining prior approval from respective authorities.

Our study was conducted on the enrolees reporting at MATRC Islamabad, which is a renowned drug detoxification and rehabilitation centre in Punjab, where addicts come from all over the province.

AFIC/NIHD is located in Rawalpindi, Pakistan. It provides primary, secondary and tertiary cardiac care to military personnel and

Table-I: Socio demographic profile of cases and controls.

Patient Attributes	Cases (n=61)	CI	Controls (n=100)	CI	*p*-value
Age (in years) ≤ 2021–40>40	8 (13.1%)	(4.6%–21.6%)	13 (13%)	(6.4%–9.6%)	0.635
	47 (77%)	(66.5%–87.6%)	72 (72%)	(63.2%-80.8%)	
	6 (9.8%)	(2.4%–17.3%)	15 (15%)	(8%–22%)	
Occupation Daily Wages Drivers Business Govt./ private Job Student Unemployed	25 (41%)	(28.6%–53.3%)	28 (28%)	(19.2%–36.8%)	0.002
	11 (18%)	(8.4%–27.7%)	12 (12%)	(5.6%–18.4%)	
	9 (14.8%)	(5.8%–23.6%)	22 (22%)	(13.9%–30.1%)	
	1 (1.6%)	(-1.6%–4.8%)	17 (17%)	(9.6%–24.4%)	
	0 (0%)	(0%–0%)	7 (7%)	(2%–12%)	
	15 (24.6%)	(13.8%–35.4%)	14 (14%)	(7.2%–20.8%)	
INCOME (PKR) <5,000- 6,000–10,000- 11,000–15,000- 15000>	37 (60.7%)	(48.4%–72.9%)	31 (31%)	(21.9%–40.1%)	0.001
	17 (27.9%)	(16.6%–39.1%)	51 (51%)	(41.2%–60.8%)	
	6 (9.8%)	(2.4%–17.3%)	10 (10%)	(4.1%–15.9%)	
	1 (1.6%)	(-1.6%–4.8%)	8 (8%)	(2.7%–13.3%)	

Table-II: Duration and route of drug addiction.

Duration of Addiction	Smoking (n=38)		IV (n=14)		Snuff (n=9)	
	N (%)	95% CI	N (%)	95% CI	N (%)	95% CI
Duration (Years) <5	23 (60.5%)	(45%-76.1%)	6 (42.9%)	(16.9%-68.8%)	6 (66.7%)	(35.9%-97.5%)
6-10	12 (31.6%)	(16.8%-46.4%)	5 (35.7%)	(10.6%-60.8%)	1 (11.1%)	(-9.4%-31.6%)
>10	3 (7.9%)	(-0.7%-16.5%)	3 (21.4%)	(-0.1%-42.9%)	2 (22.2%)	(-4.9%-49.4%)

Table-III: CXR and ECG findings in cases and controls.

Parameters	Cases (n=61)	Confidence Interval (CI)	Controls (n=100)	Confidence Interval (CI)
CXR TB Pneumonia	6 (9.8%)	(2.37%-17.31%)	3 (3%)	(-0.3%–6.3%)
	2 (3.3%)	(-1.2%–7.8%)	2 (2%)	(-0.74%-4.74%)
ECG Findings Normal T wave inversion in leads (AVF-III) T wave inversion in leads (v2-v6) J-point depression (in AVF only)	49 80.3%)	(70.4%–90.3%)	90 (90%)	(84.1%–95.9%)
	10 (16.4%)	(7.1%–25.7%)	8 (8%)	(2.7%–13.3%)
	1 (1.6%)	(-1.6%–4.8%)	1 (1%)	(-1%–3%)
	1 (1.6%)	(-1.6%–4.8%)	1 (1%)	(-1%–3%)

p=0.384 (Insignificant)

NIHD), Rawalpindi and Anti Narcotic Force (ANF) Pakistan. It was embarked upon after

civilian population. At the institute, the study

participants were administered a detailed questionnaire and their responses were recorded.

Sixty one heroin users, constituted the cases, while their one hundred non-substance using, age and gender matched relatives/family members comprised the controls. No specific complaints of the participants were present and they were recruited through consecutive sampling. Voluntary informed consent was obtained from all cases and controls.

The sample size was determined through WHO calculator easily available on internet, using prevalence of heroin use in Pakistan. (The reliable estimates of heroin use pertain to 2006 when the population of Pakistan was 172,382,000 of which 482,000 were heroin users. Prevalence rate of 0.3% with an error margin of 5% gave a

changes due to family background and environment. Socio-demographic factors like age, occupation and income group, which can affect the results, were included in the analysis to bring more credibility to the study.

Patients more than 15 years (mean 29.92 ± 10.26 SD) of age, those who had no pre-existing medical condition and lastly who gave a history of substance abuse in the past 6 months by themselves were included in the study.

Individuals who had a cardiac event warranting treatment, were cognitively impaired and did not understand Urdu were excluded from the study.

Chestx-ray (CXR) were done in the radiology department of AFIC/NIHD and reported upon by a consultant radiologist.

Table–IV: Detailed Ejection Fraction + Cardiac Chambers findings in 2D-ECHO.

2 D-ECHO Parameters	Cases	(n=61)	Controls	(n=10)	*p*-value
	Mean	SD	Mean	SD	
Aortic root diameter (AOD) mm	28.59	7.23	26.66	3.97	30.03
Left Ventricular Internal Diameter systolic (LVIDs) mm	29.47	4.63	27.62	4.48	0.014
Left Ventricular Internal Diameter diastolic (LVIDd) mm	47.11	4.67	46.06	3.67	0.139
Left Atrium Diameter (LAD) mm	31.27	3.88	30.67	3.98	0.349
Ejection Fraction (EF%)	58.93	2.76	59.10	3.21	0.738

Table–V: Abnormal findings in 2D-ECHO.

2D-Echo Parameters	Cases (n=61)	Confidence interval (CI)	Controls (n=100)	Confidence interval (CI)
Normal	46 (75.4%)	(64.6%–86.2%)	83 (83%)	(75.6%–90.4%)
LV Function mildly compromise	2 (3.3%)	(-1.2%–7.8%)	4 (4%)	(0.2%–7.8%)
Trace MR	2 (3.3%)	(-1.2%–7.8%)	4 (4%)	(0.2%–7.8%)
LV Function moderately compromise	2 (3.3%)	(-1.2%–7.8%)	1 (1%)	(-1%–3%)
Mild thick mitral valve	2 (3.3%)	(-1.2%–7.8%)	0 (0%)	(0%–0%)
TR + PAP 18	2 (3.3%)	(-1.2%–7.8%)	2 (0%)	(0%–0%)
TR + PAP 21	2 (3.3%)	(-1.2%–7.8%)	2 (1%)	(-1%–3%)
TR + PAP 25	1 (1.6%)	(-1.6%–4.8%)	3 (3%)	(-0.3%–6.3%)
TR+ PAP 29	1 (1.6%)	(-1.6%–4.8%)	0 (0%)	(0%–0%)
TR+ PAP 35	1 (1.6%)	(-1.6%–4.8%)	1 (1%)	(-1%–3%)

minimum sample size of 5). The study has a non response rate of 2%. Family members were selected as the controls in order to exclude

In addition to this, the respondents' cardiac workup included 12-lead electrocardiography (ECG) and two-dimensional echocardiography

(2D-ECHO). Both were interpreted by consultant cardiologist.

The data were analyzed on SPSS version 15. Descriptive statistics were used to describe the data i.e. mean and standard deviation (SD) for quantitative variables while frequency and percentages were used for qualitative variables. Independent samples t-test was employed to compare quantitative variables among cases and controls while for qualitative variables chi-square test was used. Ninety five percent confidence intervals were calculated for all variables. A two-tailed p-value <0.05 was considered significant.

RESULTS

Our study included 61 heroin users (cases) and their 100 controls, age and sex matched relatives. The average age of cases was 29.92 ± 10.26 years while that of controls was 30.51 ± 11.62 years.

All the cases and controls were males. There were 14 (22.9%) intravenous drug user, 9 (14.7%) were oral drug users and the remaining 38 (62.2%) smoked the drugs.

Age, occupation and income group are shown in table-I while duration of addiction is shown in table-II.

On CXR, 10% cases were found to be positive for tuberculosis (TB) as compared to 3% controls (p=0.083) while 4% cases had findings consistent with pneumonia in contrast to 2% controls (p=0.99).

Significant ECG findings were noticed in 12 (19.7%) heroin users as compared to 10 (10%) controls (p=0.083). Details of CXR finding and ECG are shown in table-III. According to 2D-ECHO reports, 15 (24.6%) heroin users and 17 (17%) controls had abnormal findings (p=0.242). Detailed 2d-echo findings are given in table-IV and V.

DISCUSSION

We found in our study that 60.7% cases earned <5000 PKR (USD 62.5 per month). It has been reported that 53% addicts earned approximately 2480 PKR (USD 31 per month)[6]. Our two groups were significantly different as regards employment. We conclude that having a secure job in public or private sector and studentship confer a benefit against heroin use while unemployment and earning daily wages are positively associated with it. This is in contrast with others[6].

Tuberculosis (TB) is a considerable problem among drug addicts. Positive associations between duration of heroin use and TB have been documented[7,8] CXR suggestive of pulmonary TB have been found in 1.2%[9], 5.6%[10], 7%[11-12] and 18%[13] of drug addicts. Although our CXR findings for cases and controls did not reach statistical significance, the same have been noted by others[14].

We found a significantly higher frequency of ECG findings among cases (p=0.032). In 12 lead ECG, 16.4% of the cases had T wave inversion in inferior leads (AVF, III). We also noted 1.6% T wave inversion in anterior leads (v2-v6) and j-point depression in 1%. Glauser reported similarly[15] while Wallner and Nakhahee report ST abnormalities, QTc prolongation and tall R-and/or S-waves [15,16].

Manolis reported valvular involvement of tricuspid and mitral,aortic and mitral, as well as tricuspid valve alone in 2-D-ECHO findings[17]. Another study reports that vegetations involve the tricuspid valve over whelmingly[18]. We however report no vegetations on any cardiac valve. The evidence of compromised LV function can be highlighted (noted in 1.6%), 3.3% of the cases had ejection fraction (EF) less than 50% and 55% respectively. In 1.6% cases, the variation in pulmonary artery pressure (as interpreted from tricuspid regurgitation and central venous-pressure was more than 35 mm Hg suggesting mild pulmonary hypertension. Andy report stricuspid and mitral valves regurgitation which is in contrast with previous reports which suggest predominant involvement of tricuspid valve,

tricuspid and mitral valves followed by aortic valve or no valve involvement[19].

A significantly higher proportion of abnormal finding have been noted in the IDUs[19,20]. However in 2D-ECHO we also found increased aortic root diameter and increased systolic left ventricular internal diameter. In rest of the measurements we find no statistically different inferential between two groups.

CONCLUSION

On radiology and cardiac parameters, heroin users are a different population as compared to the non heroin users, although our results were not statistically significant. The knowledge about variations in non invasive investigations helps the healthcare workers to optimize treatment regarding rehabilitation and making them healthier citizen.

CONFLICT OF INTEREST

This study has no conflict of interest to declare by any author.

REFERENCES

1. Ilicit Drug Trends in Pakistan. 1 April 2008. United Nations Office on Drugs and Crime Country Office, Pakistan.
2. The joint Government of Pakistan / UNODC Report 'Problem Drug Use in Pakistan: Results from the 2006 National Assessment'. http://www.anf.gov.pk/matrc.php. Accessed May 2011.
3. Devlin RJ, Henry JA. Clinical review: Major consequences of illicit drug consumption. Crit Care. 2008; 12(1): 202.
4. Nakhaee N, Ziaaddini H, Karimzadeh A. Epidemiologic Study on Drug Abuse among First and Second Grade High School Students in Kerman. Addiction and Health, 2009; 1(1): 31-36.
5. The Profile of Injection Drug Users in Chennai, India: Identification of Risk Behaviours and Implications for Interventions. Subst Use Misuse. 2010; 45(3): 354–67.
6. Fauci AS, Braunwald E, Kasper DL, Hauser S L.Harrison's Principles of Internal Medicine, 17th Edition, 2008.
7. Han B, Gfroerer JC, Colliver JD. Associations between duration of illicit drug use and health conditions: results from the 2005-2007 national surveys on drug use and health. Ann Epidemiol. 2010; 20(4): 289-97.
8. Gerard deVries and vanHest RA. From contact investigation to tuberculosis screening of drug addicts and homeless. Eur J Public Health. 2006; 16(2): 133–36.
9. Bellin E, Fletcher D, Safyer S. Abnormal chest x-rays in intravenous drug users: implications for tuberculosis screening programs. Am J Public Health. 1993; 83(5): 698-700.
10. Badr II, Farghaly AG, Koura MR, Mohamed HF, Hassan EM, Kotkat AM, et al. Health status assessment of drug addicts in Alexandria. J Egypt Public Health Assoc. 1998; 73 (3-4): 275-96.
11. Rajabizade G, Ramezani MA, Shakebi MR. prevalence of opium addiction in Iranian drivers 2001-2003. J Med. Sci. 2004; 4(3): 210-13.
12. Ojeda VD, Robertson AM, Hiller SP, Lozada R, Cornelius W, Palinkas LA et al. A Qualitative View of Drug Use Behaviors of Mexican Male Injection Drug Users Deported From the United States. J Urban Health: Bulletin of the New York Academy of Medicine, 2011; 88(1): 104–17.
13. Hao W, Xiao S, Liu T, Young D, Chen S, Zhang D, et al. The second National Epidemiological Survey on illicit drug use at six high-prevalence areas in China: prevalence rates and use patterns. Addiction. 2002; 97(10): 1305-11.
14. Glauser FL, Downie RL, Smith WR. Electro-cardiographic abnormalities in acute heroin overdosage. Bull Narc. 1977; 29(1): 85-9.
15. Wallner C, Stollberger C, Hlavin A, Finsterer J, Hager I, Hermann P. Electro-cardiographic abnormalities in opiate addicts. Addiction. 2008; 103(12): 1987-93.
16. Manolis SA, MD; Melita H, MD. Echocardiographic and Clinical Correlates in Drug Addicts with Infective Endocarditis. Implications of Vegetation Size. Arch Intern Med. 1988; 148(11): 2461-65.
17. Berger M, Delfin LA, Jelveh M, Goldberg E. Two-dimensional echocardiographic findings in right-sided infective endocarditis. Circulation. 1980; 61(4): 855-61.
18. Andy JJ, Sheikh MU, Ali N, Barnes BO, Fox LM, Curry CL, Roberts WC. Echocardiographic observations in opiate addicts with active infective endocarditis. Frequency of involvement of the various values and comparison of echocardiographic features of right- and left-sided cardiac valve endocarditis. Am J Cardiol. 1977; 40(1): 17-23.
19. Fontera JA, Grandon JD. Right-side endocarditis in injection drug users: review of proposed mechanisms of pathogenesis. Clinical Infect Dis. 2000; 30: 374-9.
20. Mylonakis E, Calderwood SB. Infective endocarditis in Adults. N Engl J Med 2001; 345: 1318-30.

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