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Research Article

### AN OBSERVATIONAL STUDY TO ASSESS AND COMPARE HEROIN USERS WITH THEIR AGE AND GENDER MATCHED RELATIVES

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**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:** Study was conducted in Lady Reading Hospital, Peshawar from April, 2019 to March, 2020.

**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).

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**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 neighboring countries differs from its western counterparts due to myriad of social, economic, 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 at Lady Reading Hospital, Peshawar from April, 2019 to March, 2020. It was embarked upon after obtaining prior approval from respective authorities.

Our study was conducted on the enrollees 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 in Rawalpindi, Pakistan. It provides primary, secondary and tertiary cardiac care to military personnel and civilian population. At the hospital, 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 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 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  $29.92 \pm 10.26$  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.

Chest x-ray (CXR) were done in the radiology department of Lady Reading and reported upon by a consultant radiologist. In addition to this, the respondents' cardiac workup included 12-lead electrocardiography (ECG) and two-dimensional echocardiography (2D-ECHO). Consultant cardiologist interpreted both.

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  $29.92 \pm 10.26$  years while that of controls was  $30.51 \pm 11.62$  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.

Table No 01: Socio Demographic Profile of Cases and Controls

Patient Attributes		Cases (n=61)	CI	Controls (n=100)	CI	p-value
Age (in years)	≤ 20	8 (13.1%)	(4.6%–21.6%)	13 (13%)	(6.4%–9.6%)	0.635
	21–40	47 (77%)	(66.5%–87.6%)	72 (72%)	(63.2%–80.8%)	
	>40	6 (9.8%)	(2.4%–17.3%)	15 (15%)	(8%–22%)	
Occupation	Daily Wages	25 (41%)	(28.6%–53.3%)	28 (28%)	(19.2%–36.8%)	0.002
	Drivers	11 (18%)	(8.4%–27.7%)	12 (12%)	(5.6%–18.4%)	
	Business	9 (14.8%)	(5.8%–23.6%)	22 (22%)	(13.9%–30.1%)	
	Govt/private Job	1 (1.6%)	(-1.6%–4.8%)	17 (17%)	(9.6%–24.4%)	
	Student	0 (0%)	(0%–0%)	7 (7%)	(2%–12%)	
	Unemployed	15 (24.6%)	(13.8%–35.4%)	14 (14%)	(7.2%–20.8%)	
INCOME (PKR)	<5,000	37 (60.7%)	(48.4%–72.9%)	31 (31%)	(21.9%–40.1%)	0.001
	6,000–10,000	17 (27.9%)	(16.6%–39.1%)	51 (51%)	(41.2%–60.8%)	
	11,000–15,000	6 (9.8%)	(2.4%–17.3%)	10 (10%)	(4.1%–15.9%)	
	>15000	1 (1.6%)	(-1.6%–4.8%)	8 (8%)	(2.7%–13.3%)	

Table No 02: 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
<b>DURATION (YEARS)</b>						
<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%)

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.

Table No 03: CXR And ECG Findings in Cases and Controls

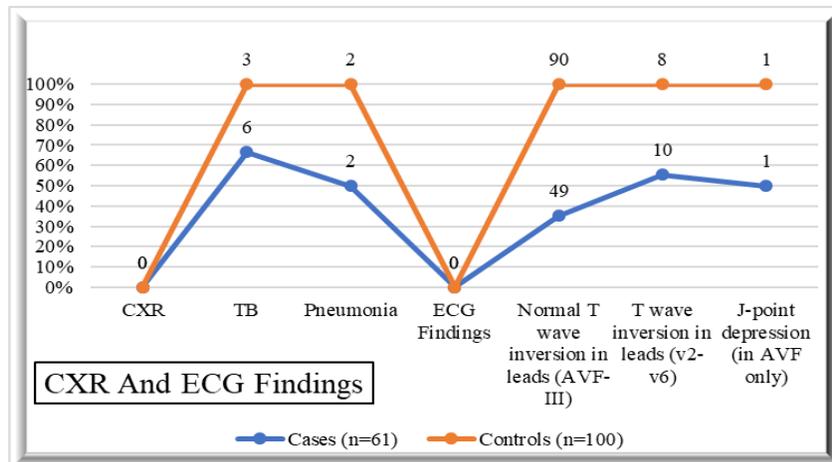
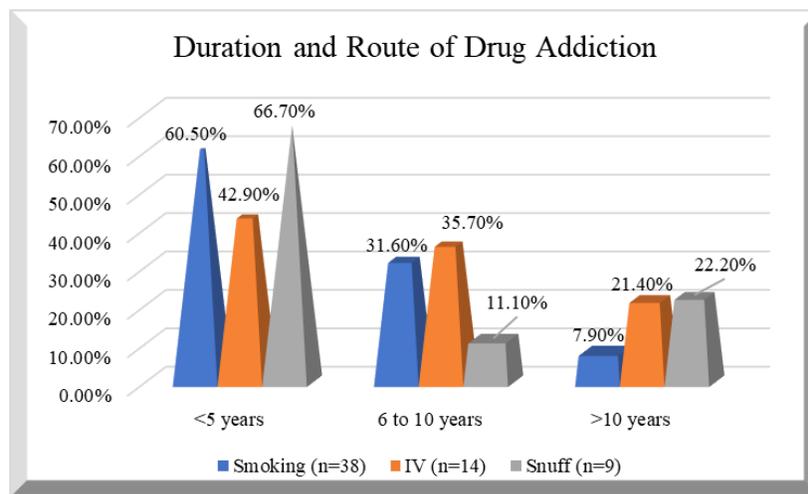
Parameters	Cases (n=61)	Confidence Interval (CI)	Controls (n=100)	Confidence Interval (CI)
<b>CXR</b>				
TB	6 (9.8%)	(2.37%–17.31%)	3 (3%)	(-0.3%–6.3%)
Pneumonia	2 (3.3%)	(-1.2%–7.8%)	2 (2%)	(-0.74%–4.74%)
<b>ECG Findings</b>				
Normal T wave inversion in leads (AVF-III)	49 (80.3%)	(70.4%–90.3%)	90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

Table No 04: Detailed Ejection Fraction + Cardiac Chambers Findings in 2D-ECHO

2 D-ECHO Parameters	Cases (n=61)	Controls (n=100)	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 No 05: 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%)



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 Nakhaee 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 reports tricuspid 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 noninvasive investigations helps the healthcare workers to optimize treatment regarding rehabilitation and making them healthier citizen.

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