

PREVALENCE AND EVALUATION OF CARDIAC COMPLICATIONS AMONG PATIENTS WITH SUBSTANCE ABUSE IN AL HUSSEIN UNIVERSITY HOSPITAL

By

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ABSTRACT

Background: Substance abuse refers to excessive use of a drug in a way that is detrimental to self, society, or both. Substance abuse and its health outcomes has become a major public health issue in Egypt in recent years.

Objective: To determine the prevalence of electrocardiographic and echocardiographic abnormalities among substance abusers who have low cardiovascular risk profile and evaluate the relation between these abnormalities and substance abuse.

Patients and Methods: This case-control study was conducted at Al-Hussein University Hospital from January 2018 to May 2020. It included 500 males and females cases aged between 18 and 45 years. They were divided into 2 major groups: Group I contained 250 substance abusers with duration of abuse \geq one year and Group II contained 250 non abusers as controls. All members of both groups had low cardiovascular risk profile. The only major risk factor for heart disease presented in this study was smoking cigarette and its effect was ameliorated by matching with the control group. All cases were subjected to a full history taking, comprehensive clinical examination and laboratory investigations to exclude cases with major risk factors for heart diseases. Cardiac condition was evaluated in all cases using standard 12-lead electrocardiogram and the results were interpreted. Further evaluation using echocardiography examination were done for all patients with abnormal ECG findings in addition to 42 cases selected randomly from control group for statistical purposes, and divided into 2 sub-groups. Sub-group I included 54 patients who had abnormal ECG findings in group I, Sub-group II included 54 cases (12 patients who had abnormal ECG findings + 42 cases selected randomly) from group II.

Results: There was significantly higher prevalence of ECG and echocardiographic abnormalities among substance abusers ($p < 0.05$) in comparison to non-abusers. The most common abnormality detected in substance abusers was QT interval prolongation (6.4%), while the most common echocardiographic abnormality detected was diastolic dysfunction (25.9%). All of abused substances detected in our study (cannabis, tramadol, heroin, alcohol and strox), except benzodiazepines, had significant relation with the abnormal ECG findings. Further analysis for factors related to abnormal ECG findings showed that the increase in duration of abuse, tramadol abuse and heroin abuse were significantly associated with the odds of abnormal ECG findings.

Conclusion: ECG and Echocardiographic abnormalities have significant prevalence among substance abusers, especially those with multiple substance abuses, despite of their low cardiovascular risk profile.

Long duration of abuse, heroin abuse and tramadol abuse were considered risk factors for abnormal ECG findings.

Keywords: Substance abuse, Cannabis, Tramadol, Heoin, Alcohol, Strox, Benzodiazepines, Cardiac complication, ECG abnormalities, low cardiovascular risk.

INTRODUCTION

Substance abuse is a cross-disciplinary topic of research and concern, which involves the need to employ concomitantly various theoretical explications and empirical evidence in collaborative efforts to strive for more optimal solutions to limit its contagiousness, and to curb any direct and indirect harm (*Lo et al., 2020*).

In Egypt, the social and economic changes associated with urbanization and social unrest have contributed to the problem of addiction over the past four decades. In addition to heroin, stimulants, and cannabis, tramadol use is now considered a major serious public health problem in Egypt, particularly among youth who are most vulnerable for substance abuse (*AbdelWahab et al., 2018*).

Cardiovascular diseases are one of the leading causes of death worldwide. There are several known risk factors for heart diseases, i.e. hypertension, obesity, and diabetes, which are the classic triads that substantially increase the risks of cardiovascular diseases. Other risk factors include family history, and behavioral factors such as smoking, alcohol consumption, physical inactivity, and unhealthy diet. There are several studies on non-traditional risk factors of heart disease; one of such is long-term substance abuse (*Ogungbe et al., 2019*).

The present study aimed to determine the prevalence of electrocardiographic and

echocardiographic abnormalities among substance abusers with low cardiovascular risk profile and evaluate the relation between these abnormalities and substance abuse.

PATIENTS AND METHODS

This case–control study was conducted at Al-Hussein University Hospital, from January 2018 to May 2020. It included 500 males and females cases aged between 18 and 45 years. They were divided into 2 major groups:

- 1. Group I (Substance abuse group):** included 250 patients (211 males and 39 females) who were diagnosed clinically as being substance abusers according to the DSM-V criteria. Patients were recruited from the outpatient clinics or inpatients of addiction units of Psychiatry Department, Al-Hussein University Hospital.
- 2. Group II (control group):** included 250 (205 males and 45 females) age and sex matched cases with group I and have no history of substance abuse or cardiovascular diseases. These cases were recruited from those attending Al-Hussein University Hospital outpatient clinics for causes other than substance abuse disorders or cardiovascular diseases with exclusion of those with medical disorders or major risk factors of cardiovascular disease (except tobacco smoking).

One sub-group was generated from each major group:

- **Sub-group I:** included 54 patients who had abnormal ECG findings in group I.
- **Sub-group II (Control):** included 54 cases (12 patients who had abnormal ECG findings + 42 cases selected randomly for statistical purposes) from group II.

Ethical approval for this study was granted by ethical committee of the Faculty of Medicine, Al-Azhar University. Prior to being enrolled in the study, all of patients gave conscious informed consent. If the competency of the patient was in doubt, informed consent was given by his/her guardian, with full explanation of the study and its steps. Complete confidentiality was followed where all data and information either obtained from patients or obtained during interviews were kept as secrets. Questionnaires were maintained by code numbers and not by the patients' names. Socio-demographic data and history of substance abuse were taken using the form prepared for the study. Many variables were included such as age, sex, residence, marital status, occupation, smoking and duration of abuse. Data related to the substance use, amount and method of administration were taken from the patients according to the questionnaire and the form prepared for the study.

Exclusion criteria:

Patients over 45 or less than 18 years to avoid age as a risk factor for cardiac disease. Ongoing use of medical prescriptions that could induce cardiovascular disorders or affect the ECG

results (e.g. CNS, cardiac drugs). Patients with a history of underlying cardiovascular disease preceding the starting date of substance abuse or within the first year of abuse. Patients with a family history of genetic or congenital cardiac disease or family history of premature ischemic heart disease (defined as male <55 years or female <65 years in first-degree family members). Patients with diabetes mellitus, hypertension, hyperlipidaemia or BMI > 25kg/m² or < 18 kg/m². Patients with severe medical disorders as renal and hepatic failure or any medical conditions or laboratory results that can affect the study results such as thyroid dysfunction and electrolyte disturbances. Duration of substance abuse was less than 1 year.

All cases were subjected to the following:

- **History taking:** Personal and present medical history including history of tobacco smoking or drug-related disorders were taken.
- **Clinical examination:** General and cardiac examinations were performed.
- **Investigations:** Complete blood count, renal function test, liver function test, serum potassium, sodium and calcium, random blood sugar, lipid profile and viral markers for hepatitis C, B and HIV. Recent documented labs. Within 6 months were accepted with no need for re-checking
- **Standard 12-leads electrocardiogram.** ECGs: were recorded while patients were in complete mental and physical rest and their vital signs (temperature,

respiratory rate, pulse and Blood pressure) were within normal ranges.

All ECGs were interpreted by an expert cardiologist. The following variables are measured from the ECG reports: QTc Interval, supraventricular and ventricular arrhythmias, atrioventricular and ventricular cardiac blocks, P and T-waves abnormalities and myocardial ischaemia (i.e. ST segment and pathological Q-wave). QT correction was performed using the Bazett's formula. QTc is prolonged if $> 440\text{ms}$ in men or $> 460\text{ms}$ in women.

- **A complete transthoracic M-mode, 2-dimensional echocardiography and pulsed color Doppler examination** was performed only for patients in sub-groups I and II (108 patients). The echocardiographic examinations were done and interpreted by a single certified cardiologist who was a participant in the study but blinded to all patient demographic and clinical information.

Statistical Analysis:

Data were composed, reviewed, coded, and entered in the Statistical Package for The Social Sciences (IBM SPSS) version 23. The quantitative data were presented as mean, standard deviations, and ranges. In addition, qualitative variables were presented as numbers and percentages. With regard to the qualitative data, the two groups were compared using the chi-squared test. However, the Fisher exact test was only used when the expected count in any cell was <5 . With regard to the quantitative data, the two groups were compared using independent t-test when the data were parametric, and Mann-Whitney test was used when data were non-parametric. A significant p-value was considered when less than 0.05 and highly significant when less than 0.01. Binary logistic regression analyses were used to assess factors related to abnormal ECG findings with odds ratio and 95% confidence interval (CI).

RESULTS

The age of the studied groups ranged between 18 and 45 years. There are no significant statistical differences between the mean ages of group I ($30. \pm 6.5$ years) and group II (29.9 ± 6.6 years). Males represent the upper portion of both group I and group II (84.4% and 82% respectively). Current smokers represent 81.2% of group I and 82.4 of group II while ex-smokers and non-smokers represent 7.2% and 11.6%, respectively in group I and represent 3.2% and 14.4%,

respectively in group II. There were no statistically significant differences between both groups as regard sex ($p=0.4$), age ($p=0.4$), age groups ($p=0.6$), residence ($p=0.4$), smoking cigarette ($p=0.09$), smoking degrees ($p=0.2$) and smoking duration (11.4 ± 5.5 Vs. 11.2 ± 6.1 years, $p=0.6$) variables. While there are highly significant statistical differences between both groups as regard marital status ($p=0.001$) and occupation ($p=0.00$) (Table 1).

Table (1): Socio-demographic characteristics of the studied groups

Variables	Group I n=250	Group II n=250	P-value
Age (years)	30.02 ± 6.58	29.95 ± 6.66	0.903
Sex			0.473
Male	211 (84.4)	205 (82%)	
Female	39 (15.6)	45 (18%)	
Smoking Cigarette			0.099
Current smoker	203 (81.2%)	206 (82.4%)	
Ex-smoker	18 (7.2%)	8 (3.2%)	
Non-smoker	29 (11.6%)	36 (14.4%)	
Smoking duration (years)	11.47 ± 5.5	11.21 ± 6.1	0.643
Residence			0.189
Urban	203 (81.2%)	191 (76.4%)	
Rural	47 (18.8%)	59 (23.6%)	
Marital status			< 0.001
Married	91 (36.4%)	129 (51.6%)	
Unmarried	159 (63.6%)	121 (48.4%)	
Occupation			< 0.001
Employed	89 (35.6%)	148 (59.2%)	
Unemployed	137 (54.8%)	74 (29.6%)	
Student	24 (9.6%)	28 (11.2%)	

Single substance abusers represent 30.4 %, while multiple substance abusers represent 69.6%. The number of abused substances ranged between (1 – 5) substances, 29.6% of patients abused two

substances, 30.4% abused three substances 8.4% abused four substances and 1.2% abused five substances (**Table 2**).

Table (2): Proportion of cases with single and multiple substance abuse

Number of abused substances	Number of Patients (n= 250)	Percentage
Single substance	76	30.4%
Multiple substances	174	69.6%
Two	74	29.6%
Three	76	30.4%
Four	21	8.4%
Five	3	1.2%

Cannabis and tramadol were the most prevalent substances among substance abuse group (64.4% and 57.2%, respectively). Cannabis has the longest duration of abuse (8.9±3.5 years), while Strox is the least abused substance (12%) with the least mean duration of abuse (2.8±0.7 years). Oral administration was the most common method used by

substance abusers, followed by inhalational route. Oral route is the only method of administration for tramadol, alcohol and benzodiazepines, while inhalation (smoking) is the only method of administration for strox and is the most common method for cannabis abuse (96.9%). IV abusers represent 27.6% and all of them were heroin abusers (**Table 3**).

Table (3): Characteristics of abused substances.

Substances Variables		Cannabis	Tramadol	Alcohol	Heroin	Benzodiazepine	Strox
Number of Patients (%)		161 (64.4%)	143 (57.2%)	86 (34.4%)	81 (32.4%)	50 (0%)	30 (12%)
Duration of abuse		8.93±3.5	6.29±3.3	7.92±3	4.91±2.6	4.02±2.6	2.80±0.7
Amount	M±SD N (%)	1.85 ± 0.7 g/day	388 ± 176 mg/day	Mild 22 (25.6%) Moderate 41(47.7%) Heavy 23(26.7%)	2.02 ± 0.8 g/weak	8.0 ± 2.2 mg/day	2.63 ± 1 cig/day
	Range	0.5-4	100-1000		1 - 4.5	4 – 12	1 - 4
Route of administration		Inhalation 134 (83.2%) Oral 5 (3.1%) Both 22 (13.7%)	Oral 143(100%)	Oral 86 (100%)	Inhalation 12 (14.8%) Injection 55 (67.9%) Both 14 (17.3%)	Oral 50 (100%)	Inhalation 30 (100%)

The current study shows a statistically highly significant difference between the 2 studied groups as regard electrocardiographic results. There is a

significantly higher prevalence of ECG abnormalities among group I (21.6%) in comparison to group II (4.8%) $p = 0.000$ (Table 4).

Table (4): Comparison between group I and group II as regard ECG findings

ECG results Groups	Normal	Abnormal	P-value
Group I n=250	196 (78.4%)	54 (21.6%)	<0.001
Group II n=250	238 (95.2%)	12 (4.8%)	

The most common abnormalities detected in group I were QT interval prolongation (6.4%) with mean duration (483.8 ± 17.9 ms), significant T-wave abnormalities (inversion or flattening) (3.6%), supraventricular premature beats

(3.2%) and poor R wave progression (3.2%), while the most common abnormality detected in group II was supraventricular premature beats (2%) (Table 5).

Table (5): Description and prevalence of ECG abnormalities among the studied groups

ECG abnormalities Groups	Group I n=250	%	Group II n= 250	%
Significant ST-elevation	2	0.8		
Significant ST-depression	7	2.8		
Significant T-wave inversion	5	2		
Pathological Q-wave	3	1.2		
Significant T-wave flattening	4	1.6		
Poor R-wave progression	8	3.2		
QTc prolongation	16	6.4		
M±SD	483.8 ± 17.9 ms.			
Range	459 – 518 ms.			
Ventricular premature beats	7	2.8		
Supraventricular premature beats	8	3.2	5	2
First degree AV. Block	1	0.4		
Abnormal P- wave	4	1.6	2	0.8
Atrial Fibrillation	1	0.4		
Low voltage	1	0.4	2	0.8
Early repolarization pattern			1	0.4
Tall T-wave			2	0.8

In comparison of substance abusers with normal and abnormal ECG findings, we found that patients with ECG abnormalities had significantly higher means of both duration of abuse (10.9 ± 2.9 vs. 7.0 ± 3.7 , respectively, $p < 0.001$) and number of abused substances (3.1 ± 0.9 vs. 1.9 ± 0.8 , respectively, $p < 0.001$). However, there was no statistically significant differences between them as respect to age (31.1 ± 5.2 vs. 29.7 ± 6.8 ,

respectively, $p = 0.09$) and duration of smoking (12.2 ± 3.7 vs. 11.2 ± 6.0 , respectively, $p = 0.163$). There were significant relations between abnormal ECG findings and smoking cigarette, cannabis, tramadol, heroin, alcohol and strox abuse ($p < 0.01$), while there was no relation between abnormal ECG findings and benzodiazepines abuse $p = 0.64$ (Table 6).

Table (6): Comparison and relation between ECG findings and other variables in group I

ECG results \ Variable		Normal	Abnormal	P-value
Age in years		29.7 ± 6	31.1 ± 5	0.09
Smoking Cigarette	Smoker	167 (75.6%)	54 (24.4%)	0.003
	Non-smoker	29 (100%)	0 (0.0%)	
Smoking duration (years)		11.2 ± 6	12.2 ± 3	0.163
Duration of abuse (years)		7.0 ± 3	10.9 ± 2	< 0.001
Number of abused substances		1.9 ± 0.8	3.1 ± 0.9	< 0.001
Cannabis	No	85 (96.6%)	3 (3.4%)	< 0.001
	Yes	110 (68.3%)	51 (31.7%)	
Tramadol	No	74 (69.2%)	33 (30.8%)	0.002
	Yes	122 (85.3%)	21 (14.7%)	
Heroin	No	156 (92.3%)	13 (7.7%)	< 0.001
	Yes	40 (49.4%)	41 (50.6%)	
Alcohol	No	142 (86.6%)	22 (13.4%)	< 0.001
	Yes	54 (62.8%)	32 (37.2%)	
Benzodiazepine	No	158 (79%)	42 (21%)	0.645
	Yes	38 (76%)	12 (24%)	
Strox	No	178 (80.9%)	42 (19.1%)	0.009
	Yes	18 (60%)	12 (40%)	

Multivariable binary logistic regression analysis for factors related to abnormal ECG findings showed that long duration of abuse, tramadol abuse and heroin abuse were significantly associated with the

odds of abnormal ECG findings at $p < 0.05$. The estimated odds ratio (OR) (95% CI) of duration of abuse was 1.495 (1.232–1.813; $p < 0.001$) (Table 7).

Table (7): Multivariable binary logistic regression analysis for factors related to abnormal ECG findings

Variables	Analysis	p-value	OR	95% C.I.	
				Lower	Upper
Duration of abuse		< 0.001	1.497	1.234	1.815
Number of abused Substances		0.128	3.137	0.721	13.650
Cannabis abuse		0.721	1.512	0.156	14.606
Tramadol abuse		0.032	0.057	0.004	0.781
Heroin abuse		0.001	0.007	0.000	0.115
Alcohol abuse		0.772	0.769	0.130	4.562
Strox abuse		0.224	2.953	0.515	16.928
Smoking cigarette		0.998	221036	0.000	.

There was a significantly higher prevalence of abnormal echocardiographic findings among Sub-group I (53.7%) in

comparison to Sub-group II (9.3%) $p < 0.001$ (Table 8).

Table (8): Comparison between sub-group I and II as regard echocardiographic findings.

Echocardiography	Normal	Abnormal	P-value
Sub-group I n=54	25 (46.3%)	29 (53.7%)	< 0.001
Sub-group II n=54	49 (90.7%)	5 (9.3%)	

Among the 54 patients in sub-group I, 29 (53.7%) had abnormal echocardiographic findings. The most common abnormalities detected were diastolic dysfunction in 25.9% of patients (16.5% mild, 7.5% moderate and 1.9% moderate to severe) and segmental wall motion abnormality in 18.5% of patients.

Among the 54 patients in sub-group II, only 5 (9.3%) patients had abnormal echocardiographic findings. The most common abnormality detected was mitral valve abnormalities 7.4% (1.9% of patients had mild MV regurgitation and 5.6% had MV prolapse) (Table 9).

Table (9): Description and prevalence of echocardiographic abnormalities among the studied sub-groups

Echo-abnormality	Sub-groups	Sub-group I n=54	%	Sub-group II n=54	%
Ejection Fraction (EF) <50% Range		7	12.9		
		40 – 49%			
Mitral valve (MV) abnormalities		6	11.1	4	7.4
	Prolapse	2	3.7	3	5.6
	Regurge	4	7.4	1	1.9
	Mild	2		1	
	Moderate	2		0	
Tricuspid valve abnormality		9	16.7		
	Leaflet Thickening	4	7.4		
	Regurge	5	9.3		
	Mild	4			
	Moderate	1			
Pulmonary arterial hypertension		4	7.4		
	Mild	1	1.9		
	Moderate	3	5.6		
Segmental wall motion abnormality		10	18.5		
	Dilated left ventricle	3	5.6		
	Diastolic Dysfunction	14	25.9	1	1.9
	Mild	9	16.5	1	1.9
	Moderate	4	7.5	0	0
	Moderate to severe	1	1.9	0	0
Dilated left atrium (mild)		1	1.9		
Left ventricular hypertrophy (mild)		2	3.7	2	3.7

We found a significant relation between number of abused substances and presence of echocardiographic abnormalities. Prevalence of abnormal echocardiography results among patients with high numbers of Co-abused substances were higher than that in patients with low numbers of Co-abused substances (mean rank 33.9 vs. 20,

respectively $p=0.001$). However, there was no statistically significant differences between patients with abnormal echocardiography and patients with normal echocardiography as respect to duration of smoking (mean rank 29.1 vs. 25.6, respectively $p=0.413$) and duration of abuse (mean rank 30.9 vs. 23.5, respectively, $p = 0.085$) (Table 10).

Table (10): Comparison between substance abusers with normal and abnormal echocardiographic findings

Variables \ Echocardiography	Normal n= 25	Abnormal n=29	P-value
Duration of abuse	23.5	30.9	0.085*
Number of abused substances	20	33.9	0.001*
Smoking duration	25.6	29.1	0.413*

* Mann–Whitney test.

DISCUSSION

In our study, two thirds (58.4%) of substance abusers were between 18 to 30 year old. This was in agreement with (Yassa and Badea, 2019) who found the most critical age of abuse was between 21 to 30 year old. In purpose of reducing the confounding factors in our study to the minimum. Most of major traditional risk factors for cardiovascular diseases such as diabetes, hypertension, dyslipidaemia, family history of premature heart disease, and obesity were avoided in the studied population.

Overall, Males (84.4%) and smokers (88.4%) represent the upper portion of substance abusers in our study, this results are nearly similar to those found in a prospective study conducted on addicts, males were 75% and smokers were 90% (Adel et al., 2019). The major portions of substance abusers were multiple substance abusers (69.6%), while 30.4% of them are single substance abusers. These results coincide with the results shown in a study

among Egyptian patients (Bassiony et al., 2016).

In our study, cannabis was the most prevalent substance among patient with abnormal findings 94.4% followed by, heroin 75.9%, alcohol 59.3%, tramadol 38.9%, benzodiazepine 22.2% and Strox 22.2%, while cannabis + heroin were the most prevalent Co-abused drugs among the same patients.

It should be mentioned that Strox is the Egyptian Spice in which Atropa Belladonna, Datura, or Hyposymus is used as a plant matrix to be enhanced with unidentified synthetic cannabinoids as the main psychoactive substance. The presence of other unidentified mind-altering additives to Strox to enhance its psychoactive effects cannot be excluded (Sobh and Sobh, 2020).

The current study revealed that the prevalence of ECG abnormalities among substance abusers was 21.6%, which was lower than the estimated prevalence of ECG abnormalities in a previous study

conducted in Egypt, which was 53.7%. This difference may be due to the low cardiovascular risk profile of our studied patients in comparison to patients of the other study. However, both studies coincided in presence of a significantly higher prevalence of ECG abnormalities among substance abusers in comparison to non-abusers (*AbdelMoneim et al., 2020*). In our study, we found tramadol abuse and heroin abuse are significantly associated with the odds of abnormal ECG findings, which coincided with the results of a cross sectional study that revealed tramadol abuse as a high risk factors for acute MI in Egyptian youth (*Mansour et al., 2020*). Tramadol was not well investigated probably as shown in medical literature because tramadol is not commonly used as an illicit drug in western countries but used more often as a sedative or in pain management purposes in the short term. Results of a recent cross sectional study support our findings and concluded that the patients with heroin abuse disorder are at risk for cardiac arrhythmia (*Demir et al., 2021*).

The most common abnormality detected in our study was QTc interval prolongation (6.4%). These results disagree with (*Scott et al., 2017*) who concluded that QT prolongation is rare in patients with substance abuse and is most likely similar to the general population. QTc prolongation may be explained due to add on pathophysiological effects of multiple different abused substances on QT interval.

QT interval prolongation was reported in previous studies of addiction population; however, it was usually related to cocaine abuse or concurrent

methadone therapy (*Demarie et al., 2011*). (*Yildirim et al., 2020*) demonstrated that heroin abuse significantly changed QT interval independent from the effect of adulterants and methadone. Tramadol also is known as an intermediate risk drug for developing long QT interval in high doses (*Behzadi et al., 2018*).

One third of abnormalities detected among substance abusers in our study were T-wave and ST-segment abnormalities which coincided with the results of a previous study conducted in Assuit University Hospital (*AbdelMoneim et al., 2020*).

In our study, atrial fibrillation was detected in one patient (0.4%) with history of multiple substance abuse including alcohol. In a previous study, alcohol was the most common trigger of atrial fibrillation reported by 35% of patients (*Groh et al., 2019*). Several possible mechanisms have been suggested to explain the association between alcohol consumption and AF risk, including prolongation of the PR, QRS, and QTc intervals, shortening of the effective refractory period, catecholamine release, increased vagal activity, and a rise in plasma free fatty acids which are thought to be arrhythmogenic (*Johansson et al., 2020*). Although, AF is a significant atrial arrhythmia, but its statistical significance in our study couldn't be assessed due to low number of cases.

In our study, despite presence of a significant relation between cannabis abuse and ECG abnormalities, logistic regression analysis showed that there was no association between cannabis abuse and ECG abnormalities. However, Cannabis has been added to the risk

factors of cardiac disease in a previous study (*Nawrot et al., 2011*).

Also, we found that alcohol and strox abuse had significant relation with the abnormal ECG findings. Relation between strox and ECG abnormalities was shown in an observational study, in which ECG of 6% of patients with Strox abuse showed inferior wall or inferolateral ischemic signs in the form of ST segment depression and T wave inversion and one patient developed transient rate controlled atrial fibrillation (*El-Masry and Abdelkader, 2021*).

In our study, long duration of abuse was significantly associated with the odds of abnormal ECG findings. This result relatively coincided with the results of analysis of the United Kingdom General Practice Database that compared no use of opioids with current opioid use and show that the risk of MI increased with longer duration of opioid prescriptions (*Li et al., 2013*).

Regarding the echocardiographic assessment, there was a significantly higher prevalence of echocardiographic abnormal findings among substance abusers (53.7%) in comparison to non-abusers (9.3%). The most common abnormality detected in our study was diastolic dysfunction in 25.9% of patients. This may be related to the high prevalence of alcohol abuse among patients with abnormal findings. Ethanol consumption predicted diastolic dysfunction independently of age, body mass index, blood pressure, insulin sensitivity, and left ventricular mass index (*Catena et al., 2016*). Diastolic dysfunction is considered a risk factor for the development of

symptomatic heart failure (*Kosmala and Marwick, 2020*).

Our results showed that segmental wall motion abnormalities were common findings among substance abusers (18.5%). These findings coincided with the results of a previous study that showed segmental wall motion abnormalities were present in 47.8% of substance abuser presented with acute coronary syndrome and were significantly associated substance abuse (*Draz et al., 2017*). Segmental wall motion abnormality considered a strong indicator for ischemic heart disease which is linked to different illicit substance abuse, e.g. cannabis and tramadol as high risk factors (*Mansour et al., 2020*).

(*Guzzo-Merello et al., 2015*) reported that excess alcohol consumption has been implicated in up to 40% of cases of dilated cardiomyopathy. This somewhat may explain the dilatation of left ventricle in 3 (5.6%) of substance abusers in our study.

Our results showed that pulmonary arterial hypertension was detected in 7.4% of substance abusers. This finding relatively disagreed with the findings of a study examined the characteristics of PAH patients having reported illicit drug use and showed low prevalence of PAH among substance abusers (*Roche et al., 2016*).

CONCLUSION

Electrocardiographic and echocardiographic abnormalities have significant prevalence among substance abusers, especially those with multiple substance abuses, despite of their low cardiovascular risk profile. Long duration of abuse, heroin and tramadol abuse is

considered risk factors for abnormal ECG findings.

REFERENCES

1. **AbdelMoneim, W., Abdellah, N. Z., Fawzy, M. and Mohammed, S. (2020):** Assessment of Addicted Cases Admitted to Addiction Management Unit of Neurology and Psychiatry Hospital at Assiut University. *Zagazig Journal of Forensic Medicine*, 18(1): 108-125.
2. **AbdelWahab, M. A., Abou El Magd, S. F., Grella, C. E., Enaba, D. A. and Abdel Maqsood, R. (2018):** An examination of motives for tramadol and heroin use in an Egyptian sample. *Journal of addictive diseases*, 37(3-4): 123–134.
3. **Adel SM, Hieba EG and Mohammed AA. (2019):** Study of respiratory complications of addiction among civilian patients at Maadi Military Hospital. *Egypt J Chest Dis Tuberc*. 68:423-32.
4. **Bassiony, M. M., Youssif, U. M., Hussein, R. A. and Saeed, M. (2016):** Psychiatric Comorbidity Among Egyptian Patients With Opioid Use Disorders Attributed to Tramadol. *Journal of Addiction Medicine*, 10(4): 262–268.
5. **Behzadi, M., Joukar, S. and Beik, A. (2018):** Opioids and Cardiac Arrhythmia: A Literature Review. *Medical principles and practice: international journal of the Kuwait University, Health Science Centre*, 27(5): 401–414.
6. **Catena, C., Colussi, G., Verheyen, N. D., Novello, M., Fagotto, V., Soardo, G. and Sechi, L. A. (2016):** Moderate Alcohol Consumption Is Associated With Left Ventricular Diastolic Dysfunction in Nonalcoholic Hypertensive Patients. *Hypertension*, 68(5): 1208–1216.
7. **Demarie, D., Marletta, G., Imazio, M., Cappa, C., Ferro, S., Compostino, R., De Vivo, E., Trincherro, R. and Bignamini, E. (2011):** Cardiovascular-associated disease in an addicted population: an observation study. *Journal of Cardiovascular Medicine (Hagerstown, Md.)*, 12(1): 51–54.
8. **Demir, B., Ozsoy, F., Buyuk, A. and Altindag, A. (2021):** ECG changes in patients with opioid use disorder; P-QT wave dispersion: a retrospective study. *Journal of Addictive Diseases*, 39(2): 234–240.
9. **Draz, E. I., Oreby, M. M., Elsheikh, E. A., Khedr, L. A. and Atlam, S. A. (2017):** Marijuana use in acute coronary syndromes. *The American journal of drug and alcohol abuse*, 43(5): 576–582.
10. **El-Masry, M. and Abdelkader, S. (2021):** Clinical profile of designer drug “Strox” intoxicated cases presented to Poison control center Ain Shams University, Egypt from first of January 2017 to end of January 2018. *Ain Shams Journal of Forensic Medicine and Clinical Toxicology*, 36(1): 98-105.
11. **Groh, C. A., Faulkner, M., Getabecha, S., Taffe, V., Nah, G., Sigona, K. and Olgin, J. E. (2019):** Patient-reported triggers of paroxysmal atrial fibrillation. *Heart Rhythm*, 16(7): 996-1002.
12. **Guzzo-Merello, G., Segovia, J., Dominguez, F., Cobo-Marcos, M., Gomez-Bueno, M., Avellana, P., Millan, I., Alonso-Pulpon, L. and Garcia-Pavia, P. (2015):** Natural history and prognostic factors in alcoholic cardiomyopathy. *JACC. Heart Failure*, 3(1): 78–86.
13. **Johansson, C., Lind, M. M., Eriksson, M., Wennberg, M., Andersson, J. and Johansson, L. (2020):** Alcohol consumption and risk of incident atrial fibrillation: A population-based cohort study. *European Journal of Internal Medicine*, 76: 50–57.
14. **Kosmala, W. and Marwick, T. H. (2020):** Asymptomatic Left Ventricular Diastolic Dysfunction: Predicting Progression to Symptomatic Heart Failure. *JACC. Cardiovascular Imaging*, 13(1 Pt 2): 215–227.
15. **Li, L., Setoguchi, S., Cabral, H. and Jick, S. (2013):** Opioid use for noncancer pain and risk of myocardial infarction amongst adults. *Journal of Internal Medicine*, 273(5): 511–526.
16. **Lo, T. W., Yeung, J. and Tam, C. (2020):** Substance Abuse and Public Health: A Multilevel Perspective and Multiple

- Responses. *International Journal of Environmental Research and Public Health*, 17(7): 2610–2616.
17. **Mansour, H., Rayan, M., Shnoda, M. and Kamal, D. (2020):** Cannabis and tramadol addiction: Do they imply additive risk for acute myocardial infarction in adults younger than 45 years?. *Anatolian Journal of Cardiology*, 24(5): 316–325.
 18. **Nawrot, T. S., Perez, L., Künzli, N., Munters, E. and Nemery, B. (2011):** Public health importance of triggers of myocardial infarction: a comparative risk assessment. *Lancet (London, England)*, 377(9767): 732–740.
 19. **Ogungbe, O., Akil, L. and Ahmad, H. A. (2019):** Exploring Unconventional Risk-Factors for Cardiovascular Diseases: Has Opioid Therapy Been Overlooked?. *International Journal of Environmental Research and Public Health*, 16(14): 2564–2573.
 20. **Roche, A., Chaumais, M. C., Perrin, S., Jaïs, X., Savale, L., Camus, P. and Montani, D. (2016):** Illicit drug use and pulmonary arterial hypertension: Not so frequent. *European Respiratory Journal*, 48: 259–260.
 21. **Scott, A. J., Dunlop, A. J., Brown, A., Sadler, C. and Isbister, G. K. (2017):** The prevalence of QT prolongation in a population of patients with substance use disorders. *Drug and Alcohol Review*, 36(2): 239–244.
 22. **Shalaby, S. F. and Soliman, M. A. (2019):** Knowledge, attitude, and practice of medical students regarding smoking and substance abuse, Cairo University, Egypt. *The Journal of the Egyptian Public Health Association*, 94(1): 11–19.
 23. **Sobh, Z. K. and Sobh, H. K. (2020):** Strox (Novel Synthetic Cannabinoids) in Egypt: Medical and Legal Challenges. *Arab Journal of Forensic Sciences & Forensic Medicine*, 2 (1): 57-60.
 24. **Yassa, H. A. and Badea, S. T. (2019):** Patterns of drug abuse in Upper Egypt: cause or result of violence?. *Egyptian Journal of Forensic Sciences*, 9(1): 1-9.
 25. **Yildirim, E., Selcuk, M., Saylik, F., Mutluer, F. O. and Deniz, O. (2020):** Effect of Heroin on Electrocardiographic Parameters. *Efeitos da Heroína nos Parâmetros Eletrocardiográficos. Arquivos Brasileiros de Cardiologia*, 115(6): 1135–1141.

معدل انتشار وتقييم المضاعفات القلبية بين مرضى تعاطي المخدرات بمستشفى الحسين الجامعي

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خلفية البحث: يعد تعاطي المخدرات واحد من أكبر المشاكل التي تواجه المجتمع البشري بشكل عام والمجتمع المصري بشكل خاص. فهناك مجموعة كبيرة من المشكلات المتعلقة بتعاطي المخدرات والتي يمكن أن تحدث آثاراً مدمرة على الفرد وعلى الأسرة ويمكن أيضاً أن يكون لها وقع فادح خطير على حياة المجتمع ككل.

الهدف من البحث: تحديد مدى إنتشار المضاعفات القلبية بين متعاطي المخدرات وتقييم هذه المضاعفات من ناحية علاقتها بتعاطي المخدرات والعوامل المرتبطة به.

المرضى وطرق البحث: أجريت هذه الدراسة في الفترة ما بين يناير 2018 ومايو 2020 بمستشفى الحسين الجامعي التابعة لكلية الطب - جامعة الأزهر، وبعد أخذ الموافقة من لجنة الأخلاقيات التابعة للكلية، وقد تم إختيار 500 فرد وتقسيمهم إلى مجموعتين، مجموعة البحث وشملت 250 فرد من متعاطي المخدرات لمدة لا تقل عن عام، ومجموعة ضابطة وشملت 250 فرد من الأصحاء الذين ليس لهم تاريخ مرضي بتعاطي المخدرات. ولدى جميع أفراد المجموعتين معامل خطورة منخفض لأمرض القلب، ولا يتعاطون أدوية من المعروف أنها تؤثر على القلب، ولا يوجد خلل بأي من التحاليل المعملية الأساسية التي أجريت لهم، كما أن أعمارهم تراوحت ما بين 18 إلى 45 عاماً وبعد الموافقة الكتابية تم أخذ تاريخ مرضي كامل من جميع أفراد البحث وخضعوا لفحص سريري عام وفحص سريري متخصص للقلب ثم أخذت عينات دم من المرضى لإجراء التحاليل المعملية التالية: صورة دم كاملة، تحاليل وظائف الكلى والكبد وأملاح البوتاسيوم

والصوديوم والكالسيوم وفحص مستوى السكر وفحص لفيروسات بي وسي الكبدية وفيروس الإيدز وكذلك عمل تحليل دهون كامل. ثم تم فحص القلب بعمل رسم مخطط كهربية القلب، والحالات التي ظهرت بها إعتلالات في مخطط كهربية القلب في كلتا المجموعتين تم فحصها عن طريق تخطيط صدى القلب.

نتائج البحث: معظم متعاطي المخدرات في الدراسة ذكور ومدخنين وتقريباً ثلثي متعاطي المخدرات يتعاطون أكثر من عقار مخدر (التعاطي المتعدد) ويتراوح عدد المواد المخدرة المستخدمة في التعاطي المتعدد ما بين 2 إلى 5 مواد.

وقد وجد أن نسبة وجود إعتلالات برسم كهربية القلب عالية بين متعاطي المخدرات مقارنة بالمجموعة الضابطة، وكثرت هذه الإعتلالات ما بين حالات التعاطي المتعدد ولفترات طويلة كما أن أكثر أنواع هذه الإعتلالات تكراراً كان إستطالة فترة (كيوتى)، وهذا الإعتلال قد يؤدي إلى حدوث نوع خطير ومهدد للحياة من عدم إنتظام ضربات القلب، وقد كان الحشيش والهروين هم أكثر المواد المستخدمة إنتشاراً بين متعاطي المخدرات الذين وجدت لديهم إعتلالات برسم كهربية القلب.

وقد وجد أن نسبة وجود إعتلالات بنتائج فحص صدى القلب عالية بين متعاطي المخدرات مقارنة بالمجموعة الضابطة. وكثرت هذه الإعتلالات ما بين حالات التعاطي المتعدد كما أن أكثر أنواع هذه الإعتلالات تكراراً كان قصور القلب الإنبساطي وهو إعتلال قد يؤدي إلى فشل بوظائف القلب في المستقبل.

وقد أظهرت الدراسة أن هناك علاقة ما بين وجود إعتلالات برسم كهربية القلب وتعاطي كل من الحشيش والترامادول والهروين والكحوليات والإستروكس بعكس البنيزوديازيبين، وكذلك وجود علاقة ما بين هذه الإعتلالات وطول فترة تعاطي المخدرات.

وقد أظهر التحليل الإحصائي اللوجستي لهذه العوامل ذات العلاقة أن تعاطي الهروين والترامادول وكذلك طول فترة تعاطي المخدرات من عوامل الخطورة التي قد تسبب هذه الإعتلالات برسم كهربية القلب.

الاستنتاج: تعاطي المخدرات المتعدد وخاصة الترامادول والهيرويين ولفترات طويلة قد يؤدي إلى ظهور إعتلالات ومضاعفات قلبية حتى بين الفئات التي لديها معامل خطورة منخفض لأمراض القلب.

الكلمات الدالة: تعاطي المخدرات، الكحوليات، الحشيش، الترامادول، الهيرويين، الإستروكس، الإعتلالات القلبية و رسم كهربية القلب.