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Effect of illicit drugs and alcoholism on cardiac enzymes

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Abstract

The use of illicit drugs is spread worldwide. Drugs have serious effect on human health and in many cases deadly. It damage cardiac tissues and release cardiac enzymes due to injury/damage to it. Main objective of the study was to evaluate the effect of illicit drugs on cardiac enzymes and to know the correlation of single drug, double drugs, triple drugs and multiple drugs effect on cardiac enzymes. A study was conducted in the Institute of Paramedical Sciences Khyber Medical University Peshawar. For CK and LDH estimation, 183 male illicit drug users and for CKMB 107 were recruited. Control group were also taken with same age group, number and population. The patient blood samples were tested for LDH, CK and CKMB by Chemistry analyzer AMP. The statistical analysis was carried out using paired t-sample test. After analysis our study revealed that illicit drug abuse has sufficient influence on cardiac enzymes and multiple drugs using reinforced elevation in cardiac enzymes. These findings indicated of myocardial tissue damage with comparison in control groups. Illicit drugs lead to heart muscles damaged and caused release of elevated level of cardiac enzymes.

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Introduction

Drug abuse (Narcotics) has adverse effect on human health, it deteriorate the normal body functioning. Drug abuse is major complicated issue worldwide. According to 2013 report around 246 million people used illicit drugs (Tomlinson, Brown and Hoaken, 2016). Cigarette smoking (CS) is the starting machinery of many diseases. Due to smoking one person dies in every 6 minutes in the world (Rasmussen *et al.*, 2014). Based on WHO estimate tobacco kills nearly 6 million people each year through heart problems, lung cancer, and other illness and is also responsible worldwide for death of one in ten adult.

If the current rate continues, the fatality rate is projected to be more than 8 million per year by 2030 (WHO - World Health Organization, 2013). Cigarette including nicotine which is an addictive substance, it deregulate the cardiac autonomic function, raise sympathetic activation, increases heart rate and also causes peripheral and coronary vasoconstriction. It is also associated with intravascular inflammation, which takes contribution in development of atherosclerosis (Filippidis *et al.*, 2013). Low density lipoprotein, other fatty acids with the passage of time attach to blood vessel walls and do hardening and narrowing (atherosclerosis) of the walls and lead to thrombosis which may cause heart attack or myocardial infarction (Marrocco and Bush, 2010).

Marijuana (cannabis) is another illegitimate drug which is the utmost risk factor for cardiovascular disease. According to WHO about 147 million of people maximum 2.5% of world population use hashish comparing to 0.2% use opiates and 0.2% cocaine. Prevalence of cannabis in Pakistan was 3.9 in 2000 (UNODC, 2011). In marijuana users there is extreme decrease in blood flow and oxygen resulting into myocardial injury (Dwivedi, Kumar and Aggarwal, 2008).

Cocaine users may have high blood pressure, thicker heart walls, stiffer arteries in comparison to nonusers. According to researcher point of view it is “The perfect heart attack drug”. Cocaine causes 30-35% aortic stiffening, 8 mm of Hg high systolic pressure and increase in thickness of heart left ventricle about 18%. Just like other drugs cocaine is a risk factor of cardiovascular system which includes premature heart attack and other cardiovascular consequences (Phillips *et al.*, 2009). Cocaine causing adverse effect on neurotransmitter it brings out damage and also cardiac muscle death by upsetting calcium balance at cellular level (Agrawal *et al.*, 2015).

Smokeless tobacco (snuff) doubles the risk of heart attack (CDC, 2014). Study showed that relative risk of death due to cardiovascular disease in smokeless tobacco users was 1.4 times higher in comparison to nonuser (Bolinder *et al.*, 1994).

The consumption of several drugs may also cause deteriorations and increased mortality in those who also have suffering from cardiovascular disease. In 2005 one out of five adults experience stroke of age limit between 18years to 44 years who were taking illicit drugs (De Los Ríos *et al.*, 2012).

When all the consequences in relation to drug abuse contribute to the formation of cardiac cell injury and later on MI, there is elevation of cardiac sensitive markers creatine kinase (CK), Iso-enzyme (CK-MB) and lactate dehydrogenase (LDH) (Jaffe *et al.*, 1996).

CK exist in moderate amount in cardiac muscles but is not preserved only to heart also correlate to skeletal muscle and other tissue. Maximally 16-40% of total CK activity of cardiac tissues is because of CKMB (Calhoun *et al.*, 2002). Cardiac enzyme CK-MB levels naturally peak 2 to 24 hours following a heart attack and slowly fall back to baseline after three to four days (Nagaraju and Lundberg, 2013).

Due to smoking inflammatory changes increase that were also marked by increased activity of CK-MB iso-enzyme in serum (Anbarasi *et al.*, 2005). Recently a study in Lahore was conducted in 20 male smoker patients in whom there is elevation of CK-MB seen (Rashid *et al.*, 2010). The main objective of this study is to evaluate the adverse effect of illicit drugs on CK,

CK-MB and LDH. Throughout the world, we found limited or selected studies on this topic. Therefore, this study will help to understand the effect of illicit drugs on cardiac enzymes.

Materials and methods

Study duration

This study is carried out for estimation of cardiac enzymes creatine kinase (CK), CKMB and lactate dehydrogenase (LDH) in sera of illicit drugs addicted people in the period of July to December 2016.

Sample Size

After taking informed consent, we collected 183 samples for LDH and CK estimation from drug abuser and 183 ethnically matched healthy controls and 107 samples for CKMB estimation from drug abusers and 107 from healthy person as a control.

Study Design

Our study design was Experimental case control.

Sampling Technique

Samples were collected through convenient sampling technique.

Study Setting

This study was conducted in Institute of Paramedical Sciences, Khyber Medical University Peshawar and samples were collected from Dost Foundation Peshawar.

Inclusion Criteria

Male Drug abusers samples were collected for this study.

Exclusion Criteria

Female was excluded because of not presence of female drug user in our society.

Statistical Analysis

The statistical analysis was carried out using paired t-sample test. Comparisons were made between different Groups, values < 0.05 were considered as significant. The data obtained were then analyzed by statistical tool SPSS 22.

Results and discussion

In our study we evolved that drug abuse has a great effect on cardiac enzymes. We categorized our subject in single drug users, double drugs users, triple drugs users and multiple drugs users. In these drug users, all have taken opium (100%) and 83% of drug abuser are triple drugs users while estimation of CK and LDH (table 1). While in case of CKMB, all abuser taking opium (100%) and 87% user were SDU (table 2). In our study p-value for CK, LDH and CKMB were 0.002, 0.00 and 0.00 respectively. So it is clear from the study that drugs addiction has significant effect on LDH, CK and CKMB. By comparing the drug abuse habits between single and double drugs users, single and triple drugs users and single and multi-drugs users, the p-value are 0.002, 0.008 and 0.000 respectively (Fig. 1) which make it significant that drug combination reinforces the effect of drugs. So the result obtained in our study revealed that illicit drugs have greater impact on cardiac enzymes and also multiple drugs abuse have increased risk of induction in enzymes.

Table 1. Percentage of Drugs and SDU, DDU, TDU, MDU among subjects in CK and LDH.

S.No	Drugs name	No of drugs abuser (out of 183)	%age of drugs abuser
1	Snuff (Naswar)	49	26%
2	Cigarrete	72	39%
3	Cannabis	55	30%
4	Alcohol	119	65%
5	Shisha	176	96%
6	Heroine	102	55%
7	IV Drugs	143	78%
8	Oral Drugs	159	86%
9	Opium	183	100%
10	Single Drug User	148	80%
11	Double Drug User	144	78%
12	Triple Drug User	153	83%
13	Multiple Drug User	107	58%

Table 2. Percentage of Drugs and SDU, DDU, TDU, MDU among subjects in CK-MB.

S.No	Drugs name	No of drugs abuser (out of 107)	%age of drugs abuser
1	Snuff (Naswar)	32	29%
2	Cigarrete	35	32%
3	Cannabis	27	25%
4	Alcohol	60	56%
5	Shisha	100	93%
6	Heroine	47	43%
7	IV Drugs	77	71%
8	Oral Drugs	87	81%
9	Opium	107	100%
10	Single Drug User	94	87%
11	Double Drug User	85	79%
12	Triple Drug User	93	86%
13	Multiple Drug User	49	45%

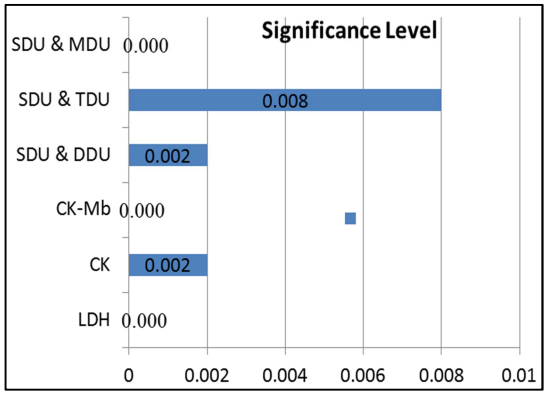

Fig. 1. Paired t-Test for comparing LDH.CK, CKMB, SDU-DDU, SDU-TDU, SDU-MDU.

Illicit drug consumption may be co-related with the increased risk of cardiovascular disease (Lott &Nemensanszky, 1987). In the current study Cardiac Bio-markers were utilized for comparative analysis between drug abuser and nondrug abuser as well as determined the direct proportionality between number of drugs abused and their adverse consequences especially upon Cardiac enzymes.

The experimental results showed significant induction in Cardiac parameters of Drug abusers; CK, CK-MB, LDH were significantly high in drug abusers as compared to nondrug abusers. Our study reveal that (in subject for CK and LDH estimation) opium user comprise the main part in this study (100%), the second one shisha (96%), the lesser one is snuff (26%) and also triple drug user comprise large part (83%). In CK-MB estimation subjects also opium comprise major part (100%), Second one shisha (93%) and lesser one cannabis (25%) and single drug user comprise the largely part (87%).

Drugs of abuse affect multiple organs, indicated by serum markers, clinical history, and tissue parameters. Our study indicates cardiac damage indicated by elevated cardiac enzyme as compared to controls. In smokers elevation of LDH as compared to control group is also reported earlier by Hollander *et al.*, (Hollander *et al.*, 1995). In other study smokers in correlation with control group was showing significant value CPK P=>0.05 (Hollander *et al.*, 1995). Another study was conducted in which 49 patients consuming cocaine were hospitalized for psychiatric disturbance or cardiac disease with CK elevation 39% none of them have MI (Lott &Nemensanszky, 1987). CK elevation was seen in about 47% to 65% of patients (Amin *et al.*, 1990). Cocaine has damaging affect and elevation in cardiac biomarkers as indicated by our results and previously reported findings(Riley *et al.*, 2017).

Rashid *et al* revealed that male smoker CKMB mean is 116.10±103.18 and nonsmoker mean is 6.00±1.58 showing that smoking has great effect on induction of CKMB (Hollander *et al.*, 1995). From our study we know that drug have a large impact on cardiac Biomarkers. All drugs tend to increase the level of enzymes in our subjects. Our selected P value is P= <0.05 and our parameters p value is 0.00 for CK-MB and 0.00 for LDH and 0.02 for CK (Table 3).

Cardiac damage indicated by elevated biomarker including CK, CK-MB and LDH is indicated by earlier reports and our study is a valuable addition to the previous findings of tissue damage and elevation in serum biomarkers.

Conclusion

We concluded in the present study that drug abusers have higher cardiac biomarkers level in their plasma as compare to nonusers and multiple drug users have greater influence on it. Further studies on larger group of drugs abuse are needed to determine the effect of drugs on cardiovascular system.

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