EVALUATUION OF ATHEROGENIC INDEX AMONG DIACETYLMORPHINE ADDICTS

Syeda Huma Khizar[1], Syed Hamid Habib[2], Mohammad Omar Malik[2], Hajra Mateen[1], Ghazala Shaheen[1], Najma Fida[3]

[1]KMU Institute of Basic Medical Science, Kohat, Pakistan
[2]Institute of Basic Medical Sciences, Khyber Medical University, Peshawar, Pakistan
[3]Kabir Medical College, Peshawar, Pakistan

Address for correspondence:
Syed Hamid Habib
Assistant Professor,
Institute of Basic Medical Sciences, Peshawar, Pakistan
E-mail:
dr.hamidhabib@gmail.com

ABSTRACT

Background: Diacetylmorphine addiction causes multiple pathologies including increased risk of cardiovascular diseases. Atherogenic index of plasma (AIP) i-e triglycerides/high-density lipoprotein (HDL) cholesterol ratio and low density lipoprotein/high density lipoprotein (LDL/HDL) ratio are the predicting markers for cardiovascular disease. In this study we aimed to look for atherogenic index in diacetylmorphine addicts.

Methodology: This cross sectional study included forty one active male diacetylmorphine addicts with age 25 to 46 years matched forty one normal male subjects (n=82). Assessment involved detail history and examination along with baseline laboratory tests for exclusion of infection. To calculate the atherogenic index lipid profile including total cholesterol, LDL-C, HDL-C and TG of all the subjects was done by Erba XL 200 random access clinical chemistry analyzer. Data was represented as mean ± standard deviation. Data was subjected to independent sample T test, univariate and multivariate regression analysis via Statistical Package for the Social Sciences (SPSS) version 22. $p < 0.05$ was considered significant.

Results: Atherogenic index (AIP)= triglycerides/high-density lipoprotein (HDL) cholesterol ratio was non significant in both the groups ($p = 0.791$). However, LDL-C/HDL-C ratio was significantly lower in addicts as compare to the normal subjects ($p < 0.001$)

Conclusion: Diacetylmorphine exposure do not increase the atherogenic index as compared to normal individuals and may have beneficial effects on LDL/HDL ratio.

This article may be cited as: Khizar SH, Habib SH, Malik MO, Mateen H. Evaluatuion of Atherogenic index among diacetylmorphine addicts. Adv Basic Med Sci. 2018;2 (2): 88-92.

INTRODUCTION

Diacetylmorphine addiction results in serious harmful effects on the physical and mental health of the individuals including cardiovascular diseases[(1)]. Cardiovascular disease (CVD) is the cause of one third of deaths worldwide[(2)]. The most common cardiac side effect of opioids is the prolongation of the QT interval, leading to ventricular tachyarrhythmia torsades de pointes, causing sudden death[(3)]. The most important risk factors for CVD consist of dyslipidemia, hypertention, physical inactivity, obesity, poor diet and smoking. Among these, dyslipidemia is one of the main risk factors and predictor for cardiovascular diseases[(2)].

Reports in 2014 indicated that >20 million people used opium in different forms such as oral, inhalation and i.v[(4)] and 19% of patients with a history of myocardial infarction reported opium consumption[(5)]. Increased atherogenic index (AIP) i-e increased Low density Lipoprotein (LDL), total cholesterol (TC)[(6)] and low high density lipoprotein (HDL) are the most prevalent abnormalities in diacetylmorphine addicts leading to coronary artery disease[(7,8)].

This increased atherogenic index of plasma (AIP) increases the risk factor for development of hypertension, deep vein thrombosis, atherogenesis, ischemic stroke and atherosclerosis plaque formation by hypercholesterolemia leading to worsening of cardiovascular risk factors[(8)]. Increase of atherogenic index is reported to be accompanied by enhanced aortic cholesterol deposition[(9)]. Studies show that mixture of opioids like morphine and codeine, is associated with atrial fibrillation (AF) as

well. Sabzi et al. showed that patients undergoing coronary artery bypass grafting, with history of opium consumption was associated with post-operative AF and was observed as a strong predictor of AF incidence in these patients[3].

The total triglycerides/high-density lipoprotein (HDL) cholesterol ratio, known as the Castelli or atherogenic index of plasma (AIP) and the LDL/HDL cholesterol ratio are two important components and indicators of vascular risk[10]. Atherogenic index of plasma (AIP) is a logarithmically transformed ratio of molar concentrations of triglycerides to HDL-cholesterol[11]. Framingham Heart Study and the Coronary Primary Prevention Trial data, sugest that the predictive value of these indices is greater than the individual lipid parameters . As a marker of lipoprotein particle size AIP adds predictive value beyond that of the individual lipids[12]. Therefore the atherogenic index (AIP)= total/high-density lipoprotein (HDL) cholesterol ratio and LDL-C/HDL-C ratio is often calculated to estimate cardiovascular risk . AIP is also considered as a highly sensitive marker for differences of lipoprotein profiles in families of patients with premature myocardial infarction and control families[11].

An atherogenic plasma index [log (triglycerides/HDL cholesterol)] over 0.5 has been proposed as the cut-off point indicating atherogenic risk .It has been suggested that an AIP value of under 0.11 is associated with low risk of CVD; the values between 0.11 to 0.21 and upper than 0.21 are associated with intermediate and increased risks, respectively[14]. It has been observed that individuals with higher BMI and waist circumferences had a higher AIP too[15]. Therefore in this study we have evaluated the effect of diacetylmorphine addiction on atherogenic index of the addicts and compared it with normal healthy individuals.

METHODOLOGY

A total of forty one (n=41) male subjects (mean age 35.24 ± 7.4) with history of active diacetylmorphine addiction for more than six months and 41 healthy age matched (36.46 ± 6.3) control subjects were included in this study (n=82 in total). This cross sectional study was conducted from September 2016 to March 2017, after receiving approval from ethical committee of Khyber Medical University, Peshawar, Pakistan. Addicts were identified from the Dost Foundation (Organization for rehabilitation of addicts) Peshawar.

The sampling technique used was non-probability random sampling technique. Informed consent was taken from all the participants. The DAM addiction was confirmed by thin layer of urine chromatography. All subjects underwent detailed history, through physical examination to exclude any signs of infections. Blood samples were taken at early morning (7-8 am) after overnight fast for biochemical analysis.To calculate the atherogenic index serum Lipid profile [cholesterol (Chol), HDL, low density lipoprotein (LDL), Triglycerides (TG) were done by Erba XL 200 random access clinical chemistry analyzer through the principle of spectrophotometry. AIP was calculated according to the formula i-e. log (triglycerides/HDL cholesterol)]. We also calculated the LDL-C/HDL-C ratio.

Data was analyzed with SPSS version 22. $p < 0.05$ was considered significant. All continuous variables were represented as mean ± S.D.

RESULTS

This study involved 82 adult male subjects aged 25 to 46 years, consisting of two groups, Group A consisting of 41 normal subjects and Group B consisting of 41 DAM addicts taken from DOST foundation, Peshawar. Both groups matched each other with respect to age ($p >0.4$), BMI ($p > 0.834$) and occupation. Results were calculated for all the 82 subjects. Distribution of all the variables was normal. Cholesterol and LDL were significantly lower ($p = < 0.001$), and HDL was higher ($p = 0.040$) in Addicts as compared to controls (Table1). In order to compare the two groups, independent sample T test was used. Atherogenic index (AIP) = triglycerides/high-density lipoprotein (HDL) cholesterol ratio was non-significant in both the groups ($p = 0.791$). However, LDL-C/HDL-C ratio was significantly lower in addicts as compare to the normal subjects ($p < 0.001$) (Table1).

Pearson correlation (r) was used to check the correlation of AIP with age, BMI, cholesterol (Chol), HDL, low density lipoprotein (LDL), Triglycerides (TG) and HB with in both groups. In addicts, AIP was significantly correlated with HDL, TG, CH (r = -.549,-0.125, 0.753, 0.428) respectively, while LDL/HDL ratio was significantly correlated with LDL only (Table 2).

AIP was significantly correlated with FBS (r = 0.47) and triglycerides in normal subjects (r =0.928) (Table 3). LDL-C/HDL-C ratio was significantly correlated with HDL,FBS ,TG, CH, LDL(r= -0.484, 0.585, 0.415, 0.668, 0.824) respectively in normal subjects (Table 3).

Table-1: Comparison of biochemical parameters between diacetylmorphine addicts and normal subjects

Variables	Normal Mean ±SD	Addicts Mean ± SD	P Value
Age (years)	36.46 ± 6.3	35.24 ± 7.4	0.42
BMI (kg/m^2)	20.6 ± 1.7	20.5 ± 7.4	.834
HDL (mg/dl)	42.29 ± 8.86	46.32 ± 9.16	0.04
FBS (mg/dl)	91.22 ± 10.62	91.22 ± 10.62	1.000
TG (mg/dl)	133.88 ± 69.3	138.90 ± 35.6	0.681
CH (mg/dl)	171.1 ± 47.7	138.59± 68.23	0.015
LDL (mg/dl)	105.39 ± 39.09	71.8 ± 25.99	<0.001
HB (gm/dl)	14.73 2± 0.91	13.44 ± 0.79	<0.001
AIP	0.45±.285	0.47±.16	0.791
LDL/HDL	2.60±1.07	1.58±.55	<0.001

Table-2: Correlation of AIP with lipid profile ,HB and BMI in diacetylmorphine addicts

Group Addicts		AIP	LDL/HDL	Age	BMI	HDL	FBS	TG	CH	LDL	HB
AIP	r	1	.309*	.083	.049	-0.549**	-.125	.753**	.428**	-.113	.015
LDL/HDL	r		1	.028	.019	-.231	-.120	.305	.202	.799**	-.149
Age	r			1	.076	.049 -	-.283	.087	-.059	.020	.102
BMI	r				1	.217	.234	-.146	-.154	-.141	.433**
HDL	r					1	-.165	.109	-.288	.376*	.003
FBS	r						1	-.298	-.138	-.232	.140
TG	r							1	.329*	.277	-.036
CH	r								1	-.014	-.173
LDL	r									1	-.160
HB	r										1

Table-3: Correlation of AIP with lipid profile , HB and BMI in normal subjects

Group Addicts		AIP	LDL/HDL	Age	BMI	HDL	FBS	TG	CH	LDL	HB
AIP	r	1	.531**	.063	-.029	-.741**	.479**	.928**	.300	.169	-.089
LDL/HDL	r		1	.005	.229	-.484**	.585**	.415**	.668**	.824**	-.318*
Age	r			1	-.067	-.206	.400**	.032	-.110	-.123	-.195
BMI	r				1	-.097	.044	-.095	-.058	.205	-.186
HDL	r					1	-.506**	-.507**	-.029	.004	.221
FBS	r						1	.366*	.302	.409**	-.460**
TG	r							1	.337*	.154	-.014
CH	r								1	.774**	-.109
LDL	r									1	-.227
HB	r										1

DISCUSSION

The results of our study reports that AIP was not significantly different in both the addicts and normal subjects ($p = 0.791$). However, LDL-C/HDL-C ratio was significantly lower in addicts as compare to the normal subjects ($p < 0.001$). The findings of our study are similar to the previous results shown by Mohammadi et. al., also showing no significant difference in the atherogenic index of both the addicts and normal subjects[16]. This is in contrast to other reports showing increased atherogenic index in opium addiction[6,8]. This difference in results may be due to difference in the sample size, age and ethnicity of the subjects.

Our study also showed that LDL-C/HDL-C ratio was significantly lower in addicts as compared to the normal subjects. This is contrast to other reports showing increased LDL-C/HDL-C ratio in addicts as compare to normal healthy indiviuals[7,8]. This may be due to the fact that opium has beneficial effects on lipid profile which results in reduced atherosclerosis[4] as it is believed that opium consists of biologically active compounds and many alkaloids used for atherosclerosis treatment[16].

In diacetylmorphine addicts AIP significantly and positively correlated with TG, CH while LDL/HDL ratio was significantly correlated with LDL only. This is similar to the study shown by Niroumand et al. in which AIP significantly correlated with HDL, LDL , serum triglycerides, total cholesterol[2]. This shows that as LDL, serum triglycerides, total cholesterol increases, the atherogenic indices also increase in diacetylmorphine addicts leading to increased CVD risk[13]. AIP negatively correlated with HDL in diacetylmorphine addicts meaning that increased HDL levels leads to decreased atherogenic indices in these individuals, hence decreasing CVD risk[7,8].

CONCLUSION

Diacetylmorphine exposure do not significantly increase the atherogenic index as compared to normal individuals and may have beneficial effects on LDL/HDL ratio.

REFERENCES

1. Maremmani I, Pacini M. Addiction as an extended form of brain disease: heroin-free clinical pictures in the history of addiction. Towards the concept of masked heroin addiction. A New Era Provide Quality Patient Care. 2014:5.
2. Niroumand S, Khajedaluee M, Khadem-Rezaiyan M, Abrishami M, Juya M, Khodaee G, et al. Atherogenic Index of Plasma (AIP): A marker of cardiovascular disease. Medical journal of the Islamic Republic of Iran. 2015;29:240.
3. Behzadi M, Joukar S, Beik A. Opioids and cardiac arrhythmia: a literature review. Medical Principles and Practice. 2018;27(5):401.
4. Hasandokht T, Salari A, Pour SS, Tirani HD, Shad B, Rajabi E. Does opium have benefit for coronary artery disease? A systematic review. Research in Cardiovascular Medicine. 2018;7(2):51.
5. Niaki MRK, Hamid M, Farshidi F, Mohammadpour M, Omran MTS. Evaluation of the role of opium addiction in acute myocardial infarction as a risk factor. Caspian journal of internal medicine. 2013;4(1):585.
6. Aghadavoudi O, Eizadi-Mood N, Najarzadegan MR. Comparing cardiovascular factors in opium abusers and non-users candidate for coronary artery bypass graft surgery. Advanced biomedical research. 2015;4.
7. Najafipour H, Beik A. The impact of opium consumption on blood glucose, serum lipids and blood pressure, and related mechanisms. Frontiers in physiology. 2016;7:436.
8. Rahimi N, Gozashti MH, Najafipour H, Shokoohi M, Marefati H. Potential effect of opium consumption on controlling diabetes and some cardiovascular risk factors in diabetic patients. Addiction & health. 2014;6(1-2):1.
9. VASCONCELOS S, SOARES P, LIMA N, PEREIRA R, ALVES R, QUEIROZ M, et al. Effects of Ethanol or Naltrexone after Ethanol Exposure on Plasma Levels of Hepatic Enzymes, Lipid Profile and Apolipoprotein in Rats. Scientia Pharmaceutica. 2008;76(2):305-20.
10. Millán J, Pintó X, Muñoz A, Zúñiga M, Rubiés-Prat J, Pallardo LF, et al. Lipoprotein ratios: physiological significance and clinical usefulness in cardiovascular prevention. Vascular health and risk management. 2009;5:757.
11. Dobiasova M. AIP--atherogenic index of plasma as a significant predictor of cardiovascular risk: from research to practice. Vnitrni lekarstvi. 2006;52(1):64-71.
12. Nwagha U, Ikekpeazu E, Ejezie F, Neboh E, Maduka I. Atherogenic index of plasma as useful predictor of cardiovascular risk among postmenopausal women in Enugu, Nigeria. African health sciences. 2010;10(3).
13. Popa CD, Arts E, Fransen J, van Riel PL. Atherogenic index and high-density lipoprotein cholesterol as cardiovascular risk determinants in rheumatoid arthritis: the impact of therapy with biologicals. Mediators of inflammation.

2012;2012.
14. Dobiášová M, Frohlich J, Šedová M, Cheung MC, Brown BG. Cholesterol esterification and atherogenic index of plasma correlate with lipoprotein size and findings on coronary angiography. Journal of lipid research. 2011;52(3):566-71.
15. Eslami O, Shahraki M, Shahraki T. Obesity indices in relation to lipid abnormalities among medical university students in Zahedan, South-East of Iran. International journal of preventive medicine. 2019;10.
16. Mohammadi A, Abbasi Oshaghi E, Noori Sorkhani A, Oubari F, Kia R, Rezaei A, editors. Effect of opium on lipid profile and expression of liver X receptor alpha (LXRα) in normolipidemic mouse. Food Nutr Sci; 2012