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Comparing Fasting Homocysteine Levels Among Healthy Adults, Diabetic and Non-Diabetic Cardiac Patients

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Author's Contribution

[1]Conception and design, Final approval and guarantor of the article
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ABSTRACT

Objective: To Compare the level of fasting homocysteine among healthy adults, diabetic and non-diabetic cardiac patients.

Methods: Using Purposive sampling method, Comparative analytical study was conducted in Rawalpindi institute of cardiology between 6th June to 15th July 2016 and included healthy adults, diabetic cardiac and non-diabetic cardiac patients between ages of 20 to 60; blood were drawn during last week of Ramadan and then examined for homocysteine level. Additional information like age, ESR, lipid profile and Leukocytes count were also Analyzed.

Results: Of the 93 subjects, there were 30(32.3%) each in healthy adults and diabetic cardiac patient groups A and C respectively but 33(35.5%) patients were in non-diabetic cardiac patients group B. The mean age of group A, B and C were 51.3+5.6 years, 56.73+9.35 years and 52.4+9.07 years respectively. The mean values of homocysteine were 12.3, 14.39 and 15.17 among group A, B and C respectively. The mean values of LDL were 2.90, 3.58 and 3.35; for HDL 1.09, 1.19, and 1.19 among group A, B and C respectively. The mean values of Triglycerides were 1.45, 1.96 and 2.07; for Cholesterol 4.72, 5.71 and 5.52 among group A, B and C respectively.

Conclusions: We may conclude that fasting may have beneficial effects on maintaining homocysteine levels among healthy adults, diabetic non cardiac patients as their mean values were within normal range, as well as on diabetic cardiac patient but there value were near to normal.

Introduction

Cardiovascular diseases (CVDs) are a group of disorders involving the heart and blood vessels or both. These are the number one killing disorders in both developed and developing countries.[1] Cardiac disease-related morbidity and mortality commonly caused by stroke, congestive cardiac failure, and ischemic heart disease. In developed countries, ischemic heart disease is the single largest cause of death so CVDs are considered as a significant burden. Smoking, hypertension, diabetes, lipid abnormalities, obesity, and sedentary lifestyle are the known risk factors for cardiovascular diseases. However, there are some emergent or new risk factors.[2]

Diabetes mellitus (DM) is a group of metabolic disorders in which blood glucose level increases because of abnormality in the secretion of insulin, its action, Or both. Due to increased risk factors e.g. Population growth, aging, obesity, and physical inactivity the number of diabetic patients is increasing worldwide.[3]

An influential risk factor for heart diseases is Diabetes mellitus. There is two times increased risk of having first myocardial infarction (MI) in diabetic patients. In diabetic patients after an acute MI mortality rate is higher as compare to non-diabetic. It is evident from recent literature that there is a two time increase in mortality rate in patients with diabetes in last 5 years.[4]

Homocysteine is a non-essential amino acid containing sulfur.[5] It is similar in structure to the amino acid cysteine only difference is an additional methylene (-CH2-) group.[6] It has no roll in protein synthesis.[2] It cannot be obtained from food so obtained by demethylation of dietary methionine by methyltransferase enzyme. Methionine is obtained from dairy products, canned foods and white flour.[5] By using vitamin B, homocysteine can be converted into cysteine or recycled into methionine.[6]

The presence of an abnormally elevated level of serum or plasma homocysteine is defined as Hyper-homocysteinaemia.[2] With A high "H Score, "Or increased serum homocysteine levels, there is a three times increased risk of heart attack as it converts the low density lipoprotein (LDL) into oxidized LDL, It encourages blood clot formation and platelets aggregation and multiply-part of the atherogenic process.[5]

Increased serum homocysteine level is implicated as an early promoter of atherosclerosis[7] It is consider as a modifiable and independent risk factor for cardiovascular diseases.[5] It is evident from literature that homocysteine levels are significantly higher in patients with CAD and diabetes mellitus particularly in type 2 diabetes.[3, 7, 8]

Increased homocysteine levels also correlated significantly with increasing severity and complication of CAD[5] In type 2 diabetic patients, increased plasma homocysteine level is related to macro vascular disease and death[6] Studies suggested that elevated level of homocysteine accelerates the risk of cerebral /peripheral vascular disease and MI in both and genders.[9]

During the blessed month of Ramadan (lunar month of the Muslim year), which is mandatory for all Muslims to refrain from drink, food and smoking every day from dawn to dusk. Numerous studies have documented the physiological effects of Ramadan, specifically regarding changes lipids profile, blood pressure, fasting blood sugar, hormonal and other biochemical markers. However, the association of homocysteine among the healthy, diabetic and non-diabetic cardiac patients and biochemical factor such as homocysteine, a significant relationship between atherosclerotic risk factors that have been previously documented but not yet been studied during the holy month of Ramadan. The purpose of the present study was to compare the level of fasting homocysteine among healthy adults, diabetic and non-diabetic cardiac patients.

Methodology

Purposive sampling technique was used, comparative analytical study was conducted in Rawalpindi institute of cardiology between 6 June to 15 July 2016 and compromised of healthy adults, diabetic cardiac and non-diabetic cardiac patients between age of 20 to 60 years and were fasting for the whole month, blood samples were drawn during last week of Ramadan and then examined for homocysteine level and lipid profile. Patients with any other comorbidity were excluded from the study. Samples containing ethylenediaminetetraacetic acid (EDTA), plasma and blood cells were then separated through centrifugate in machine. Plasma total homocysteine was measured with fluorescence detection. By using Technicon serum total cholesterol and triglycerides were measured. LDL-cholesterol concentrations were calculated by using the formula of Friedewald et al. Additional information like age, height, weight, BMI, ESR, and Leukocytes count were also analyzed. SPSS software version 21 was used for data entry and analysis and then data are reported in means ± SDs. Statistical analysis of the results was then performed by using one way ANOVA with the mean values, standard deviation among healthy subjects, Non diabetic; cardiac Subjects and diabetic; cardiac Subjects. Significance value was set at $P < 0.05$ for all statistical tests.

Permission for the study was obtained from the head of the department cardiologist. Written informed consent was taken from all subjects at the time of blood.

Results

Out of total 93 individuals, there were 30(32.3%) each in healthy adults and diabetic cardiac patient groups A and C respectively but 33(35.5%) patients were in non-diabetic cardiac patients group B. The mean age of group

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A, B and C were 51.3±5.6 years, 56.73±9.35 years and 52.4±9.07 years respectively in three groups.

The mean values of homocysteine were compared among Healthy subjects, Non diabetic; Cardiac Subject and Diabetic; Cardiac Subject respectively. In which there is a significant difference between these groups with P =0.012*. P value of HCY between Group A & C is 0.016 there is a significant difference between this groups. P value of HCY between A & B and Group B & C are 0.09 and 0.721 respectively so there is no significant difference in these groups. (Figure No 1)

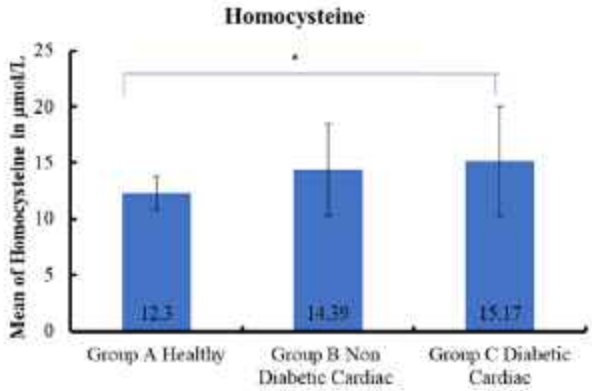

Figure 1 Shows the mean ±SD of Homocysteine among the Groups

** means P value < 0.05 statistically significant.*

Table I Shows comparison of the mean with standard deviation of different variables among Healthy subjects, Non diabetic; Cardiac Subject and Diabetic; Cardiac Subject.

The mean values of LDL, triglycerides, cholesterol and HDL were also compared among Healthy subjects, Non diabetic; Cardiac Subject and Diabetic; Cardiac Subject respectively. In which there is a significant difference between these groups with P <0.001*** except HDL. (Table no I)

P value of LDL between Group B & C are 0.211 so there is no significant difference in this group. P value of LDL between Group A & C is <0.05and Group A & B is <0.001 there is a significant difference between these groups. P value of Triglycerides between Group A& B and Group A & C are 0.005 and 0.001 there is significant difference between these groups. P value of Triglycerides between Group B & C is 0.761 there is no significant difference in this group. P value of Cholesterol between Group A& B and Group A & C are <0.005 there is significant difference between these groups. P value of cholesterol between Group B & C is 0.516 there is no significant difference in this group.

Discussion

This comparative analytical study compared three groups (healthy adults, diabetic cardiac and Non-diabetic cardiac patients) for theeffects of fasting on homocysteine levels and lipid profile (cholesterol, HDL, LDL and TGs). According to the results, fasting improved

Table No I: Show mean ± SD of different variables among healthy subjects, non diabetic; cardiac subject and diabetic; cardiac subject.

Variable	Group A: Healthy subjects (Neither cardiac, nor diabetic) (n=30) Mean± SD	Group B: Non diabetic; Cardiac Subject (n=33) Mean± SD	Group C: Diabetic;Cardiac Subject: (n=30) Mean± SD	P-Value One-way Anova
TLC (Total leukocytes count in cells/ cumm)	9716.67±792.67	9336.36±2631.64	9686.67±2835.82	0.763
ESR (mm/hr)	13.20±1.54	24.39±5.04	26.27±6.90	<0.001***
Cholesterol (mmol/L)	4.72±0.38	5.71±0.79	5.52±0.72	<0.001***
Triglycerides (mmol/L)	1.45±0.49	1.96±0.56	2.07±0.73	<0.001***
HDL (mmol/L)	1.09±0.28	1.19±0.69	1.19±0.43	0.085
LDL (mmol/L)	2.90±0.26	3.58±0.69	3.35±0.44	<0.001***

**p < 0.05*
****p < 0.001*

the homocysteine and lipid profile levels.

Our results are supported by previous researches such as a study conducted on Effects of Intermittent Fasting on Serum Lipid Levels, Coagulation Status and Plasma Homocysteine Levels and demonstrated that intermittent fasting has some positive effects on plasma homocysteine levels and serum HDL.[10] Another study demonstrated that in a model like Ramadan prolonged intermittent fasting led to beneficial changes on the risk factors for cardiovascular diseases such as homocysteine (levels were significantly low during Ramadan in the fasting subjects of both genders) but it contradicted some results of the current study as no significant changes were observed in serum total cholesterol, triglycerides and LDL levels.[11]

Another study reported that during Ramadan changed feeding behaviors beneficially affects plasma lipids (significant decrease in serum total cholesterol and serum triglyceride concentration) and lipoproteins.[12] Results of another stud revealed significant reduction in high-density lipoprotein (HDL) cholesterol levels which supports our results but there was the contradiction that not significant changes in other lipids.[13]

Another study done on the weight changes and metabolic profile during Ramadan fasting and its results contradicted our results as LDL increased and HDL decreased significantly but there was no significant factor seen in total TG and cholesterol, negative correlation between primary TG level before and during Ramadan, i.e., subjects with more TG level had a lesser increase in TG level during Ramadan (Pearson correlation=-0.432, sig= 0.000, n=81)[14] thus a change in feeding behaviours during fasting in Ramadan beneficially effected homocysteine and lipid profile levels in all three groups.

Conclusion

Discussion demonstrates that fasting led to some beneficial effects on homocysteine levels as well as on lipid profile. By omitting at least one meal particularly at fasting time body is active metabolically and low blood viscosity level at same time. We conclude that fasting might have favorable effects on homocysteine levels for healthy adults, diabetic non cardiac patient as well as on diabetic cardiac patient as their mean values are within normal range or near to.

References

1. Awad, A. and H. Al-Nafisi, Public knowledge of cardiovascular disease and its risk factors in Kuwait: a cross-sectional survey. BMC public health, 2014. 14(1): p. 1131.
2. Marti-Carvajal, A.J., et al., Homocysteine lowering interventions for preventing cardiovascular events. The Cochrane database of systematic reviews, 2009(4): p. CD006612.
3. Shaikh, M.K., et al., Plasma homocysteine level in patients with diabetes mellitus. World Applied Sciences Journal, 2012. 16(9): p. 1269-1273.
4. Armstrong, M.J., et al., Cardiac rehabilitation completion is associated with reduced mortality in patients with diabetes and coronary artery disease. Diabetologia, 2015. 58(4): p. 691-698.
5. Berenson, G.S., et al., Association between multiple cardiovascular risk factors and atherosclerosis in children and young adults. New England journal of medicine, 1998. 338(23): p. 1650-1656.
6. van Guldener, C. and C.D. Stehouwer. Diabetes mellitus and hyperhomocysteinemia. in Seminars in vascular medicine. 2002: Copyright© 2002 by Thieme Medical Publishers, Inc., 333 Seventh Avenue, New York, NY 10001, USA. Tel.:+ 1 (212) 584-4662.
7. Shenoy, V., et al., Correlation of serum homocysteine levels with the severity of coronary artery disease. Indian Journal of Clinical Biochemistry, 2014. 29(3): p. 339-344.
8. Li, F., et al., Human betaine-homocysteine methyltransferase (BHMT) and BHMT2: common gene sequence variation and functional characterization. Molecular genetics and metabolism, 2008. 94(3): p. 326-335.
9. Ramachandran, L., N. Negi, and B. Gupta, Prevalence of hyperhomocysteinaemia in type 2 diabetes mellitus and its correlation with its complications. Journal, Indian Academy of Clinical Medicine, 2012. 13(4): p. 277-81.
10. Yusuf, S., et al., Global burden of cardiovascular diseases: Part II: variations in cardiovascular disease by specific ethnic groups and geographic regions and prevention strategies. Circulation, 2001. 104(23): p. 2855-2864.
11. Tucker, A.M., et al., Prevalence of cardiovascular disease risk factors among National Football League players. Jama, 2009. 301(20): p. 2111-2119.
12. Harp, J.B. and L. Hecht, Obesity in the national football league. Jama, 2005. 293(9): p. 1058-1062.
13. Temizhan, A., et al., The effects of Ramadan fasting on blood lipid levels. The American journal of medicine, 2000. 109(4): p. 341.
14. Ziaee, V., et al., The changes of metabolic profile and weight during Ramadan fasting. Singapore medical journal, 2006. 47(5): p. 409.

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