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Original Research Paper

General Medicine

A STUDY BETWEEN CORRELATION OF PLASMA HOMOCYTEINE LEVELS WITH BMI IN FEMALES WITH TYPE2 DIABETES

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ABSTRACT Hyperhomocysteinemia is established as a risk factor for cardiovascular disease and is highly prevalent in patients with type II diabetes and microvascular disease. In order to determine whether body-mass index vary with plasma homocysteine concentrations in patients with type II diabetes, we measured plasma homocysteine in lean, normal weight, and overweight females living in India.

Plasma homocysteine concentrations were significantly lower in lean females with diabetes when compared to those females who were obese and compared to control subjects ($p < 0.02$). We have concluded that plasma homocysteine concentrations are lower in lean females with type II diabetes and that this efficiency in homocysteine metabolism may contribute in protection from cardiovascular disease.

KEYWORDS : Hyperhomecysteine , Type 2 diabetes

INTRODUCTION:

Obesity is a chronic metabolic disorder which is associated with various atherosclerotic and cardiovascular complications. Proportion of obese women has increased from 16.4% in 1993 to 24.2% in 2006.[1] In many studies obesity has shown to cause Dyslipidemia , Hypertension, Type-II diabetes mellitus and cancer.[2],[3] It has been seen that there is significant correlation between body mass index and homocysteine levels .[4],[6] Homocysteine is a amino acid formed by the conversion of methionine to cysteine. The metabolism of homocysteine is via one or two pathways either remthylation or transsulfuration.This process requires vitamin B as a cofactor.[7]In human plasma homocysteine exist in various fractions, total plasma homocysteine is the sum of protein bound, free oxidized and reduced species of homocysteine in plasma, and is commonly about 5-15µmol/l in healthy persons. Hyperhomocysteinemia is identified when the total plasma homocysteine levels are above 15µmol/l.[8] Hyperhomocystenemia is an independent risk factor for cerebrovascular events ,atherosclerotic vascular disease, and recurrent venous thromboembolism.[9]-[14]Hyperhomocytenemia occurs due to genetic defect in enzyme involved in homocysteine metabolism like methylene tetrahydrafolate reductase (MTHFR) & other deficiencies in folate &Vitamin B 12. It may also be associated with certain chronic medical conditions and drugs such as nicotinic acid and fibrates .[14]-[15] The health risks increase above the cut-off point of 25 kg/m2 that defines overweight in the current WHO classification.[20] Thus this study was done to determine the serum homocysteine level & its correlation with anthropometric parameter (BMI) among over weight, obese and non obese women.

MATERIAL & METHODS

This cross sectional prospective study was conducted in Department of General Medicine, from August 2016 to July 2017 . After informed consent total 90 female patients were enrolled, which included 29 overweight, 16 obese and 45 non-obese patients , who were taken as controls. patients with chronic diseases that could cause obesity, history of drug use (steroids and antipsychotics), endocrine pathology (Cushing's syndrome & hypothyroidism) were excluded from the study. Patients on metformin, folic acid and on antiepileptics, vitamins, oral contraceptive pills, antidiabetics, cigarette smoking, and coffee consumption more than 2 cups per day, known case of hypertension, and CVD were also excluded. The ethical clearance for this study was given by the Institutional ethics committee of SREE BALAJI MEDICAL COLLEGE, Chennai. All the patients were subjected to thorough physical examination and laboratory tests. Physical examination included measurement of height and weight of the patients. The height of the patients were measured by using harpaden stadiometer with a sensitivity of 0.1 cm and weight was measured using a sera scale with a sensitivity of 0.1 kg. The weight of the each patient was measured with minimal clothing. BMI was calculated by dividing weight in kg by height in meter square. BMI less than 25 were considered as non obese, ≥25 were considered as overweight and ≥30 were considered obese.

II. LABORATORY TESTS:

Blood samples for homocysteine measurement were collected, placed immediately on ice and centrifuged at 40 C. Plasma was separated within 30 minute and stored at -700 C. Plasma homocysteine concentration was measured by fluorescence polarization immunoassay by using ABBOTT diagnostic kit . Normal reference range of our laboratory were 5-11µmol/L. Hyperhomocystenemia was defined as plasma homocysteine level ≥11µmol/l . BMI was calculated as the weight in kilograms divided by the square of the height in metres (kg/m2).

III. RESULTS :

This study included ninety female patients who were divided into three groups. On the basis of BMI, according to WHO classification 2004 for Asians, the groups constituted 16 obese (BMI ≥30), 31 overweight (BMI ≥25) and 43 non obese patients (BMI <25). A comparison of the data from overweight, obese and non obese female group revealed that the difference between the BMI and homocysteine levels three groups were statistically significant ($p<0.001$). Table-1 In the obese group 62.5% (10/16) female patients had hyperhomocysteinemia, where as in over weight group 29.03% (9/31) had hyperhomocysteinemia, however only 4.6% (2/43) in non obese group had hyperhomocysteinemia. In obese group the mean homocysteine level was (14.78 +/-5.71), in overweight (9.84+/-5.16) and in non obese (8.37+/-2.48). The above results suggest association between increasing homocysteine levels with increasing BMI.

IV. DISCUSSION :

Homocysteine is a sulfur containing amino acid and it is a risk factor for vascular damage. It has been associated with cerebrovascular disease and recurrent arterial venous thromboembolism.[21] Homozygous or heterozygous defects in gene encoding the enzymes involved in the remethylation (methylene tetrahydrofolate reductase) or trans-suphuration (cystathione - synthase) metabolic pathways as well as deficiencies in nutrients or micronutrients (folate, Vit B12 and Vit B6) disrupt homocysteine metabolism and increases homocysteine level. Homocsyteine levels may also be affected by demographic life style and various health factors.[22] In recent years controversial results regarding the association between obesity and total homocysteine levels have

been reported. In our study homocysteine levels have been reported to vary according to BMI, The serum homocysteine levels were high in obese females as compared to non obese and overweight group (p<0.001). The above study showed that a significantly higher mean homocysteine levels (14.78±5.71, 9.84±5.16) were present in obese female patients as compared to non obesefemales however in the study conducted by Vivian A Fonseca et al.[23] they concluded that there was no correlation between homocysteine levels and BMI.

V. CONCLUSION :

In the above study homocysteine levels were significantly correlated with BMIHence, we can conclude that a positive correlation was observed in females ,between increasing homocysteine levels with BMI.

Table 1 :

Characteristics	Overweight (n=31)	Obese (n=16)	Non-obese (n=43)	"p" value
Age	26.84±3.98	25.69±3.74	26.69±4.50	0.649
BMI	27.00±1.57	31.33±0.92	23.03±1.32	<0.001
Homocysteine	9.84±5.16	14.78±5.71	8.37±2.48	<0.001

REFERENCES;

[1] The information center statistics on obesity, physical activity and Diet, England, January 2008. London Department of Health, 2008.
[2] Spiotta RT, Luma GB. Evaluating obesity and cardiovascular risk factors in children and adolescents. Am Fam Physician 2008;78:1052-8.
[3] Haslam DW, James WP, Obesity, Lancet 2005;366:1197-209.
[4] Golbahar J, Aminzadeh MA, Kassab SE, Omrani GR. Hyperhomocysteinemia induces insulin resistance in male Sprague-Dawley rats. Diabetes Res Clin Pract2007;76:1-5.
[5] Yilmaz N, Pektas M, Tongue E, Kilic S, Gulerman C, Gungor T et al. The correlation of plasma homocysteine with insulin resistance in polycysticovary syndrome. J ObstetGynaecol Res 2008;34:384-91.
[6] Zhu W, Huang X, Li M, Neubauer H. Elevated plasma homocysteine in obese schoolchildren with early atherosclerosis. Eur J Pediatr 2006;165:326-31.
[7] Wild S, Pierpoint T, Mckeigue P, Jacobs H. Cardiovascular disease in women with polycystic ovary syndrome at long-term follow-up: a retrospective cohort study. Clin Endocrinol (Oxf) 2000;52(5):595-600.
[8] Clarke R, Daly L, Robinson K, Naughten E, Cahalane S, Fowler B, et al. Hyperhomocysteinemia: an independent risk factor for vascular disease. N Engl J Med 1991;324:1149-55.
[9] Kazemi MB, Eshraghian K, Omrani GR, Lankarani KB, Hosseini E. Homocysteine level and coronary artery disease. Angiology 2006;57:9-14.
[10] Semiz S, Rota S, Ozdemir O, Ozdemir A, Kaptanoglu B. A C-reactive protein and homocysteine cardiovascular risk factors in obese children and adolescents? Pediatr Int 2008;50:419-23.
[11] Tavil Y, Sen N, Yazici HU, Hizal F, Abaci A, Cengel A. Mean platelet volume in patients with metabolic syndrome and its relationship with coronary artery disease. Thromb Res 2007;120:245-50.
[12] Kumbasar SD, Dincer I, Ertas F, Gulec S, Erol C, Akyurek O et al. Hyperhomocysteinemia and restenosis. J Cardiovasc Risk 2001;8:9-13.
[13] Martos R, Valle M, Morales R, Canete R, Gavilan MI, Sanchez-Margalet V. Hyperhomocysteinemia correlates with insulin resistance and low-grade systemic inflammation in obese prepubertal children. Metabolism 2006;55:72-7.
[14] Cabarkapa V, Stosic Z, Zeravica R, Ilincic B. The importance of homocysteine measurement in chronic renal failure. Med Preg. 2007;60 suppl 2:81-83.
[15] Dierkes J, Westphal S, Luley C. The effects of fibrates and other lipid lowering drugs on plasma
[16] Welch GN, Loscalzo J: Homocysteine and atherothrombosis. N Engl J Med. 338:1042-1050,1998.
[17] Dicker-Brown A, Fonseca VA, Fink LM, Kern PA: The effect of glucose and insulin on the activity of enzymes in homocysteine metabolism (Abstract). Diabetes 48Suppl:A135,1999.
[18] McCarty, MF (2000b) Increased homocysteine associated with smoking, chronic inflammation, and ageing may reflect acute-phase induction of pyridoxal phosphatase activity. Med. Hypoth.2000:55,289-293.
[19] Meigs JB, Jacques PF, Selhub J, Singe DE, et al. (2001). Fasting plasma homocysteine levels in the insulin resistance syndrome. Diabetes Care, 24, 1403-1410.
[20] BMI Classification. Adapted from WHO, 1995, WHO, 2000 and WHO 2004.
[21] Smolders RG, van der Mooren MJ, Sipkema P, Kenemans P, 2003 Estrogens, homocysteine, vasodilatation and menopause: basic mechanisms, interactions and clinical implications. Gynecol Endocrinol 2003;17: 339- 354.
[22] Strassburg A, Krems C, Luhrmann PM, Hartmann B, Neuhauser-Berthold M, Effect of age on plasma homocysteine concentrations in young and elderly subjects considering serum vitamin concentrations and different lifestyle factors. Int J VitamNutr Res 2004;74:129-136.