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The effect of Moderate Beer consumption on Plasma Homocysteine and Cholesterol Level

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Abstract

Hyperhomocysteinaemia is implicated in various disease states and conditions including cardiovascular diseases. Various studies have shown that moderate beer consumption helps to lower the level of plasma homocysteine which is beneficial to human health. The aim of this study is therefore the determination of the effect of beer on plasma Homocysteine level in healthy adults in Ekpoma, Nigeria. 40 Healthy fasting adult males and females were screened and randomized into two groups; control (water) and beer (1bottle). They had venepuncture while supine and without tourniquet. Homocysteine, tHcy, assay was done using ELISA with tHcy binding protein as the capturing enzyme. Excluded from the study were subjects with impaired renal and hepatic function. Hypertensives and diabetics were also ruled out. The mean level of tHcy in males and females were 8.4 ± 0.8µmol/L and 7.1 ± 0.5µmol/L respectively and these reduced markedly after two weeks of moderate beer consumption. The cholesterol level before and after two weeks of beer in males and females are as follows; 4.5 v 3.9, 4.1 v 3.6 mmol/L. It remained unchanged in the control group. Moderate consumption of beer lowers tHcy.

Keywords: Homocysteine, plasma, proteins, Beer, cholesterol, Nigeria

1.Introduction

Beer is a delightful drink of many Nigerians and it is a rich source of B vitamins. Beer is credited with the reduction of the level of homocysteine in many studies. Van der Gaag and colleagues, in 2000 published the effect of consumption of red wine, spirits and beer on serum tHcy. They observed a direct proportional level with spirit and wine but an inverse relationship with beer. Mayer and colleagues in 2001 studied the influence of beer consumption on folate and tHcy on a population with similar result to Van der Gaag. Sakuta and colleagues, in 2007 studied the relationship between tHcy and beer in type 11 diabetes patients with an interesting finding of lowered tHcy and inferred a reduced cardiovascular risk factor as well as a better heart health. Moderate consumption of beer has also been found to improve lipid profile in healthy Spanish adults (Romeo et al 2008). There is an increased HDL fraction of the lipid profile which is particularly beneficial for heart health.

Homocysteine (Hcy) is a thiol containing amino acid produced by the intracellular demethylation of the essential amino acid methionine. Intracellular Hcy either enters the transulphuration pathway or the remethylation cycle. In the remethylation pathway, homocysteine is remethylated to methionine by B_{12} dependent MS (B_{12}MS) in the presence of 5 methyltetrahydrofolate (CH, THF). The latter is the product of 5,10-methylenetetrahydrofolate (CH_2THF) reduction by MTHFR, Homocysteine can also be remethylated by betaine: homocysteine methyltransferase (BHMT) in the liver and kidney. In the methionine cycle, dietary methionine is converted to s-adenosylmethionine (SAM), which serves as a methyl group donor substrate for methyltransferases. The other product of this reaction is s-adenosylhomocysteine (SAH), which is hydrolyzed by SAH hydrolase to

homocysteine and adenosine. The methionine and folate cycle enzymes are widely distributed. Homocysteine also enters the catabolic transsulphuration pathway. The first enzyme in this pathway is B_6 dependent CBS. Cystathionine is converted to cysteine by B_6 dependent cystathionase, cysteine is further catabolised to inorganic sulphate which is excreted in the urine. The transsulfuration pathway has somewhat limited tissue distribution liver, kidney pancreas, and brain.

Total Hcy (tHcy) represents the sum of all forms of Hcy including forms of oxidized, protein bound and free. Hyperhomocysteinaemia is a sensitive marker of folate and cobalamin (vitamin B_{12}) deficiency and an independent risk factor for cardiovascular disease. Plasma tHcy concentrations are also related to birth defects, pregnancy complications, Psychiatric disorders, and cognitive impairment in the elderly (Savage et al 1994, Smith 2000) . The measurement of tHcy in the clinical setting is thus of potentially great importance (Carmel and Jacobsen 2001).

Deriving from the literature above, it is pertinent to have local references for these claims particularly as we know that beer and to a lesser degree, wine consumption are regularly consumed in this environment.

This study therefore aims at assessing the effects of beer on tHcy and lipid profiles in healthy adults in Ekpoma.

2. Materials and methods

40 healthy adult males and females were recruited within Ekpoma. Excluded from the study were individuals with malignant diseases, acute infections, cardiovascular diseases, liver and renal disease. Volunteers were screened for underlining heart conditions especially hypertension. Liver disease was screened out. The screening was done by qualified medical personnel. Among those screened in, there were 20 subjects each as controls and beer group.

Controls consume 650ml purified bottled water daily for two weeks. Beer group drank one bottle of beer (650ml) only each day for two weeks. Consumption in each group was consecutive days for the two weeks. Groups were assigned by randomization.

Venous blood was collected at recruitment and a day after the two weeks. Total cholesterol, haematocrit and tHcy were analysed.

Analysis of data was by using SPSS (Chicago, USA) and Microsoft Excel software to determined associations, correlations and other relationships.

3. Result

The mean age of the male volunteer beer drinkers was 26.6 ± 3.7years while that of female drinkers was 26.7 ± 3.74years. The mean ages of the control males and females were 26.5 ± 3.8 and 26.2 ± 3.7 years respectively.

The mean plasma concentrations of total Cholesterol in males and females, before and after moderate beer consumption were 4.5 ± 0.38 v 3.9 ± 0.27, 4.1 ±0.65 v 3.6 ±0.34 mmol/L. The values in the control groups of males and females were 4.5 ±0.36 v 4.4 ± 0.39 and 4 ±0.68 v 4.1 ±0.56 mmol/L in the two weeks period.

4. Discussion

The result obtained from this study is comparable with that of Sakuta and Zuzuki (2005). They found out that Plasma tHcy was positively associated with consumption of whiskey but not with consumption of shochu (Japanese spirits), sake, beer, or wine. In this study, only the effect of beer is however studied. The level of tHcy is negatively associated with beer consumption. In a similar study by Sakuta et al in 2007, where they analyzed the association between beer and other type of ethanol consumption and tHcy levels among type 2 diabetic patients. Male type 2 diabetic patients without overt nephropathy were studied (n = 242). Ethanol consumptions of the patients were 35.1 ± 37.8 mL/day for total ethanol, 13.9 ± 15.2 mL/day for beer ethanol and 21.2 ± 32.1 mL/day for non-beer ethanol. Both, total and non-beer ethanol consumption correlated with tHcy, whereas beer ethanol consumption showed a trend to inverse association with tHcy (standard regression coefficient, 0.184, 0.283 and −0.110, respectively). The levels of tHcy obtained in this study is comparable to that of an earlier study in Lagos, Nigeria where mean value for males was 9.42 ±1.6 µmol/L and for females was 8.0± 4.1 µmol/L (Adebayo, 2006). Each intake of 30 mL/day ethanol consumption was associated with an increase of 0.6 µmol/L for total ethanol and 1.1 µmol/L for non-beer ethanol and a decrease of tHcy of 0.7 µmol/L for beer ethanol. This is a similar study and the results are similar. We found a decline of about 0.8 µmol/L(fig1) in males after two weeks of moderate beer consumption and about 1.1 µmol/L in females. Romeo (2008) and colleagues analyzed the association of moderate beer consumption on the blood lipid profile in healthy Spanish adults. They had an interventional longitudinal design in which each subject established their own control with a previous wash-out phase. After a 30-day alcohol abstinence period, 57 healthy volunteers were submitted to a daily moderate intake of beer for 30 days. Serum total cholesterol and HDL-cholesterol amongst other analytes were measured. The result was that the level of total cholesterol reduced but the HDL fraction increased. This HDL is the cardio protective portion. We had a similar finding, the total cholesterol level reduced after two weeks of moderate consumption of beer (fig2). The result in fig3 shows no change in the levels of analyte after two weeks of water consumption in the control groups in males and females.

5. Conclusion

The findings from this study involving few volunteers show the positive effect of moderate consumption of beer on homocysteine and cholesterol level. Thus, it is right to say that there are health benefits of beer consumption. Reduced tHcy has been shown by Ajuluchukwu et al (2011) to correlate with good prognosis in diverse cardiovascular diseases in urban Africans. This is particularly important because black Africans are prone to hypertension. Finding that moderate consumption of beer can reduce its complication is a good development because beer consumption is a regular past time in many African nations.

There is need for a larger and wider population study and for a longer duration. This will help in elucidating possible effects of long term effects of moderate consumption of beer and help in shaping the kind of advice that can be given in this regard. Also, beer brewers can be better advised on the nutritional supplementation of beer such that a balance can be reached between social drinking and health.

Limitation

Fund is the primary limiting factor for this study. We are however open to sponsorship for a wider, larger and longer population study or collaboration of any sort concerning this subject matter.

References

Adebayo KJ,Ajuluchukwu JNA, Oluwatowoju IO. Plasma homocysteine: establishing reference values for healthy adult Nigerians. *Archives of Clinical Research* 2006; 1: 25-28.

Ajuluchukwu J, Oluwatowoju I, Adebayo K, Onakoya A. Plasma total homocysteine in diverse cardiovascular diseases in urban Africans. *World j Life Sci and Medical Research* 2011;1(6) :126-132.

Carmel R, Jacobsen DW. Homocysteine in health and disease. Cambridge, UK: Cambridge University Press, 2001: 500pp.

Mayer O Jr, Simon J, Rosolova H. A population study of the influence of beer consumption of folate and homocysteine concentrations. *Eur j Clin Nutrition, 2001; 55: 605 – 609.*

Romeo J, Gonzalez-Gross M, Warnberg J, Diaz LE, Marcos A. Effects of moderate beer consumption on blood lipid profile in healthy Spanish adults. *Nutrition, metabolism and cardiovascular diseases, 2008; 18(5): 365 – 372.*

Sakuta H, Suzuki T, Ito T, Yusuda H. Beer ethanol consumption and plasma homocysteine among patients with type 2 diabetes. *Diabetes Research and Clinical Practice, 2007; 78(2): 202 – 207.*

Sakuta H, Suzuki T. Alcohol consumption and plasma homocysteine. Alcohol 2005; 37 (2) 73-77.

Savage DG, Lindenbaum J, Stabler SP, Allen RH. Sensitivity of serum methylmalonic acid and total homocysteine determinations for diagnosing Cobalamin and Folate deficiencies. *Am. J. Med*. 1994; 96: 239-246.

Smith AD. Homocysteine, B vitamins, and cognitive deficit in the elderly (Editorial). *Am. J. Clin. Nutr* 2000; 75: 785-786.

Van der Gaag MS, Ubbink JB, Sillanaukee P, Nikkari S, Hendricks HFJ. Effect of consumption of red wine, spirit and beer on serum homcysteine. *Lancet, 2000; 355:1522.*

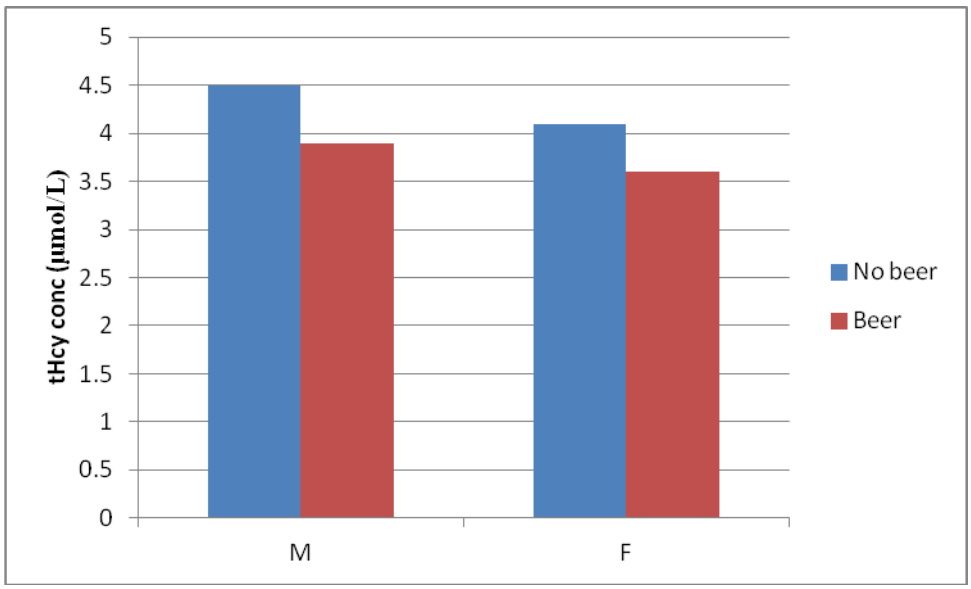

Figure 1: The mean plasma level of tHcy before and after two weeks of beer consumption is as shown in fig1

above.

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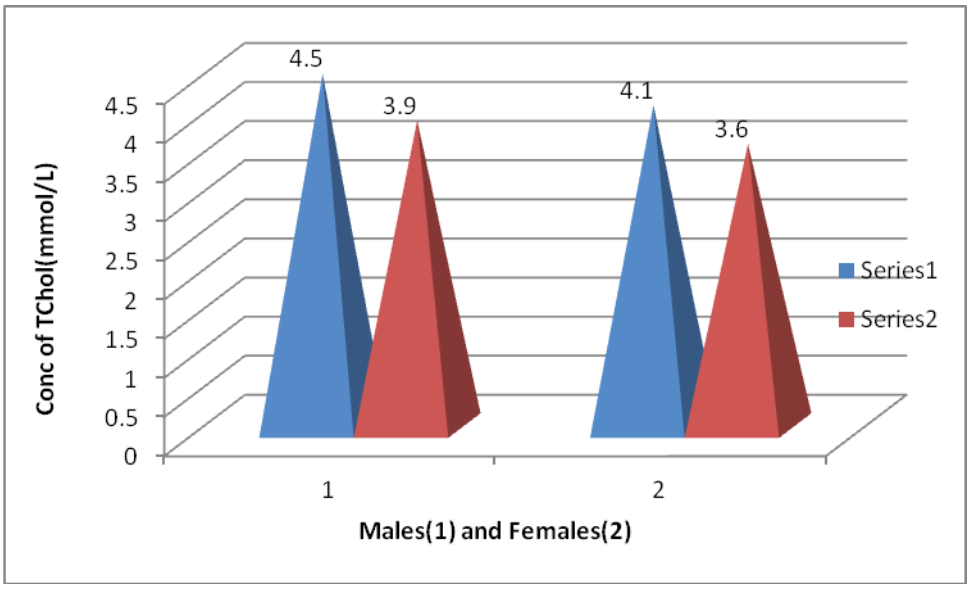

Figure 2: The mean plasma level of TChol before and after two weeks of beer consumption is as shown above.

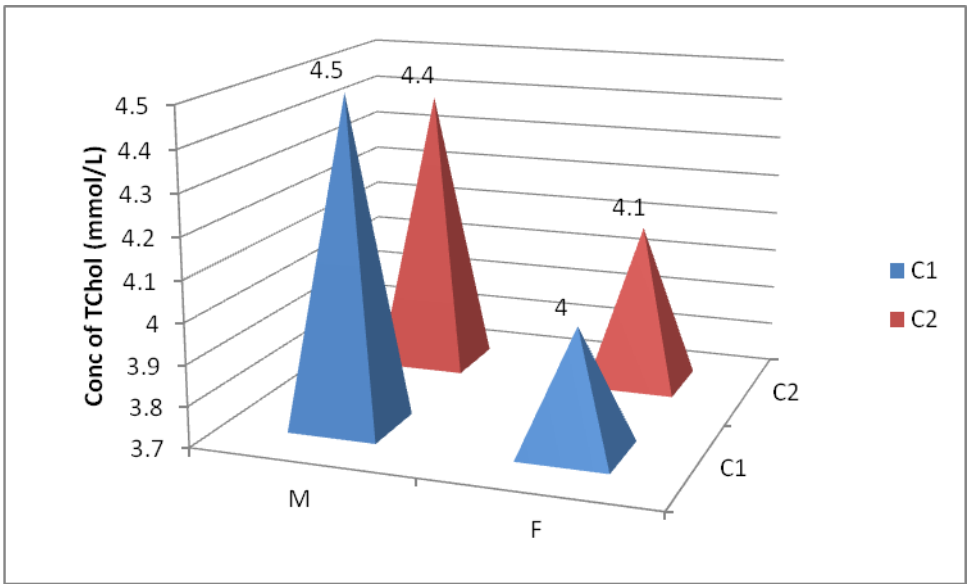

Figure 3: The mean plasma level of TChol in the control groups before and after two weeks of no beer consumption is as shown above.

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