Effect of vegetarian diet on Triglyceride (TG) level.

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Abstract

Background: Vegetarians consume higher amount of dietary fiber, polyunsaturated fatty acid and anti-oxidant in comparison to non-vegetarians. Vegetarians have lower incidence of heart disease, hypertension, diabetes mellitus and malignancy. Although, the relationship between vegetarian and triglyceride have been investigated extensively, but the studies have showed conflicting results. **Objective:** To observe the effect of vegetarian diet on Triglyceride level. **Methods:** This cross sectional comparative study was carried out in the department of Physiology in collaboration with the department of Biochemistry of Rajshahi Medical College, Rajshahi between July 2014 to June 2015. Fifty healthy adults male and female aged 18 to 45 years were studied. Twenty five healthy adult, vegetarians (lacto vegetarians) enrolled in study group and twenty five healthy adult non-vegetarians were in control group. Serum Triglycerides were measured by colorometric method. Data were analyzed by unpaired student's t-test. **Results:** Serum Triglyceride level did not show any significant difference between vegetarians and non-vegetarians. **Conclusion:** This study suggested that lactovegetarian diets have no effect on Triglyceride level.

Key words: vegetarians, non-vegetarians, triglyceride.

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Introduction

The lipids are a heterogeneous group of compounds, including fats, oils, steroids, waxes and related compounds, that are related more by their physical than by their chemical properties. They have the common property of being relatively insoluble in water and soluble in non-polar solvents such as ether and chloroform. They are important dietary constituents not only because of their high energy value, but also because of the-fat-soluble vitamins and the essential fatty acids contained in the fat of natural foods. Fat is stored in adipose tissue, where it also serves as a thermal insulator in the subcutaneous tissue and around certain organs.[1]

Triacylglycerols (formerly triglycerides) are the most abundant group of lipids that primarily function as fuel reserves of animals. The fat reserve of normal humans (men 20%, women 25% by weight) is sufficient to meet the body's calorie requirements for 2 – 3 months.[2]

Adipocytes of adipose tissue predominantly found in the subcutaneous layer and in the abdominal cavity are specialized for storage of triacyglycerols. The fat is stored in the form of globules dispersed in the entire cytoplasm. And surprisingly, triacylglycerols are not the structural component of biological membranes.[2]

Diet associated with non vegetarians (meat eaters) also offers some benefits such as protein-rich and caloric dense nutrients. It is also a rich source of vitamin B complex, especially B_{12} which is not available in plant foods. The occurrence of cardiovascular diseases, obesity, high blood pressure and high blood cholesterol levels is found to be greater among non-vegetarians owing to the high concentration of saturated fatty acids in animal food.[3]

Vegetarian diet contains the richest dietary antioxidants. Studies over the years have revealed that plants are a rich source of phyto-nutrients, vitamins C, E and carotenes as well as micronutrients such as selenium, Iron, copper, zinc and manganese which are co-factors for optimum catalytic activity of enzymes.[3]

Vegetarian have been broadly classified into three diet types, these are-Restricted or total vegetarians with no animal product in their food (they are also called vegans). Lacto-vegetarians which include only milk and dairy product in their diet and lacto-ovo vegetarians which also allows the inclusion of egg.[3]

Yadav et al. (2013)[4] and Verma et al. (2015)[5] have found no significant difference in TG level between vegetarians and non-vegetarians. Similarly, Pan et al.(1993)[6] and Huijbregts et al. (1980)[7] also have found no significant difference in TG level between

vegetarians and non-vegetarians. On the contrary, Jhala et al. (1998)[8] and Gandhi et al. (2014)[9] have found higher TG level among non-vegetarians. Similarly, Nduka et al. (2011)[3], De Biase et al. (2005)[10] and Famodu et al. (1998)[11] also have found higher TG level among non-vegetarians than vegetarians. In contrast, Dourado et al. (2011)[12] and Lin CK et al. (2010)[13] have found lower TG level among non-vegetarians than vegetarians.

So the findings of the researches are contradicting to each other and not conclusive. Moreover limited information is available regarding influence of lacto-vagetarian diet on lipid profile which is the usual dietary habit of vegetarians of our country.

Methods

The cross-sectional comparative study was carried out in the department of Physiology and department of Biochemistry of Rajshahi Medical College between the period of July 2014 to June 2015. The protocol of this study was approved by Institutional Review Board (IRB) and Ethical Review Committee (ERC) of Rajshahi Medical College. Fifty healthy adult male and female subjects, aged 18-45 years were selected among medical students, doctors, stuff and their relatives. Purposive sampling technique was applied to select each study lacto-vegetarian subject. After careful matching of age, gender and BMI, non-vegetarian subjects were selected for each lacto-vegetarian. Subject having history of hyperlipidaemia, hypertention, any vascular disease, diabetes mellitus, any endocrine disease, chronic illness, alcoholics, smoking, taking antihyperlipidaemic drugs or oral contraceptive pills were excluded from this study.

After proper counseling the aim, objectives, benefit, risk and procedure of the study were explained in details to the subjects. After taking informed consent, complete history taking and physical examination were done and record in a preformed data sheet. Following an overnight fasting (10-12 hours), 3 ml of venous blood sample were drawn into test tube (from the anticubital space of the forearm) by venepuncture after taking all aseptic precautions. After coagulation serum separated by centrifugation at 3000 rpm for 10 minutes. Then serum was used for estimation of triglyceride level by colorimeter. The results were expressed in mmol/L. Collected data were analyzed by using SPSS (Statistical Package for Social Sciences) computer software programme and test to significance were calculated by using unpaired t-test. P value at or below 0.05 was taken as level of significance.

Results

Comparison of background characteristics between vegetarian and non-vegetarian healthy adults were shown in Table-1. There were no statistically significant difference of age (years), weight (kg), height (meter), BMI (kg/m^2), Waist/Hip ratio, Waist/Height ratio, pulse (beats/min), systolic blood pressure (mm of Hg) and diastolic blood pressure (mm of Hg) between the two groups.

Table-1: Background characteristics of the study subjects (n=50)

Parameter	Vegetarian (n-25) (mean±SD)	Non Vegetarian (n-25) (mean±SD)	P-value
Age	33.68±9.05	33.92±9.04	>0.05
Height	1.60±0.07	1.61±0.06	>0.05
Weight	62.76±9.34	63.72±9.79	>0.05
BMI	24.39±3.65	24.40±3.54	>0.05
Waist/Hip ratio	0.86±0.05	0.86±0.05	0.05
Waist/Height ratio	0.51±0.06	0.51±0.06	>0.05
Pulse	79.68±4.71	76.60±4.22	>0.05
Systolic BP	120.0±9.46	114.8±7.56	>0.05
Diastolic BP	76.2±5.05	74.2±5.71	>0.05

The mean triglyceride concentration in healthy adult vegetarian group was 1.26±0.43 mmol/L. It was slightly higher (1.33±0.41mmol/L) in non vegetarians than vegetarians , but not significantly (Table 2).

Table 2: Fasting serum triglyceride concentration in healthy adult vegetarian group and non-vegetarian group (n=50).

Parameter	Vegetarian (n-25) mean±SD(95% CI)	Non Vegetarian (n-25) mean±SD (95% CI)	P-value
Triglyceride (mmol/L)	1.26±0.43 (0.76-2.4)	1.33±0.41 (0.8-2.7)	>0.05

Discussion

Persistent high lipid level is usually associated with different diseases like atherosclerosis, myocardial infarction, cerebro-vascular disease, peripheral vascular disease etc. Hyperlipidemia may cause heart disease and majority of non-communicable diseases are heart related. So, many possible fatal diseases can be avoided by maintaining normal blood lipid levels. It is observed that vegetarians have lower incidence of heart disease, hypertension, diabetes mellitus and cancer.[10]

We have found no significant difference of triglyceride level between vegetarians and non-vegetarians. This finding is compatible with Vishwabharathi *et al.* (2013)[14], Yadav *et al.* (2013)[4],

Verma *et al.*(2015)[5] and Lee*et al.*(2000).[15] It may be due to the fact that total energy intake was same in both groups. Moreover carbohydrate was the main food consumed by the both groups which may mis-interpret the benificial effect of vegan diet on lipid profile.

Additional longitudinal studies on larger sample size should be done to comment about this finding. On the other hand, Jhala *et al.* (1998)[8] have observed higher TG level in non-vegans. The sample size of their study was multiple times greater than this present study which may be reason of the difference. Pan et al. (1993)[6] underwent a study on Buddhist vegetarians, who lives on carbohydrate, did not find no difference in lipid profile which is consistent with the present study. Similarly Huijbregts et al. (1980)[7] have opined that high carbohydrate consumption is the cause of failure to reduce TG level among vegetarians which correlates with the present study finding.

Moreover, Gandhi *et al.* (2014)[9] have opined that vegetarians had lower TG level than non-vegans. However they have included only strict vegans in vegetarian group. On the contrary, this study had included lacto-vegans in vegetarian group which may be the reason of the conflicting finding. In addition, Nduka et al. (2011)[3] and Famodu et al (1998)[11] have found higher TG level among non-vegetarians. It may be due to presence of high concentration of saturated fatty acid in animal fat. Moreover De Biase et al. (2005)[10] also have found that TG level decreases as animal products were restricted in diet. It indicates that animal fat intake is an important contributor of TG level in addition to carbohydrate intake.

Interestingly, Dourado et al. (2011)[12] have found that non-vegetarians had lower TG than vegetarians. Higher percentage of carbohydrate intake among vegetarians may be the cause of this finding. Furthermore, Lin CK et al. (2010)[13] were found that the prevalence of hyper-trigiyceridaemia is non-significantly higher among vegetarians. It indicates that the diet of vegetarians might have affected TG level.

One of the strength of our study is we have done careful matching of anthropometric indices in addition to age and gender. However it was a cross-sectional study on smailer sample size. To establish the cause-effect relationship,a cohort study on larger sample should be done.

Conclusion:

This study did not find any significant difference of triglyceride level between vegetarians and non-vegetarians. It indicates that the vegetarians have similar cardio-vascular risk like the non-vegetarians unless influenced by certain modifiable risk factors like high BMI, lack of exercise, smoking, alcohol consumption, increase intake of dietary fat etc.

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