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Comparative Study of Lipid Profile levels in Vegan, Vegetarian and Non-Vegetarian Persons

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Abstract **Original Research Article**

Previous studies have suggested an association between vegetarian persons and non-vegetarian persons, although this relationship positive correlation significant. The present study was designed to investigate comparative study of lipid profile levels in vegan, vegetarian and non-vegetarian person. Cardiovascular disease and related mortality are strongly associated with elevated plasma concentration of total cholesterol and low-density lipoprotein. The present study was undertaken to compare the parameters of lipid metabolism i.e. cholesterol, tri-glyceride, high density lipoprotein, low density lipoprotein of the age of 21-30 years healthy age and sex matched persons. The divided categories i.e. vegan, vegetarian and non- vegetarian persons. The study was done on 90 subjects in 30 were vegan and equal number of subjects in vegetarian and non-vegetarian groups. The vegan and vegetarian diet was significantly found to reduce the values of all the parameter lipid metabolism except HDL-Cholesterol (45.02± 9.595; $p<0.0001$).when these parameters were analyzed for the category of middle and old age, most of the lipid parameters total cholesterol (TC) including were significantly increase among Non-vegetarian (224.02 ± 18.85; $p<0.0001$) from this study, it can be concluded that along with diet, sex and age factor also influence parameters of lipid metabolism.

Abbreviation
HDL- High Density Lipoprotein LDL-Low Density Lipoprotein, TG-Triglycerides, VLDL-Very low Density Lipoprotein, Veg-Vegetarian, NonVeg-Non-vegetarian.

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INTRODUCTION

Veganism is the practice of abstaining from the use of animal products, particularly in diet and associated philosophy that rejects the commodity status of animals [1]. A follower of the diet is known as vegan

Donald Watson coined the term "vegan" in 1944 when he co-founded the Vegan Society in the United Kingdom [2, 3]. At first he used it to mean "non-dairy vegetarian". Vegan explicitly abstained from "eggs, honey, and milk, butter and cheese" and any other animal derived substances [4]. Some people choose veganism for its potential health effects and to avoid the side effects linked to the antibiotics and hormones used in modern animal agriculture [5]. Some studies consistently link vegan diets to a lower body weight and body mass index (BMI). Some people may choose these diets to lose weight [6]. Many anthropologists believe that early humans ate mainly plant based foods, being more like gatherers than hunters. According to them, the natural diet of man consists of fruits, nuts and grains, and not meat. Regarding the effects of vegetarian diets on blood lipid concentrations, several cross-sectional studies showed that vegetarians have significantly lower concentrations of total cholesterol, low density lipoprotein and triglyceides as compared with non-vegetarian diet [7]. Cardiovascular disease and related mortality are strongly associated with elevated plasma concentration of total cholesterol and low-density lipoprotein. Scientific evidence indicates that a diet with high intake of saturated fat, trans fat, and salt and low intake of vegetables, fruits and fish has been associated with cardio-vascular risk factors [8]. In 2004, the National Cholesterol Education Program (NCEP) and the third report of the Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults recommended the Therapeutic Lifestyle Changes plan, which calls for limiting total and saturated fats and dietary cholesterol and including plant sterols, viscous fibers, soy protein, and nuts, as the initial intervention

for cholesterol reduction [9]. Both saturated fats and trans fats tend to block low-density lipoprotein (LDL) receptors, thus preventing the uptake of LDL from the bloodstream. When LDL becomes oxidized, it induces endothelial cell injury as well as foam cell formation, causing atherosclerosis development. Frequent consumption of energy-dense foods, such as foods that are rich in fats and sugars, promotes obesity and increases the risk of atherosclerosis and cardiovascular diseases [10] Vegetarianism is a plant-based diet with fruits, vegetables, and grains in a large amount. A vegetarian as someone who does not eat meat, poultry or sea food, or products containing these foods but may consume milk, dairy products and exclude all animal flesh [11]. Many studies have assessed the nutritional adequacy of vegetarian diets. Overall, these have shown that a well-planned vegetarian or vegan diet can supply all the nutrients required for good health [12]. A recent meta-analysis of 7 clinical trials and 32 observational studies showed that consumption of vegetarian diets was associated with lower risk of experiencing health problems including hypertension [13]. High intake of vegetables is associated with decreased risk of dyslipidemia [14]. The vegetarian diet when compared with non-vegetarian diet appears to below in factors positively related to blood pressure (BP) and high in protective factors [15]. A summary analysis of 5 observational studies demon-strated that populations consuming plant based (vegetarian & vegan) diets have lower rates of coronary artery disease compared to the general population [16]. Vegetarian dietary patterns have been reduction in several diseases such as metabolic syndrome, diverticular diseases, and colorectal cancer [17]. These positive effects include an improvement in proteinuria, hyperfiltration and renal perfusion, and decreased renal injury. To prevent or delay further progression of kidney damage in diabetic nephropathy, results of studies suggest replacing animal protein with soy-protein [18]. Then the question arises why do large numbers of people eat animal flesh? A non-vegetarian diet includes chicken, meat, eggs and fish, especially as a major source of protein [19]. Among non-vegetarian subjects, various pattern of consumption of non-vegetarian food is seen. These are meat (red & white) only, egg and meat, fish and meat, egg and fish and all three. Fish is low in fat, high in protein and an excellent source of omega-3 fatty acids which reduces inci-dence of heart disease [20]. Saturated fats, such as animal fats and cholesterol play an important role in person's health. In addition, adoption of a vege-tarian diet has been shown to be more beneficial in improving diabetes symptoms than traditional medication in some studies [21]. The functionality of certain foods has been found to improve the symptoms of diabetes [22]. It might be a useful non-pharmacutical managing of dyslipidemia. The lipid profile is a blood test done to access the status of fat metabolism in the body and is important in heart diseases MATERIAL & METHODS - The study was con-ducted in the Department of Physiology, in associ-ation with the department of biochemistry, Sardar Patel Medical college and attached Hospitals, Bikaner 1.Study Design- Community based comparative Cross-sectional observational study.2. Study Popu-lation- The minimum healthy subjects were 30 in each group. 3. Sampling Techniques- Convenient Sampling. Inclusion criteria:1. Vegan persons, Vegetarian persons and non-vegetarian person. 2. Aged 21- 40 years healthy individuals (both sex). 3. Subjects who are cooperative and giving informed written consent. Exclusion criteria: 1. Smokers (past/present) 2. Alcoholics (past/present) 3. Diabetics 4. Hyperten-sive 5. Familial hyperlipidemia 6. Pregnancy 7. Anemic & Polycythemic persons Equipment: Weighing machine: Suvarna (Slim-line), Height Measuring scale, Measuring Tape. Lipid Profile: All subjects were tested under simi-lar laboratory conditions. The blood samples for lipid profile were taken early morning after 12 hour fasting and the samples were centrifuged in an ul-tracentrifuge; the serum was stored in the Depart-ment of Biochemistry. Lipid profile was performed in the Central Biochemistry laboratory using a semi-automated analyser. TG – Enzymatic colorimetric (End point) method, TCH -Enzymatic colorimetric (End point) method, LDL & HDL - by precipitation method using a reagent that consists of modified polyvinyl sulfonic acid (PVS) and polyethylenegly-col methyl ether (PEGME) Low density lipoprotein cholesterol was using the formula by Friedewald's formula VLDL-C (mg/dl): Triglyceride/5.

OBSERVATIONS & RESULTS

Table-1: Distribution of study subjects according to Age

Age	Vegan Group		Veg-Group		Non-veg. Group	
In Years	No.	%	No.	%	No.	%
21-30	15	50	15	50	15	50
31-40	15	50	15	50	15	50
Total	30	100%	30	100	30	100%

Table-2: Mean Serum HDL (mg/dl) compared with all groups.

Groups	Vegan	Veg.	N-Veg	P-value
HDL (mg/dl)	41.60±5.90	43.40±4.69	44.37±9.93	0.323

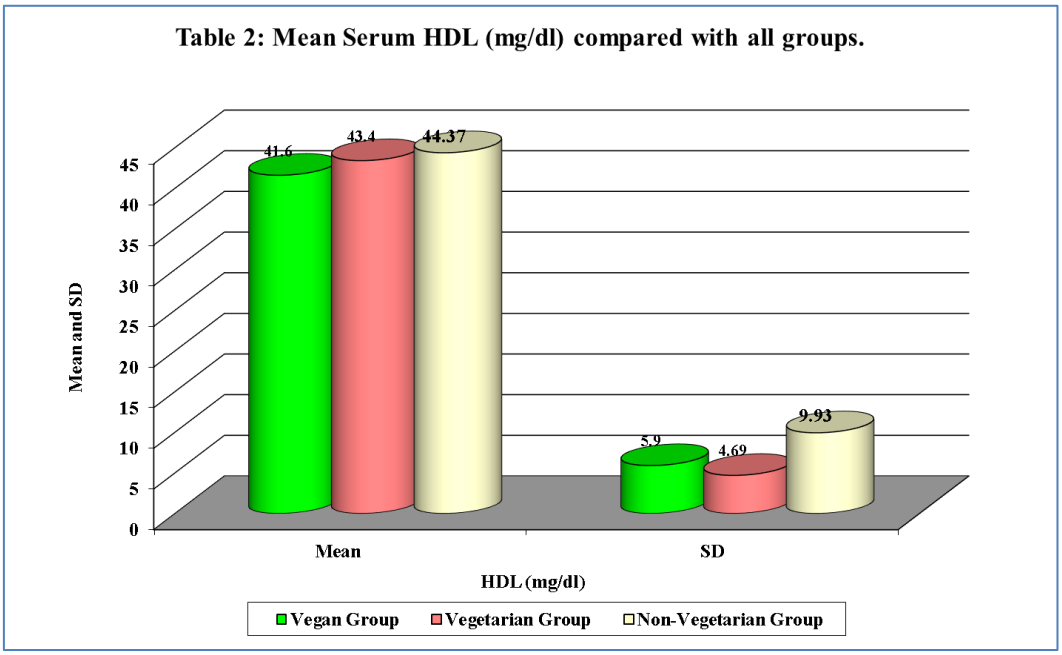
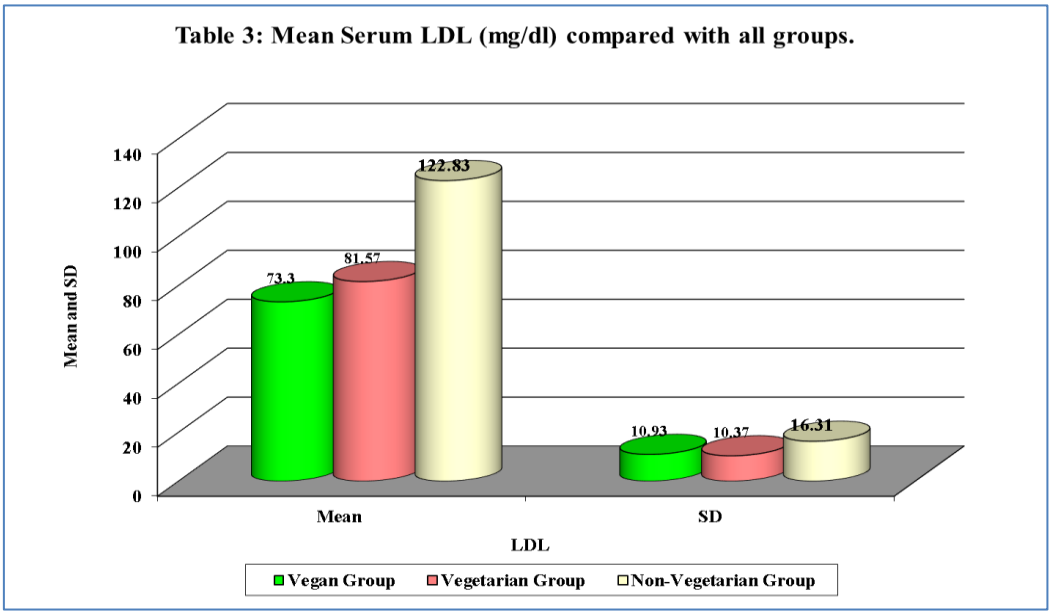


Table-3: Mean Serum LDL (mg/dl) compared with all groups.

Groups	Vegan	Veg.	N-Veg	P-value
LDL(mg/dl)	73.30±10.93	81.57±10.31	122.83±16.31	0.0001*



There was statistically significant difference between all the 3 group LDL level (p = 0.0001) It was found that mean value of LDL in vegan was low as compared vegetarian group. The mean value of LDL was high in non-vegetarian group**.**

Table-4: Very low density Lipoprotein

Groups	Vegan	Veg.	N-Veg	P-value
VLDL	15.27±4.85	17.90±4.24	26.87±8.54	0.0001

Table 4: Mean Serum VLDL (mg/dl) compared with all groups.

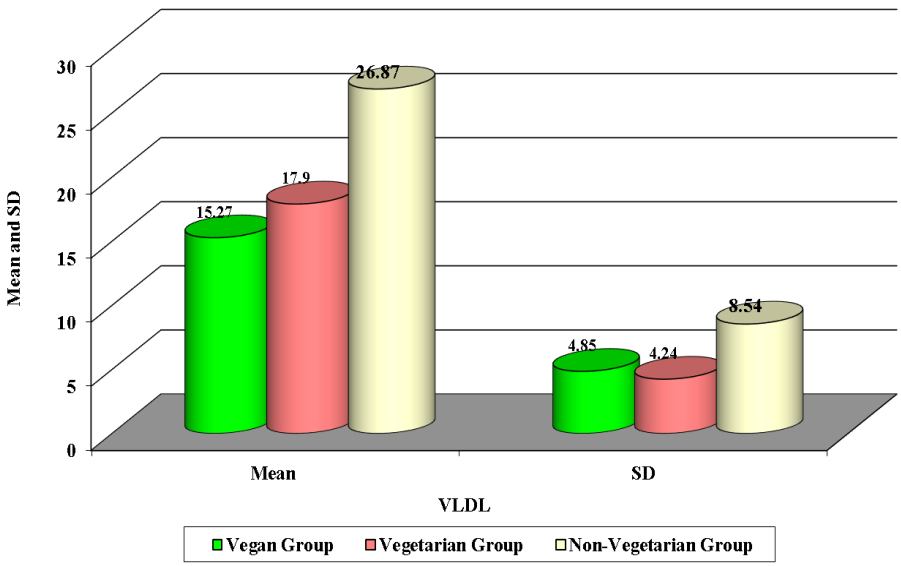
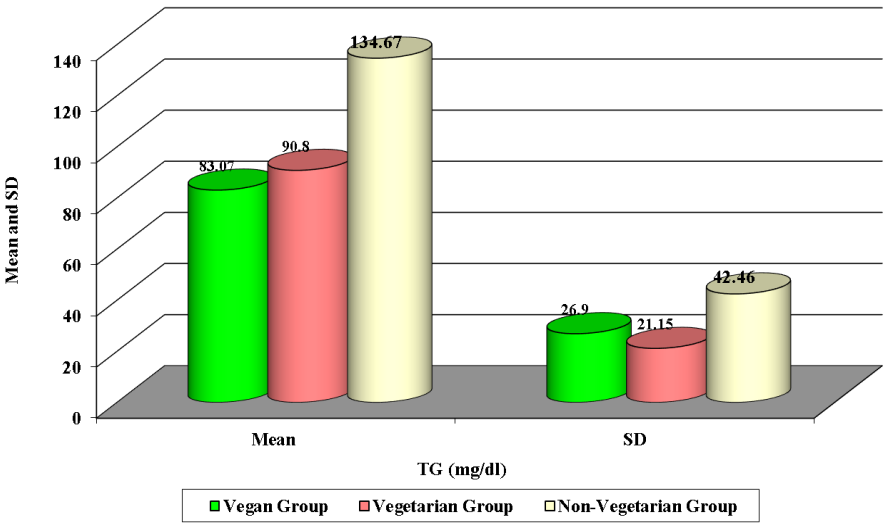


Table-5: Mean Serum TG (mg/dl) compared with all groups.

Groups	Vegan	Veg.	N-Veg	P-value
TG	83.07±26.90	90.80±21.15	134.67±42.46	0.0001

Table 5: Mean Serum TG (mg/dl) compared with all groups.

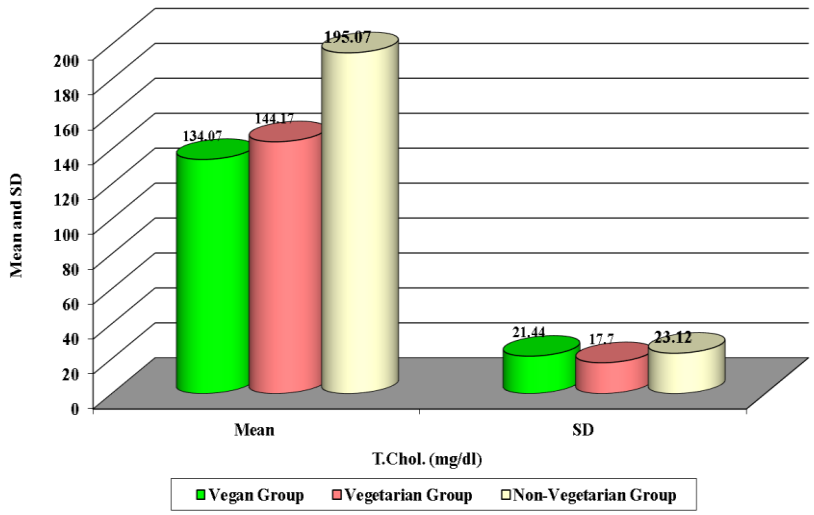


Triglyceride: There was statistically significant difference between all group Triglyceride level (p = 0.0001) It was found that mean value of triglyceride in vegan was low as compared to vegetarian and non-vegetarian groups.

Table-6: Mean Serum Total cholesterol (mg/dl) compared with all groups.

Groups	Vegan	Veg.	N-Veg	P-value
T.chol.	134.07±21.44	144.17±17.70	195.07±23.12	0.0001

Table 6: Mean Serum T.Chol. (mg/dl) compared with all groups.



Total Cholesterol: There was statistically signifi-cant difference between all group Total cholesterol level (p = 0.0001) It was found that mean value of total cholesterol in vegan was low as compared to vegetarian and non-vegetarian groups/ .

DISCUSSION

The present study includes 90 participants divided into three groups ie, Vegan, Vegetarian and Non-vegetarian from the local community of Bikaner city. The present study showed that there was statistically significant difference in all 3 groups of LDL level ($p < 0.001$), It was found that mean value of LDL in vegan was low as compared vegetarian group and in previous study showed that vegans had lower total cholesterol and LDL-cholesterol concentrations than did meat eaters (Paul *et al*. in 2020) [23] and another study showed that vegetarians presented higher LDL levels than non-veg individuals (Saintila *et al*. in 2020) [24]. The present study showed that there was statistically significant difference in all the three groups of VLDL, TG, TC ($P < 0.01$). It was found that mean value of VLDL, TG, TC was lower in vegans than vegetarians and non-vegetarians. This result is in agreement with several previous studies. Paul *et al*. in 2020 showed that vegans had lower TC than non-vegetarians ($P < 0.001$) [23]. Saintila *et al*. in 2020 showed that no significant differences in VLDL and TG concentrations in between veg and non-veg individuals.(Saintila *et al*. in 2020)[24]. The present study showed that there was no statistically significant difference between all 3 groups (vegan, veg. and non-veg) of HDL level ($p = 0.323$) and previous study showed that Vegetarian diet was significantly found to reduce the values of all the parameter lipid metabolism except HDL cholesterol (45.02 ± 9.595; $p < 0.0001$), and HDL cholesterol was significantly increase among non-veg. ($p < 0.0001$) (Verma *et al*. in 2015) [25], and some previous researches also showed that Consumption of vegetarian diets was associated with lower mean concentrations, and HDL ($P < 0.001$), compared with consumption of non-veg. diet (Yokoyama *et al*. in 2017) [26]. SUMMARY AND CONCLUSION The present study was conducted on 90 subjects of which 30 were healthy vegan person and equal number of healthy age matched vegetarian & non-vegetarian persons selected randomly from local community people of Bikaner city. All selected individuals were in between the age group of 21-40 years. We have been able to conclusively prove that there is in fact a cumulative effect of vegan, vegetarian and non-vegetarian person on lipid profile by showing our result tables. In our study we found that vegan and vegetarians had low level of LDL, VLDL, TG, TC in comparison to non-vegetarian persons. There was no statistically significant difference in HDL level in between the three groups. The observation of our study suggests a plant based vegan and vegetarian diet consumption reduced TC and LDL cholesterol concentration. Thus, for subjects who may have elevated blood lipids, consumption of vegan diets and vegetarian diets, may prove to be an effective non-pharmacologic means to optimize blood lipid profiles, possibly leading to improved cardio-metabolic health.

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