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Comparison of Fasting and Non-fasting Lipid Profile in Young Healthy Adults

Satish Dipankar[1,*], Shankar Pawar[2]

ABSTRACT

Background and Aim: It is necessary to find out whether fasting blood samples are must for lipid profile determination. Aim of this study to find out is there any difference between fasting and non-fasting lipid profile in young healthy adults. **Methods:** This study was done on 100 MBBS students of medical college. Lipid profile was done in these healthy young adults for fasting and postprandial statuses. **Results:** The lipid profile parameters were compared in both the groups of fasting and postprandial statuses. In fasting group, the mean total cholesterol level was 192.1 mg/dl and mean postprandial total cholesterol level was 194.98 mg/dl (P = 0.0407). The mean fasting serum triglyceride level was 121.16 mg/dl and mean postprandial serum triglyceride level was 126.18 mg/dl (P = 0.0001). The mean fasting high density lipoprotein (HDL) level was 45.08 mg/dl and mean postprandial HDL was 43.84 mg/dl (P = 0.0656). The mean fasting serum VLDL level was 24.23 mg/dl and mean postprandial VLDL level was 25.24 mg/dl (P = 0.0001). The mean fasting LDL was 122.8 mg/dl and mean postprandial LDL was 125.9 mg/dl (P = 0.0416). **Conclusion:** Finally, from this study we found that there is no significant clinical difference between fasting and non-fasting levels of total cholesterol, HDL, LDL, VLDL and TG. Thus, for estimation of lipid profile we can use the blood samples at any time or irrespective of mealtime.

Key words: Lipid profile, Fasting, Non-fasting, Total-cholesterol (TC), High density lipoprotein-cholesterol (HDL), Low density lipoprotein-cholesterol (LDL), Very low-density lipoprotein-cholesterol (VLDL), Triglycerides (TG).

INTRODUCTION

In cardiology, diabetology, thyroid clinics, etc. estimation of lipid profile is now a days common and frequently done test. Serum lipid profile has now become almost a routine test. It is usually done in fasting state due to certain alterations in postprandial triglyceride and subsequent calculated LDL values in non-fasting serum sample but in few recent studies it has been seen that there is no much difference between the values of fasting lipid profile and non-fasting lipid profile.[1] It is difficult to get fasting blood samples of diabetics and children. In such conditions why to put burden on patients to be overnight fasting and why to put burden on the laboratory to collect early morning blood samples? In recent studies most daytime lipid concentrations changed only slightly therefore non-fasting samples could be used for routine lipid tests. However, in cases of abnormal postprandial triglyceride concentrations, dietary factors and fasting time should be considered when interpreting the results. It is important to establish an optimal cutpoint for nonfasting triglycerides to be used for the reporting of abnormal lipid profiles. Recently several societies' guidelines and statements in Denmark, the United Kingdom, Europe, Canada, Brazil and the United States endorse nonfasting lipid profiles.[2] as previously required for lipid profiles, normally only occurs a few hours before breakfast. By contrast, the nonfasting state predominates most of a 24 h cycle and better captures atherogenic lipoprotein levels. Plasma contains atherogenic lipoproteins of hepatic origin in the fasting state and additionally those of intestinal origin in the nonfasting state. Maximal mean changes for random, nonfasting versus fasting levels are +26 mg/dl for triglycerides, −8 mg/dl for total cholesterol, −8 mg/dl for low-density lipoprotein cholesterol, +8 mg/dl for remnant cholesterol, and −8 mg/dl for non–high-density lipoprotein cholesterol; lipoprotein (a).

In this study, we will discuss the difference between the lipid parameters (TC, TG, HDL and LDL) in both fasting and postprandial statuses.

MATERIALS AND METHODS

Materials

Study group: 100 healthy young adults.

Inclusion Criteria: Healthy young adults between the age group of 18 to 25years having BMI between 18.5 to 25.

Exclusion Criteria: Young adults suffering from any disease. Pregnant and breast-feeding mothers, non-alcoholics, nonsmokers.

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Study material: Blood samples.

Methods

This study was performed on 100 healthy young adults without dyslipidemia. Lipid profile was determined for fasting and postprandial statuses. Two blood samples–one fasting after 10 h overnight fast and another after two h of breakfast were drawn and subjected to testing for lipid profile. Lipid profile was estimated by enzymatic kit method.

1. Estimation of Total Cholesterol in serum (enzymatic method: cholesterol oxidase/ peroxidase): the assay was carried out by using A25 bio system auto analyzer. Reference range: Upto 200mg/dl – desirable, 200–239 mg/dl–borderline high and > 240 mg/dl – High.
2. Estimation of serum Triglycerides (Enzymatic method glycerol phosphate/ peroxidase): the assay was carried out using A25 bio system auto analyzer. Reference range: Upto 150 mg/dl – Normal, 150–199 mg/dl–Borderline high, 240-249 mg/dl – High and > 500 mg/dl – Very high.
3. Estimation of serum High Density Lipoprotein-Cholesterol (direct detergent method): the assay was carried out by using A25 bio system auto analyzer. Reference range: Upto 35 mg/dl – High risk, > 60 mg/dl–Low risk.
4. Estimation of serum Very Low-Density Lipoprotein: VLDL Cholesterol is calculated by Friedewald equation (Triglycerides/5). Reference range: 5–40 mg/dl and > 40 mg/dl high
5. Estimation of serum Low Density Lipoprotein-Cholesterol. Serum LDL-Cholesterol is calculated by Friedewald equation LDL-cholesterol = Total cholesterol – [HDL-C + (triglycerides/5)]. Serum LDL cholesterol was estimated by direct method when TG values were > 400 mg/dl.

Statistical analysis of data

Statistical analysis of the data was performed using Graph bar diagram and Microsoft Excel 2007. For every test of *p* value ≤ 0.05 was considered as statistically significant.

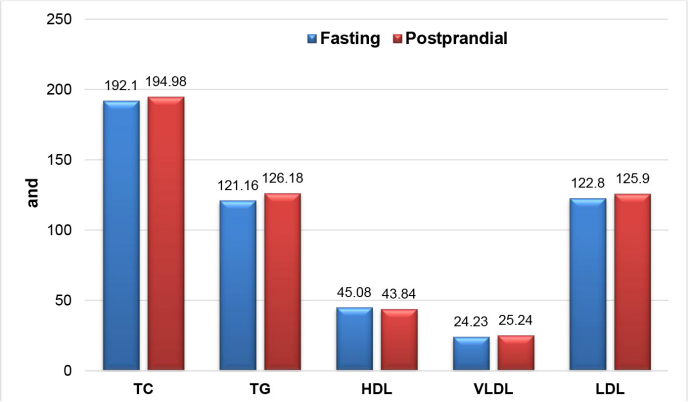
RESULTS

The lipid profile parameters in both groups in fasting and postprandial statuses were compared. In fasting group, the mean fasting serum total cholesterol level was 192.1 mg/dl and in postprandial group, mean serum total cholesterol level was 194.98 mg/dl ($P = 0.0407$). In fasting group, the mean fasting serum triglyceride level was 121.16 mg/dl and in postprandial group, mean serum triglyceride level was 126.18 mg/dl ($P = 0.0001$). The mean fasting High Density Lipoprotein (HDL) level was 45.08 mg/dl and mean postprandial HDL was 43.84 mg/dl ($P = 0.0656$). The mean fasting serum VLDL level was 24.23 mg/dl and mean postprandial VLDL level was 25.24 mg/dl ($P=0.0001$). The mean fasting LDL was 122.8 mg/dl and mean postprandial LDL was 125.9 mg/dl ($P = 0.0416$).

Comparison between laboratory findings of the lipid parameters in fasting and postprandial status in healthy young adults.

Parameters	Fasting [mean (± SD)]	Postprandial [mean (± SD)]	P value
TC (mg/dl)	192.1 (±9.55)	194.98 (±10.21)	0.0407*
TG (mg/dl)	121.16 (±4.56)	126.18 (±3.71)	0.0001**
HDL (mg/dl)	45.08 (±4.48)	43.84 (±4.98)	0.0656
VLDL (mg/dl)	24.23 (±0.91)	25.24 (±0.74)	0.0001**
LDL (mg/dl)	122.8 (±10.78)	125.9 (±10.6)	0.0416*

TC- cholesterol; TG- triglyceride; HDL- high density lipoprotein; VLDL- very low-density lipoprotein; LDL-low density lipoprotein; TG- triglyceride, $P>0.05$: not significant. $P<0.05$: significant*, $P<0.001$: Highly significant**



Comparison of Lipid parameters in fasting and postprandial statuses in healthy young adults.

DISCUSSION

To save the time and expenses for special instrument required for LDL-C estimation we used universally accepted Friedewald equation we used all values of lipid profile in mg/dl, study population is healthy young adults and TG values are less than 400mg/dl.

In our study, on comparison of lipid profile parameters in both fasting and postprandial statuses, the mean level of Total cholesterol (192.1 vs.194.98 mg/dl), TG (121.16 vs. 126.18 mg/dl), HDL (45.08 vs. 43.84 mg/dl), VLDL (24.23 vs. 25.24 mg/dl) and LDL (122.8 vs. 125.9 mg/dl) was not significantly different. Thus, there was no significant clinical difference between fasting and non fasting levels of total cholesterol, TG, HDL, VLDL and LDL. This change in levels of lipids, at most in response to normal food intake is minimal and unimportant.

Evidence suggests differences in cholesterol levels based on fasting versus not fasting are not clinically significant. In 2013, the American College of Cardiology and the American Heart Association released guidelines noting that non-fasting lipid tests can be used for assessing cardiovascular risk, but still recommended a fasting lipid panel prior to statin initiation.[3] Anne Langsted *et al.* and Samia Mora *et al.* demonstrated that fasting lipid levels are not superior to non fasting levels for cardiovascular risk prediction.[4,5]

Since the 1970s, numerous reports from well-conducted, large, representative and mostly prospective studies with medium to long-term follow-up have consistently found that non-fasting lipids suffice for screening of cardiovascular disease risk.[4-8] postprandial hypertriglyceridemia may play an important role in atherosclerosis. Objective To determine the association of triglyceride levels (fasting vs nonfasting).

Study by Langsted, A. and Nordestgaard, B. G. showed that postprandial reductions in HDL cholesterol observed in both populations were caused by hemodilution due to fluid intake. No statistically significant differences in postprandial apolipoprotein B concentrations were found.[9] A paradigm shift towards measuring postprandial lipid profile, as opposed to fasting lipids has occurred in recent decades. Some countries have already adopted nonfasting lipid testing (i.e. measured on a random blood sample irrespective of time since last meal) in routine practice, including Denmark in 2009, the UK in 2014, as well as Europe and Canada in 2016.

Study by Sidhu D and Naugler C. showed that fasting times showed little association with lipid subclass levels in a community-based population, which suggests that fasting for routine lipid levels is largely unnecessary.[9-11]

Several large-scale, population-based studies and registries including children, women, men and patients with diabetes have now demonstrated that no clinically significant difference was found in diabetic or nondiabetic patients of fasting and nonfasting lipid profile.[6,7,12-14]1166 of whom developed cardiovascular events during 14 years of follow-up. Compared with fasting levels, total cholesterol, low-density lipoprotein cholesterol, High-Density Lipoprotein (HDL).

The advantages of a determining lipid profiles in a non-fasting blood sample are that patients who have not fasted do not have to make another appointment to have their blood drawn, By not requiring an overnight fast, the crowd of patients showing up in the morning for a blood test is lessened and physicians are spared from having to track down repeat tests. Laboratories won't be overwhelmed with people in the morning; patients can receive testing during a physician visit; and patients are likely to be more compliant with testing. Requiring fasting is also difficult for those with diabetes and for children.[9] It is quite reasonable to suggest that lipid profile testing performed on samples collected in the nonfasting state at a random time convenient for the patient and the laboratory represents the way of the future. Arguments in support of this approach include the following: 1) most people are in the nonfasting state for most of the day, 2) this state may be a better reflection of the true metabolic state of a person, 3) nonfasting triglycerides possibly are better at predicting cardiovascular disease risk than fasting triglycerides and 4) nonfasting lipid profiles simplify blood sampling for patients, laboratories, general practitioners and hospital doctors alike.[14] The study of White *et al*. is timely, as the current trend toward the use of nonfasting lipid profile testing has created an urgent need for evidence-based cutpoint values for the reporting and flagging of abnormal nonfasting triglycerides in laboratory reports. When non-fasting plasma triglyceride concentration is more than 440 mg/dL (>5 mmol/L) consideration should be given to repeating the lipid profile in the fasting state.[15]

Study limitations

The limitation of our study was that the samples were obtained from a relatively small portion of population with normal lipid profile. We suggest further study should be done on larger population.

CONCLUSION

In this study we did not found any significant clinical difference between fasting and nonfasting levels of Total Cholesterol, Triglycerides, High density lipoprotein, Very low-density lipoprotein and Low-density lipoprotein. Thus, we can use the nonfasting blood samples to estimate lipid profile in follow-up the dyslipidemic patients. There is no need to make fasting lipid profile mandatory. This study suggests efforts should be made to simplify blood sampling by replacing fasting lipid profile with non-fasting lipid profile. It is necessary to determine cut-points of non-fasting lipid values. Life-threatening or extremely abnormal test results deserve special attention and reactions of the clinical biochemical laboratory.

CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest.

Source of Funds

Nil.

Ethical Clearance

Institutional ethical committee, LAMGMC, Raigarh

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