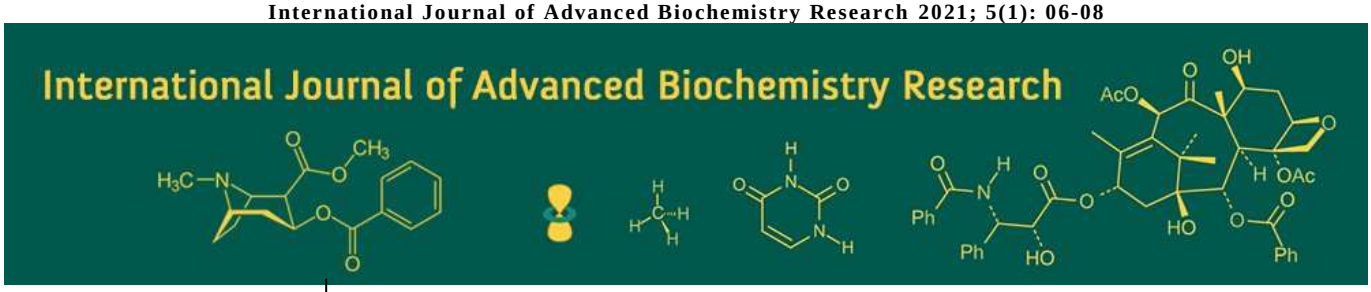

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Fasting and non-fasting lipid profile – A comparative study

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Abstract
Sedentary lifestyle and lack of physical activity predisposes to Hyperlipidaemia which is a modifiable risk factor for coronary artery disease. Deranged lipid profile is also seen in patients of hypertension and diabetes mellitus which are among most common non communicable diseases seen mainly in developed and some of developing countries. Dyslipidaemia depending upon the severity will be monitored by Lipid profile usually done in fasting state and based on differential derangement of lipid levels, treated accordingly. Most of the nations have switched on to non-fasting lipid profiles owing to its convenience and feasibility of testing and also probably considering the fact that body is exposed to non-fasting lipid levels for most time in 24 hours of the day. This pilot study tried to compare and study the fasting and non-fasting lipid profile components by doing an observational cross sectional study on 50 patients attending the Haasana Institute of Medical Sciences laboratory services, Haasana for regular health checkup. There was no statistically significant difference between total cholesterol, HDL cholesterol and LDL cholesterol in fasting and post prandial state whereas triglycerides and VLDL showed significant statistical difference with p value less than 0.05. Our study concludes that non fasting lipid profile is better both technically, operationally with better diagnostic and prognostic capability with respect to monitoring and treatment of dyslipidaemias as compared to fasting lipid profile.

Keywords: fasting, non-fasting, lipid profile

Introduction
Lipid profile is one of the most commonly performed blood investigations encompassing Total cholesterol (TC), High Density Lipoprotein cholesterol (HDL), Low Density Lipoprotein cholesterol (LDL), Very low density lipoproteins (VLDL), and Triglycerides. Preferred sample for this investigation is fasting serum with 8-12 hours fasting (1, 2). Patients on their first visit are usually advised by the doctors to visit them again on a different day with fasting lipid profile laboratory reports which is most of the times inconvenient to doctors, patients as well as laboratories. From the perspective of the patient, a random, non-fasting lipid profile is practical compared with a fasting lipid profile because it does not interfere with the patient's normal life and allows going to the laboratory for the blood draw at any time of the day (3). From the perspective of the laboratory, a fasting lipid profile is thought to be superior to a non-fasting one because it can be standardized and leads to slightly less variation in the measured analytes (5)
Fasting for >8 h, as required for lipid profiles, normally only occurs a few hours before breakfast. By contrast, the non-fasting state predominates most of the 24 hour cycle and better captures atherogenic lipoprotein levels (3). With developing knowledge base it is known that the body is exposed to lipids round the clock and fasting lipid profile values represent only the fraction that the body is exposed for 3-4 hours and during rest of the times body is exposed to non-fasting lipids. So, non-fasting lipid profile values ideally should be more indicative of status of health or disease (3, 4). Not many studies have been conducted in India to study the non-fasting lipid values in our population which accounts for 1/6th population of the world. This study intends to find the difference between fasting and non-fasting lipid profiles.

Materials and Methods
An observational cross sectional study was done on patients attending the Haasana Institute

Of Medical Sciences laboratory services, Haasana for regular health checkup with the approval of Institutional Ethical Committee on a pilot basis. After obtaining the informed consent from the patients, the blood samples given by the patients in fasting and post prandial state were analysed for Lipid Profile. Type of sampling employed was sampling of convenience and age group of patients was between 30 to 70 years. Out of 50 patients recruited for the study, 20 were males and 50 were females. Fasting and post prandial blood samples obtained from the patients using standard venepuncture technique were analysed for total cholesterol, triglycerides and HDL using ERBA EM 360 auto analyser. VLDL and LDL were calculated using Friedewald formula. Triglycerides/5 gives the VLDL value and TC-[HDL + VLDL] gives the value of LDL. The units for all the parameters of Lipid profile is mg/dL. The data collected was analysed by using graph pad prism version 9. The measured parameters were expressed as Mean ± Standard deviation. The parameters were compared using paired 't' test at 5% level of significance. P value<0.05 was considered statistically significant. Paired "t-test" was used because we measured lipid profile before and after food.

Results

A total of 50 patients of age between 30 to 70 years were involved in this study. The results obtained along with the graphs are as given below:

Table 1

Parmeters	Fasting Sample	Non Fasting state	P value
Total cholesterol	217 ± 49	214 ± 51	0.27
Triglycerides	240 ± 92	254 ± 91	0.0002
HDL cholesterol	52 ± 14	51 ± 15	0.4285
VLDL cholesterol	48 ± 18	51 ± 18	0.0003
LDL cholesterol	117 ± 46	112 ± 48	0.0948

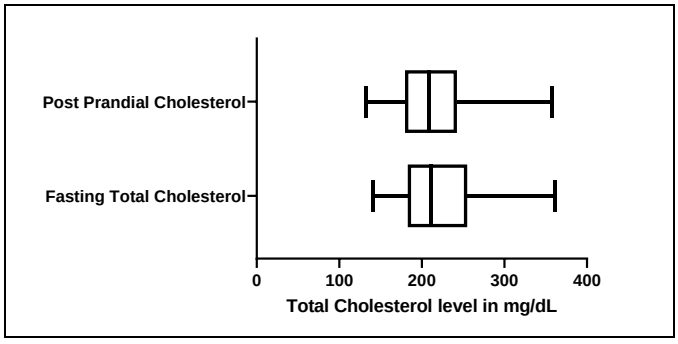

Fig 1

The mean Total cholesterol level in fasting sample is 217 with a standard deviation of 49, the mean Total cholesterol level in non-fasting sample is 214 with a standard deviation of 51 with p-value of 0.27.

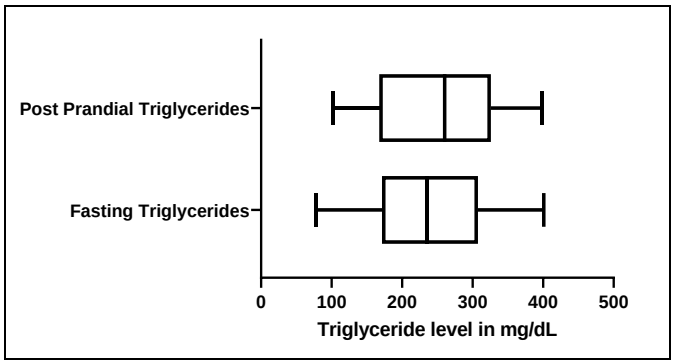

Fig 2

The mean Triglyceride level in fasting sample is 240 with a standard deviation of 92, the mean Triglyceride level in non fasting sample is 254 with a standard deviation of 91 with p-value of 0.0002.

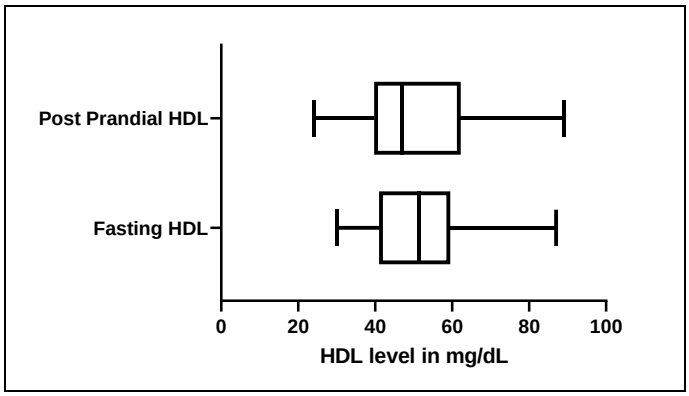

Fig 3

The mean HDL level in fasting sample is 52 with a standard deviation of 14, the mean HDL level in non-fasting sample is 51 with a standard deviation of 15 with p-value of 0.425

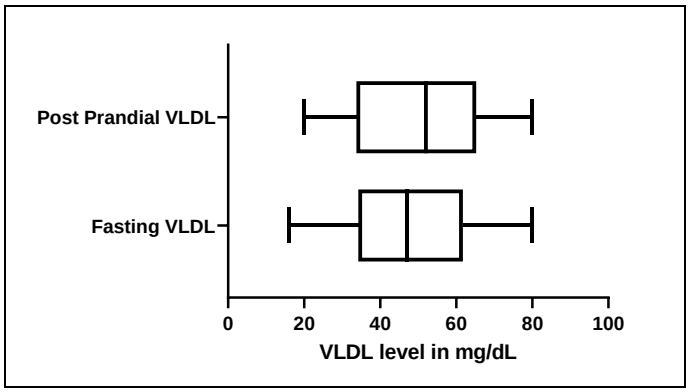

Fig 4

The mean VLDL level in fasting sample is 48 with a standard deviation of 18, the mean VLDL level in non-fasting sample is 51 with a standard deviation of 18 with p-value of 0.0003.

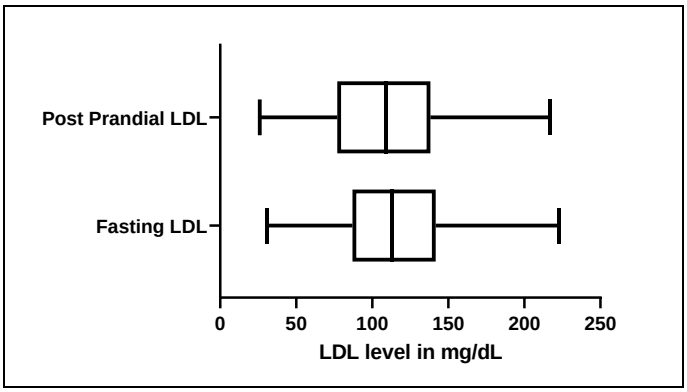

Fig 5

The mean LDL level in fasting sample is 117 with a standard deviation of 46, the mean LDL level in non-fasting sample is 112 with a standard deviation of 48 with p-value of 0.0948.

Discussion

This pilot study showed that there is no statistically significant difference between total cholesterol, HDL cholesterol and LDL cholesterol in fasting and post prandial state indicating that it should not make any difference whether the blood sample is collected in fasting state or non-fasting state for these three parameters.

Statistically significant difference was noted in fasting and post prandial levels of triglycerides and VLDL cholesterol indicating that fasting and non-fasting samples cannot be used interchangeably for these parameters. In our study, VLDL and LDL being calculated parameters; mainly depend on Triglycerides, Total cholesterol and HDL. Direct measurement of these two parameters could have added more strength to the statistical significance. Also as per the Friedewald formula, validity of calculated VLDL and LDL is not good whenever triglycerides level will be more than 400 mg/dL because of which patients with Triglyceride level more than 400 mg/dl in fasting or non-fasting state have not been included in the study.

Lynn E. Eberly, Jeremiah Stamler, James D. Neaton, et al in their study published in 2003 state that fasting and non-fasting triglycerides are similarly predictive for non fatal and fatal coronary artery disease[CAD](6). Robert H. Eckel in his article published in 2014 states that VLDL predicts coronary artery disease better as compared to Triglycerides (7). Wang H and Eckel R.H in their study published in 2009 state that fasting VLDL will usually miss out the VLDL remnants which are the produced from Chylomicrons by the action of lipoprotein lipase (8). From the above studies, it can be inferred that fasting and non-fasting triglycerides do not matter pertaining to prediction of CAD and VLDL predicts CAD better in non-fasting state.

Due to its convenience and better clinical value, many organizations across the globe have accepted the use of non-fasting lipid profile. The Danish Society for Clinical Chemistry recommended nationwide use of non-fasting lipid profiles in 2009, followed by similar endorsement in 2011 by the American Heart Association and, in 2014, by the U.K. National Institute for Health and Care Excellence guidelines and guidelines from Veterans Affairs and U.S. Department of Defense. This was followed by similar recommendations in 2016 by the European Atherosclerosis Society (3).

Conclusion

Irrespective of statistical significance, non-fasting lipid profile is better both technically and operationally with respect to convenience and feasibility and more advisable as our body is exposed to non-fasting state for more duration (3) as fasting state persists only for a short period of time after we wake up and even just a bed coffee or tea will further reduce the body's exposure time to fasting lipid levels. A well designed study with large number of subjects, random sample instead of post prandial sample and direct estimation of all the parameters of lipid profile would add on more credibility and validity for correlating the fasting and non-fasting lipid profiles.

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