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Comparison of Cardiovascular Risk by Lipid Profile Test in Fasting and Random Blood Samples

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ABSTRACT

Background –Cardiovascular risk can be assessed by estimation of Lipid Profile test in which estimation of total cholesterol (TC), low-density lipoprotein cholesterol (LDL-C) , triglycerides (TGs) , VLDL (increased level) and a linear decrease in high-density lipoprotein cholesterol (HDL-C) levels has been considered as increased cardiovascular risk [3].Ratio of Total Cholesterol to HDL level & LDL to HDL level, is of more importance & helpful in knowing cardiac risk. Routinely Fasting lipid Profile is advised for estimation but there can be variation in results & every time it is not possible for patients to remain fasting, due to overburden for laboratory during morning hours while collection of fasting sample. So, aim of this study is to compare & correlate between fasting & no fasting cardiovascular risk factors (any variation in ratio) in both fating condition & no fasting ie random blood samples.[4]

Materials & Methods – This study include about 100 patients attending the clinical Biochemistry OPD, IGGMC, and Nagpur. All patients who were attending biochemistry OPD for Lipid Profile tests were selected for this study. History was taken as per designed Performa and consent form was obtained. Their Fasting Blood samples was analyzed for lipid profile as well as random sample also taken & estimation of Nonfasting lipid profile test ie Serum cholesterol, Triglycerides, HDL,LDL & VLDL was done in clinical Biochemistry Laboratory & Ratio was calculated (CHO/HDL & LDL/HDL) to assess cardiovascular risk . All these tests were run on Autoanalyser EM 460. Serum values of Both Fasting & Non fasting lipid profile were compared, correlated and ratio was calculated to assess cardiovascular risk. The data was analyzed & Student's T-test was used for the correlation of values. P <0.05 was considered significant.

Result – Our results shows there is no statistically significant difference between fasting & Non fasting (Random) blood level of Serum lipid profile tests & Ratio of CHO/HDL & LDL/HDL which are used to assess cardiovascular risk. So, Nonfasting blood sample can be advised ie Random lipid profile tests can be done specially when it is inconvenient for patients to come empty stomache & to reduce overburdeon on laboratory during morning hours.

Conclusion – Results of our study indicates how the risk factors for coronary heart disease ie ratio of Total cholesterol to HDL & Ratio of LDL to HDL , doesn't show any statistically significant difference in fasting & Random ie nonfasting blood samples , so collection of sample in morning or random (nonfasting) doesn't make much difference in their prediction in diagnosis of cardiovascular risk.

Keywords: Lipid Profile Test & its Ratio, Cardiovascular risk, Fasting sample, Non Fasting(Random)

INTRODUCTION

Serum lipid profile is one of the most popular test used to estimate cardiovascular risk and has now become almost a routine test.[5] Lipid profile is a laboratory test performed to detect abnormalities in various blood cholesterol levels to diagnose its related disorders like heart failure.

Disturbed values often suggest an increased cardiovascular risk .So it is a screening tool for coronary heart disease. Lipid profile test includes 5 basic parameters - Total cholesterol & its components HDL cholesterol, LDL cholesterol ,VLDL cholesterol & Triglycerides usually all these test done in fasting blood sample.[6,7] Fasting blood samples have long been the standard for measurement of triglycerides & cholesterol as it is believed to reduce variability and allow for a more accurate deviation of

the commonly used friedewald formula .But fasting may not reflect daily average plasma lipids and lipoprotein concentrations and associated risk of CVD [8,9] Rather nonfasting state predominates most of a 24-hr cycle and better captures atherogenic lipoprotein levels. Many times it is observed that Diabetic patients experience a '' fasting evoked enroute hypoglycemic event due to long duration of fasting" for blood test, so this needed to shift practice.

Fasting blood test may be difficult for children. Because recently American academy of Paediatrics an NHLBI now recommend that children of age group 9-11 years should be screened for severe cholesterol abnormalities to detect familial hypercholesterolemia that can be lethal if not treated. Traditionally most laboratories have required patients to fast for 9-12 hours before screening so laboratories are already overburden during this time.So it will be convenient for both health care provider/lab and patients if there is not much variations in nonfasting lipid profile level compared to fasting.

In addition, recent studies suggest that postprandial effects do not weaken, and may even strengthen, the risk associations of lipids with cardiovascular disease (CVD). If postprandial effects do not substantially alter lipid levels or their association with cardiovascular risk, then a non-fasting blood draw has many practical and possibly economic advantages (10).

Objectives of the study

1) To compare nonfasting lipid profile level with fasting to observe any variation
2) To compare Ratio of CHO/HDL & LDL/HDL which are used to assess cardiovascular risk to see any variation of values in fasting as well as Random Blood samples
3) To assess clinical implications of the use of nonfasting rather than fasting lipid profile

Method of collection of data & selection of subjects:

About 100 patients coming to Biochemistry OPD ,IGGMC,Nagpur were selected for the study. Both male & female of age goup 25 to 55 years, nonalcoholic,nonsmoker, nondiabetic & nonhypertensive were included in the study. Their Fasting as well as Random blood samples were withdrawn for lipid profile estimation. About 5 ml intravenous blood sample was withdrawn in plain bulb (both fasting & postmeal) & send to clinical biochemistry laboratory for estimation of Serum Triglyceride,Total cholesterol, HDL – cholesterol & non HDL Cholesterol ie LDL & VLDL cholesterol. All parameters analysed on ERBA XL 460 Autoanalyser machine by following kit methods and their results were compared (fasting vs nonfasting) .

Methods

For Serum Cholesterol Estimation - Kit based on CHOD-POD method (Autoanalyser) (Normal range – 150 mg% to 200 mg%)

For Serum Triglycerides Estimation - Kit based on GPO method (Autoanalyser) (Normal range – 75 to 200 mg %)

For Serum HDL-Chol Estimation – Kit based on Precipitation method (Autoanalyser) (Normal range – 35 mg% to 60 mg%)

For Serum VLDL & LDL Estimation - Friedwald Formula VLDL = TG/5 & LDL = CHO – (HDL+VLDL)

Ratio was calculated for Total Cholesterol / HDL (>5 cardiovascular risk, 3-5 intermediate risk)

Analysis was carried on Autoanalyser EM – 460 in clinical Biochemistry lab, IGGMC for Serum cholesterol, Triglycerides, HDL,LDL & VLDL . All estimations were done & their values were compared & correlated.

Results

Table : Mean Values of Lipid Profile Test & Ratio

	Cholesterol (mg%)	Triglycerides (mg%)	HDL (mg%)	VLDL (mg%)	LDL (mg%)	CHO/HDL	LDL/HDL

Volume 2, Issue 6; November-December 2019; Page No.129-133

Fasting (Mean)	172.44	138.72	55.46	26.02	96.39	3.285	1.786
Nonfasting (Mean)	177.18	130.73	54	30.74	91.04	3.270	1.693
P value (>0.005 NS)	0.49	0.31	0.30	2.34	3.35	0.562	0.0003

Discussion

Results of our study shows Clinically insignificant changes ; negligible changes for high-density lipoprotein (HDL) cholesterol; slight changes (up to 5 mg/dL) for total cholesterol, LDL cholesterol, and VLDL cholesterol; and modest changes (up to 8 mg/dL) for triglycerides . Ratio of Total cholesterol to HDL in fasting is 3.285 while in Random (nonfasting) is 3.270 , so there is not much statistical difference in their values.

Recently, in 2016, the European Atherosclerosis Society and the European Federation of Laboratory Medicine recommended using non-fasting lipid testing for routine clinical practice and provided specific cut-points for desirable fasting and non-fasting lipid levels (9,10). Elevated non-fasting triglycerides were defined as ≥175 mg/dL (≥2 mmol/L) (12,13), and repeat measurement of fasting triglycerides were suggested when non-fasting levels are greater than ~400 mg/dL (15,16).

Non-fasting lipids would be more economical and safer for certain groups of patients, such as diabetics. In fact, according to a pilot study by Aldasouqi *et al*. up to 27.1% of diabetic patients experience a fasting-evoked en-route hypoglycemic event due to fasting for blood tests. These events are vastly under reported and add considerably to patient morbidity, suggesting that a shift in practice is mandated for these patients.

However, levels of nonfasting triglycerides are better at predicting future cardiovascular events than levels of fasting triglycerides. levels of total cholesterol, low-density lipoprotein (LDL) cholesterol, high-density lipoprotein (HDL) cholesterol, non-HDL cholesterol, triglycerides and the ratios of total cholesterol to HDL cholesterol change only minimally in response to normal food intake in individuals in the general population. From the EAS and EFMS Joint Commission Statement, EHJ March 15, 2016. [Nordestgaard BG, Langsted A, Mora S, *et al*.] Fasting is not routinely required for determination of a lipid profile:

If nonfasting rather than fasting lipid profiles for cardiovascular risk prediction were used, it would simplify clinical care for patients worldwide. Because we detected only minimal changes in levels of lipids in fasting and nonfasting levels, changes that are clinically unimportant, and nonfasting levels also predict cardiovascular events.

Conclusion

In summary, results of our study suggest the use of non-fasting blood draws for routine clinical practice favorable for both patients and healthcare providers. The fasting panel now has a much more limited role. For the majority of patients, the non-fasting test is safe, convenient. Many countries are currently changing their guidelines towards a consensus on measuring a lipid profile for cardiovascular risk prediction in the nonfasting state, simplifying blood sampling for patients, laboratories, and clinicians worldwide.

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Volume 2, Issue 6; November-December 2019; Page No.129-133

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Volume 2, Issue 6; November-December 2019; Page No.129-133

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Volume 2, Issue 6; November-December 2019; Page No.129-133