

To Fast or Not to Fast? Choosing the Best for Serum Lipid Profile

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THE STUDY: *Arch Intern Med* 2012; 172(22):1707-1710. Davinder Sidhu, Christopher Naugler. Fasting Time and Lipid Levels in a Community-Based Population Cross-sectional Study.

BACKGROUND

Serum lipid profile is a common investigation. Numerous guidelines recommend sampling in the fasting state for cardiovascular risk assessment [1, 2] as the levels of triglycerides vary greatly in the non-fasting state. Furthermore, the LDL levels, calculated by the Friedewald equation ($\text{LDL cholesterol} = \text{total cholesterol} - \text{HDL cholesterol} - [\text{triglycerides}/5]$) may be underestimated if fasting triglyceride levels are not used.

Fasting for 12-14 hours (and definitely more than 8 hours) is not only cumbersome and unpleasant for patients, but may result in limited compliance to disease monitoring and treatment. This may expose at-risk patients to increased risk of adverse cardiovascular outcomes [3].

WHY WAS THE STUDY CONDUCTED?

In some recent studies, non-fasting lipid levels were better predictors of adverse cardiovascular outcomes than fasting lipid levels. In a prospective study done in the US, non-fasting triglycerides maintained an independent relationship with adverse cardiovascular events compared to fasting levels [4]. The study also showed that non-fasting levels changed minimally in response to food intake. The large-scale Copenhagen prospective cohort study, which had a patient follow-up for up to 26 years, drew similar conclusions [5].

Sidhu et al hypothesized that lipid levels would not vary significantly by the duration of the fasting period. Previous studies examining the same hypothesis were much smaller and thus a large-scale study to determine the association of fasting duration with lipid levels was conducted.

THE STUDY

It was a cross-sectional study conducted in

Canada over a 6-month period in 2011 in a large community-based cohort. The final sample size consisted of 209,180 individuals. Total cholesterol, triglycerides, LDL and HDL were measured after various fasting durations, from 1 hour to more than 16 hours. Authors used linear regression to estimate the mean levels of cholesterol subclasses after different fasting periods.

- HDL and triglycerides were measured directly while LDL was calculated using the Friedewald equation.
- Time since last meal (fasting duration in hours) was obtained by self-report. Fasting durations were stratified into intervals from one to 16 hours. Duration longer than 16 and less than one hour was included in the 16 and 1 hour categories. Records with missing data on fasting times were excluded as were records with triglyceride levels greater than 400 mg/dl. Age was categorized into 5-year intervals. Individuals greater than 80 years were categorized into one group.
- Fasting duration varied as a function of age and sex. To control for these effects, data for males and females was analyzed separately.
- For each sex, linear regression models were constructed with cholesterol levels as dependent variables and age and fasting duration as independent variables.
- After calculation of estimated marginal means at 95% confidence interval for each lipid component at each fasting period, statistical significance was assessed by comparing cholesterol measurements obtained at 9-12 hours and more than 8 hours with all other fasting time intervals.

WHAT DID THE STUDY FIND?

The mean cholesterol subclass levels varied by

- less than 2% for total cholesterol and HDL cholesterol
 - less than 10% for calculated LDL cholesterol
 - less than 20% for triglycerides
- Statistically significant differences among chole

-terol subclass levels were present only for a minority of fasting intervals when compared with either 9-12 hour fasting time or a greater than 8 hour fasting time.

LEARNING POINTS FROM THE STUDY

Sidhu and Naugler concluded that fasting correlated little with lipid subclass levels and thus fasting for this test is largely unnecessary. This finding is in accordance with recent studies and has the advantage of having a larger sample size.

Fasting for a long time prior to the test is inconvenient for patients; this has been shown to decrease compliance towards treatment and thus increasing propensity towards adverse cardiovascular outcomes [3]. Measurement of non-fasting lipid levels reduces this inconvenience and will likely improve patient compliance towards lipid testing and lipid lowering therapies.

In a study done by Mora et al, non-fasting triglyceride levels after 4 hours were deemed to be better predictors of cardiovascular outcomes [6]. HDL cholesterol, total/HDL ratio and apo A-1 levels also predict cardiovascular risk better when measured in a non-fasting state.

Studies reveal postprandial triglyceride levels and decreased HDL together to be better predictors of insulin resistance and thus type 2 diabetes mellitus [7]. This has a twofold benefit; it can identify dyslipidemia, can raise the suspicion of coexistent type 2 diabetes and insulin resistance, and thus, can be used as a screening tool for patients.

The greatest difficulty encountered during fasting for the lipid profile is by diabetics, the elderly, and by those who are seriously ill. Non-fasting lipid levels will come as a blessing for such patients.

LIMITATIONS

The study has several limitations. First, the individual meal choices prior to sample withdrawal were not assessed. Second, recall errors for self-reported fasting times can affect true effect size estimate. Third, due to a lack of patient outcome data, the predictive value of fasting versus non-fasting levels on adverse cardiovascular outcome cannot be assessed. Fourth, history on recent lipid lowering medications was not obtained; a past study did conclude that patients taking lipid-lowering therapy did not differ in lipid subclass levels

when compared with controls for fasting versus non-fasting times [4]. Last, the study sample consisted of all individuals presenting to the laboratory for cholesterol testing; it was not a random sample drawn from the population.

Further studies addressing these limitations will provide more authenticity for these findings and may guide clinical practice towards non-fasting lipid profiles in the future.

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