The Egyptian Journal of Hospital Medicine (July 2024) Vol. 96, Page 3399-3402

# Magnitude of Difference between Fasting and Non-Fasting Triglycerides in Healthy Population

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## ABSTRACT

**Objectives:** Elevation of TGs levels has been involved in the pathogenesis of cardiovascular disease (CVD), so the regular assessment of its level is very important. **Objective:** This study aimed to compare the levels of TGs in fasting and non-fasting situation in same individual. **Methods:** In one hundred normal subjects, TGs levels were compared in fasting and non-fasting status in relation to sex, age, BMI, smoking, duration of fasting, and fat content in last meal. **Results:** The only independent predictor for high non-fasting TGs level was the fat content in the last meal (p: 0.003). **Conclusion:** High fat content in the last meal significantly elevates TGs level in comparison with fasting level in same individual.

**Keywords:** Fasting, Triglycerides, Healthy.

## INTRODUCTION

High triglycerides (TGs) levels during fasting status (>150 mg/dl) are associated with cardiovascular disease (CVD), and it is a criterion for the diagnosis of metabolic syndrome and is commonly found in patients with type 2 diabetes [(1)]. Chronic elevation of fasting TGs in the absence of a genetic lipid disorder is associated with metabolic disturbance, as prolonged positive energy balance resulting in weight gain, increased adipose tissue, and hepatic steatosis [(2)].

Measuring TGs is also used to calculate low-density lipoprotein (LDL), which is unlikely directly measured and it may be underestimated if fasting TGs are not used [(3)]. Fasting TGs levels has been long used to predict CVD and for regular general health checkup [(4)], the increased levels of TGs after a meal has become increasingly examined due to the epidemiological evidence that non-fasting TGs that is measured within 8 hours of unstandardized meal can be used instead in routine assessment of plasma lipid profiles [(5)], which can improve time of screening as patient can do their test anytime in the day and just after visiting their physicians, and avoid any complication that can rise from fasting in diabetic patients [(6)].

Many factors can affect the level of TGs in the non-fasting status including physical activity, time since last meal, and the meal fat content and that's explain why fasting measurement has been the standard practice for assessing TGs level [(7)].

## MATERIALS AND METHOD

Our study was performed during the period from June 2023 to December 2023 in Clinical Pathology Department, Al-Ahrar Teaching Hospital. This study included one hundred normal adult subjects, whom TGs level was measured in fasting (at least 8 hours of fasting) and then measured in non-fasting state (last meal was less than 8 hours).

After taking medical history of the participants and blood biochemistry were evaluated to exclude chronic disease affecting lipid metabolism also treatment with drugs that affect TGs level were excluded.

Each participant was asked about history of smoking, special habits and lifestyle activity. Also, fat content in last meal before the non-fasting sample and BMI of each participant were calculated.

Blood samples were collected from all participants, for TGs levels once after fasting (8-12 hours) and then within 8 hours of last meal, the content of last meal is calculated by using my fitness pal: calorie counter application [(8)], and categorized as low, medium, and high. High: More than 17.5 g of fat per 100 g, medium: Less than 17.5g and more than 3 g of fat per 100 g and low: 3 g of fat or less per 100 g [(9)].

Serum of the participants was examined for TGs level by enzymatic method using dimension xpand plus® analyzer.

**Ethical approval:** An informed consent was obtained from each subjects. The study was approved by The Ethical Committee of Al-Ahrar Zagazig Teaching Hospital and Zagazig University. The study was conducted in accordance with Declaration of Helsinki.

### Statistical analysis

Data were analyzed using SPSS version 16, mean values were calculated for all continuous findings of the values along with their standard deviation to study the difference. Paired sample T-test was used to assess the difference between fasting and non-fasting TGs levels. Difference was considered statistically significant at $p \leq 0.05$. Univariate regression analysis was used to predict high non-fasting TGs test.

## RESULTS

As shown in table (1), among one hundred patient studied, 51 patients (51%) were males, 36% were active smokers, 44% had low daily activity. Twenty-two patients (22%) had high fat content in the last meal. Time since last meal was 2.98 ± 1.614 hours. Serum non-fasting triglycerides was 113.15 ± 21.946 mg/dl. However, after fasting of those subjects, their serum triglycerides level was 88.85 ± 15.339 mg/dl.



Received: 30/03/2024
Accepted: 30/05/2024

**Table (1):** Baseline characteristics of the studied patients.

| | All patients (n=100) |
|---|---|
| **Demographic characteristics** | |
| **Male sex, n (%)** | 51 (51%) |
| **Age (years)** | 35.67±10.636 (16-55) |
| **BMI (kg/m$^2$)** | 28.86 ± 5.039 (18-39) |
| **Smoking** | 36 (36%) |
| **Clinical characteristics** | |
| **Activity:** | |
| **High** | 16 (16%) |
| **Medium** | 40 (40%) |
| **Low** | 44 (44%) |
| **Fat content in last meal** | |
| **High** | 22 (22%) |
| **Medium** | 54 (54%) |
| **Low** | 24 (24%) |
| **Time since last meal (hours)** | 2.98±1.614 (1-6) |
| **Laboratory characteristics** | |
| **Serum non fasting TGs (mg/dl)** | 113.15±21.946 (70-170) |
| **Serum fasting TGs (mg/dl)** | 88.85±15.339 (65-120) |

BMI: Body mass index; TGs: Triglycerides

There was non-statistically significant negative correlation between fasting triglyderides level and time since last meal ($R^2$: 0.014, P: 0.237) as shown in figure (1).

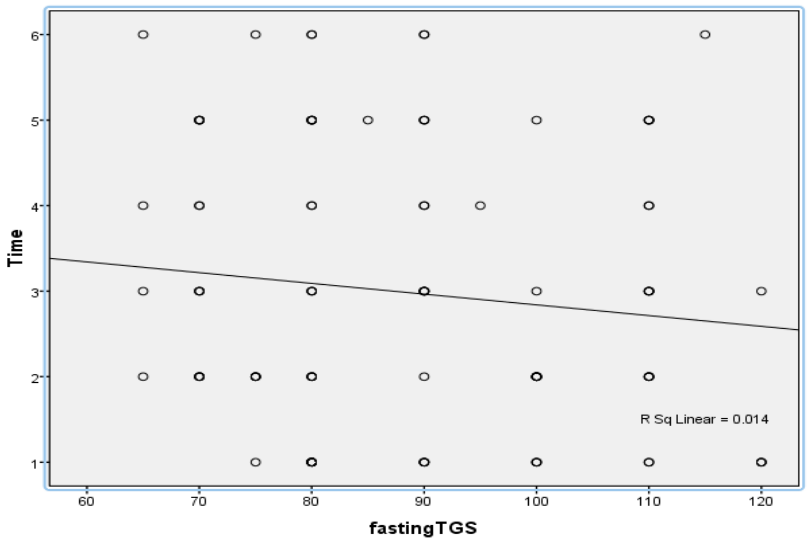


**Figure (1):** Correlation between fasting triglyderides level and time since last meal.

By applying paired sample t-test (Table 2), there was statistically highly-significant difference between fasting and non-fasting TGs level (P<0.001) as fasting levels were significantly lower.

**Table (2):** Paired sample t-test assessing the difference between fasting and non fasting triglycerides level (Paired Samples test)

| | | Paired Differences | | | | | t | df | Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference | | | | |
| | | | | | Lower | Upper | | | |
| Pair 1 | Non-fastTGS - FastingTGS | 24.300 | 12.753 | 1.275 | 21.770 | 26.830 | 19.054 | 99 | <0.001 |

By applying univariate regression analysis, the only independent predictor for high non-fasting TG level was the fat content in the last meal (P: 0.003) as shown in table (3).

**Table (3):** Univariate regression analysis to predict high non-fasting triglycerides level Coefficients[a]

| Model | | Unstandardized coefficients | | Standardized coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 11.178 | 10.446 | | 1.070 | .287 |
| | Age | .426 | .212 | .207 | 2.011 | .417 |
| | BMI | .059 | .342 | .014 | .173 | .863 |
| | Time | .239 | .786 | .018 | .304 | .762 |
| | Fat | .923 | 122 | 312 | 6.356 | 0.003 |

a. Dependent Variable: nonfast-TGS.

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## DISCUSSION

TGs level is one of the tests used in lipid profile, which is contributed to CVD [(10)]. It has been a usual practice to measure TGs after 8-12 hours of fasting to avoid the effect of post-prandial lipemia [(11)]. There have been many studies regarding the use of non-fasting TGs in routine checkups and as screening for CVD [(12)] as it is more simple and economic for patient and suitable for diabetic patients and children [(13)]. And many organizations as American Heart Association, Eurobian Atherosclerosis Society, Danish Socity for Clinical Chemistry, and others recommend the use of non-fasting lipid profile [(14)].

In this study we showed that there was a significant difference between fasting and non-fasting TGs level in same individual, there was a significant increase in the non-fasting TGs compared to fasting TGs. Difference in the fasting and non-fasting TGs was also shown in studies done by **Langsted *et al.*** [(15)], **Sundvall *et al.*** [(16)] and **Shetty *et al.*** [(17)].

The increase in TGs levels in the non-fasting state was related directly to the fat content in the last meal befor the non-fasting sample, while normal food intake has been shown to increase non-fasting TGs levels insignificantly.

## STRENGTH AND LIMITATIONS

There was several limitations of the present study sample since it was relatively small, which might have contributed to borderline significance so larger sample sized studies are needed in the future. But, the major advantage in our study was that we compared the fasting and non-fasting TGs levels in the same individual and that we collected detailed data about last meal before the non-fasting sample to calculate the fat content in it, and the study involved young to middle aged persons and we took in consideration other factors that may influence the difference between fasting and non-fasting TGs levels as physical activity and BMI.

## CONCLUSION

The difference found between the fasting and non-fasting TGs evels was only contributed to the high fat content in the last meal before the non-fasting sample that was drawn. It could not be a limitation for establishin the use of non-fasting TGs test in regular check ups and for screening of CVD as long as we took in consideration to have a proper history about the last meal befor taking the sample and warned the patient about the effect of high fat content on the result and it could be repeated in the fasting state.


- **Sources of funding:** Funding institutions in the public, commercial, or nonprofit sectors did not award a specific grant for this research.
- **Conflicts of interest:** There were no conflicts of interest according to the authors.

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