

Postprandial Hypertriglyceridemia as an Independent Risk Factor for Ischemic Heart Disease

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Abstract

Introduction: Atherosclerosis is the leading cause of death and disability in the developed world. Despite our familiarity with this disease, some of its fundamental characteristics remain poorly, recognized, and understood.

Aim: To study the relation between risk factors for atherosclerosis using fasting and postprandial triglyceride (TG) levels in patients of unstable angina.

Materials and Methods: Observational prospective study on unstable angina patients not on treatment was assessed on serum cholesterol, serum TG, high-density lipoprotein (HDL), low-density lipoprotein (LDL), very LDL, postprandial 2 h glucose, 4 h blood samples for TGs levels.

Results: Postprandial hypertriglyceridemia was found in 64%, 52% had high body mass index, 7.3% patients had high waist-hip ratio, and 64% patients had diabetes mellitus.

Conclusion: Increased TG level is a risk factor for cardiovascular disease independent of HDL cholesterol level.

Key words: IHD, Hypertriglyceridemia, risk factors

INTRODUCTION

Atherosclerosis is the leading cause of death and disability in the developed world.¹ Despite our familiarity with this disease, some of its fundamental characteristics remain poorly, recognized, and understood.² Although many generalized or systemic risk factors predispose to its developments, atherosclerosis affects various regions of the circulation preferentially and yields distinct clinical manifestations depending on the particular circulatory bed affected. The association between atherosclerotic diseases and elevated fasting plasma low-density lipoprotein (LDL)-cholesterol and reduced fasting

plasma high-density lipoprotein (HDL)-cholesterol is well established.³⁻⁶ However, many individuals without fasting lipid abnormalities develop atherosclerotic diseases and several lines of evidence suggest that non-fasting lipid measurements may be more relevant to atherogenesis.^{7,8}

Aim

To study the relation between risk factors for atherosclerosis using fasting and postprandial TG levels in patients of unstable angina.

MATERIALS AND METHODS

The observational prospective study was conducted in Department of Medicine, Government Mohan Kumaramangalam Medical College Hospital. Approval from Institutional Ethics committee and informed consent from patients were obtained. Patients with unstable angina diagnosed on classical anginal chest pain or anginal chest pain equivalent with electrocardiogram showing ST-

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segment depression in two consecutive chest leads or limb leads and normal serum creatine phosphokinase-MB levels, fasting serum triglycerides (TGs) <150 mg%, fasting serum cholesterol <180 mg% were included in the study. Patients already on treatment for lipid lowering agents, suspected case of Prinzmetal's angina, Rheumatic heart disease, oral contraceptive pills, or other hormone therapy were excluded from the study. Selected patients completed history was taken complete physical and cardiovascular system examination was performed. Laboratory tests serum cholesterol, serum TG, HDL, LDL, very LDL, postprandial 2 h glucose, 4 h blood samples for TGs levels were done.

RESULTS

A total of 100 patients were included in this study, out of 56 were male and 44 were female. Only 17 female patients are aged <46 years. There were 46 patients in age group 46-55, out of which 27 were male and 19 were female. 32 male and 25 female patients were hypertensive and 34 male and 30 female were diabetes (Table 1).

In our study, 40 patients were overweight, 52 were obese, and only 8 patients had normal weight. 25 male (62.5%) were overweight, 26 male (50%) were obese, 5 male (62.5%) had normal weight. In 44 females, 15 females (37.5%) were overweight, 26 females (50%) were obese, 3 females (37.5%) had normal weight.

About 71% of male and 75% of female patients had high waist-hip ratio (WHR). Out of 100 patients, 64 patients showed serum TG levels >160 mg% after 4 h of meal. 34 out of 56 male patients (60.7%) and 30 out of 44 female (68.18%) showed postprandial hypertriglyceridemia. In this study, 58 patients had low fasting HDL level (<40 mg% in male <50 mg% in female), 36 out of 56 male (64.28%) and 22 out of 44 female (50%) had low fasting HDL level.

In this study, out of 100 patients 64 had postprandial hypertriglyceridemia. Out of 64, 44 had low fasting serum HDL and 20 had normal fasting serum HDL. While 36 patients had normal postprandial serum TG level, out of 36, 14 had low fasting serum HDL and 22 had normal fasting serum HDL. There is no relation found between HDL level and high PP4TG levels ($P = 0.341$) (Table 2).

In this study, out of 76 patients having high WHR; 62 (81.5%) had high PP4TG, while 14 had normal PP4TG. Out of 24 normal WHR patients, 2 had high PP4TG (Table 3).

In this study, out of 32 patients having a high body mass index (BMI), 38 patients (73.07%) had high postprandial TG levels. While out of 40 patients had (60%) high postprandial

TG levels. Moreover, 2 patients out of 8 patients (25%) having normal BMI had high PP4TG levels (Table 4).

In this study, 64 patients had high postprandial serum TG level, out of 64 patients 55 were diabetic. Only 9 patients were not diabetic. In the remaining 36 patients who had normal postprandial S. TG level, 13 were diabetic and 23 were non-diabetic. There was strong association found between diabetes mellitus and high PP4TG levels ($P < 0.0001$) (Table 5).

DISCUSSION

In this study, 69% patients were aged <55 years, while 75% female and 62% male were aged <55 years. This finding

Table 1: Age distribution according to gender

Age	Male	Female	Total
35-45	6	17	23
46-55	27	19	46
56-65	16	5	21
>66	7	3	10
Total	56	44	100

Table 2: Distribution according to PP4TG and HDL

PP4TG	Normal HDL	Low HDL	Total
Normal	22	14	36
High	20	44	64
Total	42	58	100

HDL: High-density lipoprotein

Table 3: Distribution according to WHR and PP4TG

WHR	Normal PP4TG	High PP4TG	Total
Normal	22	2	24
High	14	62	76
Total	36	64	100

WHR: Waist-hip ratio

Table 4: Distribution according to BMI and PP4TG

BMI	Normal PP4TG	High PP4TG	Total
Normal	6	2	8
Overweight	16	24	40
High	14	38	52
Total	36	64	100

BMI: Body mass index

Table 5: Distribution according to diabetes and PP4TG

Diabetes	Normal PP4TG	High PP4TG	Total
Absent	23	9	32
Present	13	55	68
Total	36	64	100

shows that middle age patients are more likely to be selected for study like the present study. In Iso *et al.*⁹ study, 55% were male and 45% were female, average age was 55.1 ± 6.3 years. In that study, the majority of patients were from middle age group. In our study, 40% of patients were overweight, 52% of patients were obese, according to the National Institute of Health Definition. The mean BMI was 30.08. The mean BMI in normal PP4TG group was 28.90 and high PP4TG group was 30.87, so there is strong correlation found between high BMI and high PP4TG. In Iso *et al.*⁹ study, the mean BMI was 28.08. The mean WHR in normal PP4TG group was 0.968 and high PP4TG group was 1.028, so there is strong correlation found between high WHR and high PP4TG. In Couillard *et al.*¹⁰ study, on postprandial TG response in visceral obesity showed that obesity and WHR are associated with impaired postprandial TG clearance. In our study, 64% were diabetic of which 62.5% of male were suffering from diabetes mellitus, whereas 68.18% females were diabetic. The mean fasting blood sugar (FBS) in normal PP4TG group was 80.30 and high PP4TG group was 168.90, so there is strong correlation found between high FBS and high PP4TG. The mean PP2BS in normal PP4TG group was 174.30 and high PP4TG group was 226.46, so their correlation found between high PP2BS and high PP4TG. In Iso *et al.*⁹ study, 52.1% patients were diabetic. A study done by Axelsen *et al.*,¹¹ on postprandial hypertriglyceridemia and Type-2 diabetes showed postprandial lipid intolerance despite having normal fasting TG level and increased risk of macroangiopathy. In this study, out of 100 patients, 64 patients showed serum TG level more than 160 mg% after 4 h of meal. 34 out of 56 male patients (60.7%) and 30 out of 44 females (68.18%) showed postprandial hypertriglyceridemia these data tells that patient having ischemic heart disease, even if they have normal fasting TG levels, they might have impaired postprandial lipid metabolism. The mean PP4TG was 181.47 mg% suggest that there is an association between coronary artery disease and PP4TG levels and the relative risk was 1.75. In Iso *et al.*⁹ study, 58% male and 64% female patients showed postprandial hypertriglyceridemia. In Nordestgaard *et al.*¹² study on non-fasting TGs and risk of myocardial infarction, ischemic heart disease and death in men and women showed that non-fasting TG levels independently predict myocardial infarction, ischemic heart disease, and death. In our study 57 patients were hypertension. 32 male patients (57.14%) were hypertensive and 25 female (56.81%) were hypertensive. The mean systolic blood pressure in normal PP4TG group was 129.88, high PP4TG group was 141.84, and the mean diastolic blood pressure in normal PP4TG group was 84.16, and the high PP4TG group was 88.51, so there is strong correlation found between hypertension and high PP4TG. In Kolovou

*et al.*¹³ study on postprandial lipemia in hypertension suggest that patient with hypertension have an exaggerated response and delayed clearance of plasma TG lipase concentration.

CONCLUSION

There is a positive correction between high WHR, diabetes mellitus and postprandial hypertriglyceridemia in ischemic heart disease patients. Non-fasting TG levels indicate the presence of remnant lipoproteins, which may promote atherosclerosis. Postprandial hypertriglyceridemia may be an independent risk factor for atherosclerosis in ischemic heart disease patients. Evaluation of postprandial TG levels is important during the assessment of ischemic heart disease patients.

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