

Serum Fibrinogen Levels and its Relation to Hypertension

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Abstract

Background: Fibrinogen has been identified as major independent risk factor for cardiovascular disease. Fibrinogen levels (FLs) in our hypertensive Kashmiri population have not been studied so far.

Aims and Objectives: To compare serum FL in hypertensive with non-hypertensive patients in Kashmiri ethnic population.

Materials and Methods: It was a prospective, hospital-based, non-randomized study. The study was conducted for a period of 18-month from August 2011 to January 2013. Fibrinogen detection was done as per standard guidelines.

Results: The total number of patients included in our study were 101 in which females were 65 (64.35%) and males were 36 (35.64%). The mean age for males was 57.5 years and females was 54.6 years. Total numbers of hypertensive patients were 64 and non-hypertensive were 37. There was no significant difference in mean serum FLs in patients with and without hypertension (4.465 g/l vs. 4.666 g/l. $P = 0.552$).

Conclusion: There is no association of FLs and hypertension in our population. Further prospective studies with larger sample size are needed to fully elucidate the relationship between FLs and Hypertension in our population.

Key words: Fibrinogen, Hypertension, Risk Factor

INTRODUCTION

Fibrinogen is a recognized risk factor for macrovascular disease and increased levels may exert effects through a variety of mechanisms including increased blood viscosity, increased size of fibrin clots, increased tissue deposition and stimulation of atherosclerosis, and vascular thickening thus involved in the pathogenesis of thrombotic cardiovascular events.¹⁻⁵ Various studies have tried to studied association of fibrinogen with hypertension in which few are showing positive association⁶⁻¹⁵ and few are showing negative association between two.^{2-5,16,17} As in Leigh study, which suggest that fibrinogen levels (FLs) may affect

prognosis in hypertension in which hypertensive patients with plasma fibrinogen above 3.5 g/L had a 12-fold greater coronary risk than those with fibrinogen below 2.9 g/L.¹⁸ These and other clinical and laboratory observations have led to the hypothesis that hypertension per se may confer a hypercoagulable state^{19,20} that might be related to the development of target-organ damage and long-term prognosis.²¹ On other hand, in the biracial atherosclerosis risk in communities study, the prospective association between plasma FL and incident hypertension is still not clear.²² Thus, to investigate further any possible relationship between serum FLs and hypertension, we evaluated serum FL in both hypertensive and non-hypertensive patients in Kashmiri ethnic population.

MATERIALS AND METHODS

This was a prospective, hospital-based, non-randomized study of 101 cases which was conducted at the Department of Ophthalmology, Government Medical College Srinagar,

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Kashmir, India. The study was conducted for a period of 18-month from August 2011 to January 2013. The study was approved by the Institutional Ethics Committee.

Inclusion Criteria

- Known cases of hypertension.

Exclusion Criteria

- Patients taking anticoagulants
- Inherited diseases which cause either hypercoagulability or bleeding tendencies
- Patients with severe liver, cardiac, or renal failure
- Systemic illnesses altering the blood coagulation profile.

Based on the status of hypertension, two groups for comparison were made cases and control:

1. Group 1: Cases with hypertension
2. Group 2: Control without hypertension.

Estimation of Plasma Fibrinogen

Test principle

In presence of excess of thrombin, the clotting time of diluted plasma has a direct bearing on the level of plasma fibrinogen.^{23,24}

Procedure

Specimen collection and treatment was done as per standard guidelines described by us previously.²⁵

Statistical Analysis

Statistical software GraphPad InStat-3 was used for statistical analysis. The statistical method involved included independent student *t*-test for normally distributed continuous variables, the Pearson Chi-square test for categorical variables, and ANOVA was used for comparison of more than two continuous variables. The data were expressed as mean (\pm standard deviation) and percentage values, and $P < 0.05$ was considered statistically significant.

RESULTS

The total number of patients included in our study where 101 in which females were 65 (64.35%) and males were 36 (35.64%). The mean age for males was 57.5 years and females was 54.6 years, 66.33% of cases in our study were between 41 and 60 years of age (Table 1 and Figure 1). Total numbers of hypertensive patients included in the study group were 64 and total number of patients without hypertension which were included in the control group were 37. In our study, mean serum FLs in patients with hypertension were 4.465 g/l and mean serum FLs in patients without hypertension were 4.666 g/l. There was not a statistically significant difference between the mean

serum FLs of patients with and without hypertension $P = 0.552$ (Table 2 and Figure 2). In our study, difference in the mean serum FL of male (4.079) and female (4.794) seems to be significant as $P = 0.033$, but the statistical result was underpowered, thus statistical significance between two groups is questionable and can be due to the fact that female patients outnumbered male patients in our study population. The maximum number of patients attending the OPD for an ophthalmic checkup was urban dwellers 68.31% in comparison to rural 31.68%. The relationship of serum FL was found to be statistically insignificant with the geographical distribution of population $P = 0.754$ (Table 3 and Figure 3).

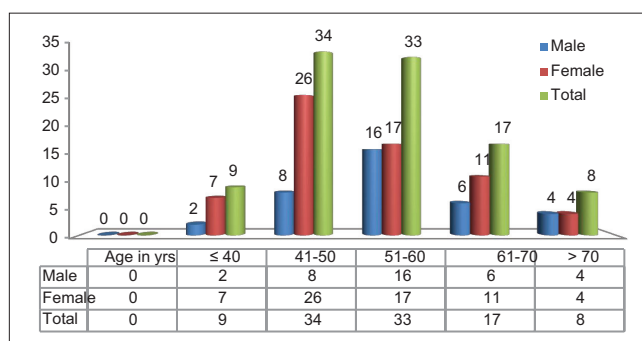


Figure 1: Age and gender distribution

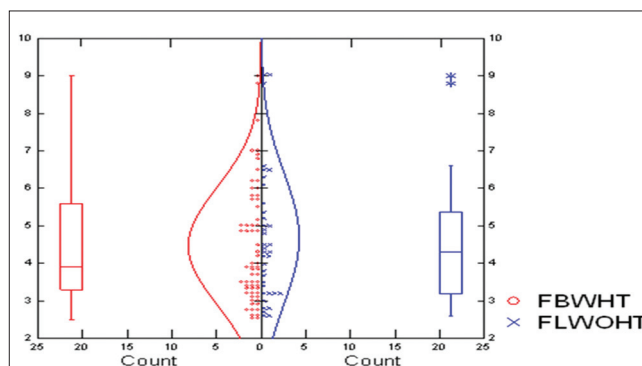


Figure 2: Two-sample t-test

Table 1: Age and gender distribution of the studied subjects

Age in year	n (%)			P value
	Male	Female	Total	
≤40	2 (5.55)	7 (10.76)	9 (8.91)	0.204 (NS)
41-50	8 (22.22)	26 (40.00)	34 (33.66)	
51-60	16 (44.44)	17 (26.15)	33 (32.67)	
61-70	6 (16.66)	11 (16.92)	17 (16.83)	
>70	4 (11.11)	4 (6.15)	8 (7.92)	
Total	36 (35.64)	65 (64.35)	101 (100)	
Mean±SD	57.5±10.8	54.6±11.0	55.6±11.0	
(max, min)	(32, 80)	(35, 80)	(32, 80)	

SD: Standard deviation, NS: Not significant

Table 2: Serum FLs of patients with and without hypertension

Variable	n	Mean	SD	Mean difference	95% CI		Cal.t	Df	P value
					Lower limit	Upper limit			
Fb with HT	64	4.465	1.563	-0.201	-0.868	0.466	-0.598	99	0.552
Fb without HT	37	4.666	1.736						

t (Cal)=-0.598 with 99° of freedom (P=0.552), SD: Standard deviation, CI: Confidence interval

Table 3: Relationship of FLs with urban and rural population

Dwelling/ geographical status	n (%)			FL (mean±SD)
	DR present	DR absent	Total	
Urban	34 (49.27)	35 (50.72)	69 (68.31)	(4.504±1.431)
Rural	16 (50.00)	16 (50.00)	32 (31.68)	(4.613±1.999)

SD: Standard deviation, DR: Direct Relationship, FL: Fibrinogen level

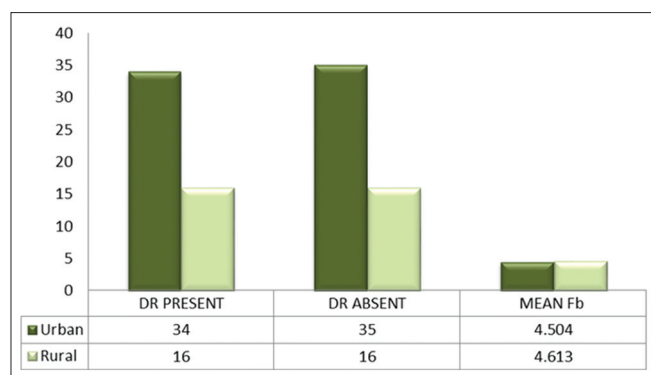


Figure 3: Relationship of fibrinogen with geographical distribution

DISCUSSION

Many studies have compared FLs in normotensive and hypertensive patients.²⁶⁻²⁸ Our study demonstrated that there was no significant difference in FLs in hypertensive as compared to the normotensive population. We also observed that this was true irrespective of gender. Conflicting results in various studies may be explained by the difference in blood pressure values of patients; less sample size included in these studies and interference of antihypertensive treatment on the hemostatic system. Papadakis *et al.*, reported that patients who were on lipid-hostile antihypertensive drugs had significantly higher levels of fibrinogen as compared with those on lipid-neutral antihypertensives or those who were not receiving antihypertensive treatment.

Hypertensive patients have been shown to have increased the degree of platelet and coagulation system activation while as the fibrinolytic system has decreased activity²⁹ which may be explained by the prothrombotic state related to hypertension. However, our study did not show any significant difference between elevated FLs

and blood pressure. Anoop Shankar *et al.*, observed the lack of association between FL and incident hypertension among women in their study although they showed significant association of FLs and development of hypertension in men. These gender-related differences between fibrinogen and other cardiovascular outcomes have been noted in coronary heart disease,⁸ carotid intima-media thickness,³⁰⁻³² and peripheral vascular disease. However, our study failed to show any gender difference. Limitations of our study included a smaller number of sample size. Furthermore, we did not study the relationship between FLs and target end-organ damage in hypertensive patients.

CONCLUSION

There is no association of FLs and hypertension in our population. Further prospective studies with larger sample size are needed to fully elucidate the relationship between FLs and Hypertension in our population.

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