

Clinical evaluation of fibrinogen level in type II diabetes mellitus: A descriptive study from urban Karnataka

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Abstract

Background: Diabetes mellitus comprises a group of common metabolic disorders where increased fibrinogen levels can act as a thrombogenic factor. Diabetic patients have higher cardiovascular morbidity than non-diabetic subjects. Several studies have shown that haemostatic factor especially hyper fibrinogenemia is implicated as a source of atherosclerosis and its complications. **Objective:** To assess the fibrinogen levels in patients of type-2 diabetes mellitus. **Methodology:** This study included 100 cases of type-2 diabetes mellitus who attended the OPD at Government General Hospital and Basaveshwar Teaching and General Hospital, attached to Mahadevappa Rampure Medical College, Gulbarga in year 2005. Newly detected type-2 diabetic patients with and without associated hypertension of more than 40 years of age belonging to both sexes were included. **Results:** Maximum number of type-2 diabetic patients in the age group of 50–59 years (39 patients, 39.9%). The sex distribution among the patient groups showed male preponderance with respect to each age group and as a whole. The correlation coefficient between age and fibrinogen level was 0.69 ($p < 0.001$), which is highly significant. Higher plasma fibrinogen levels in females compared to males (6.37 ± 1.65 versus 5.94 ± 1.43). Negative correlation between fibrinogen level and duration of diabetes. **Conclusion:** Positive correlation observed between age and fibrinogen level. Females had significantly higher mean plasma fibrinogen levels compared to males. Negative correlation seen between fibrinogen level and duration of diabetes.

Key Word: Type II DM, fibrinogen

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INTRODUCTION

Diabetes Mellitus (DM) represents a range of metabolic disorders characterized by hyperglycemia resulting from insulin deficiency, insulin resistance or both. Type 2 DM represents 85% to 95% of the people with diabetes in developed countries and an even higher percentage in

developing countries. With over 20 million diabetic people, India leads the world in the number of individuals with Diabetes Mellitus.¹ During the past decade, the potential role of haemostatic factors particularly fibrinogen in various disorders and their complication has gained considerable interest. It has now been established through several cross-sectional prospective epidemiological studies that plasma fibrinogen concentration is a strong and an independent cardiovascular risk factor along with other risk factors such as smoking, age, sex, hypertension, obesity, family history and lipids etc. The plasma fibrinogen predicts cardiovascular events in both general population, diabetics and non-diabetic patients with clinical vascular disease^{2,3,4}. Epidemiologic studies have long demonstrated the strong and often independent direct correlation between high plasma fibrinogen levels and cardiovascular disease, but the mechanisms by which

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fibrinogen would act is still unclear³. The interest in relationship between diabetes mellitus and fibrinogenemia has grown, as an increase in fibrinogen levels may be one of the mechanisms by which diabetes exerts its effect on cardiovascular risk.^{5, 6, 7, 8} Because of these reasons we planned this study at Kalaburgi to assess levels of fibrinogen in patients of type-2 diabetes mellitus.

OBJECTIVE

To assess the fibrinogen levels in patients of type-2 diabetes mellitus

METHODOLOGY

This study included 100 cases of type-2 diabetes mellitus who attended the out-patient department and admitted as in-patients at Government General Hospital and Basaveshwar Teaching and General Hospital, under the department of General medicine attached to Mahadevappa Rampure Medical College, Gulbarga in year 2005. A total of 100 known and newly detected type-2 diabetic patients with and without associated hypertension of more than 40 years of age belonging to both sexes were included. All these patients were registered cases in Government General Hospital and Basaveshwar Teaching and General Hospital, Gulbarga as outpatients/ in-patients. Type-2 diabetic patients associated with myocardial infarction, stroke, chronic inflammatory diseases, tuberculosis, malignancy, secondary hypertension and pregnancy were excluded from this study. Estimation of plasma fibrinogen was done by thrombin-clotting method by using FIBROQUANT KIT [Tulip Diagnostics (p) Ltd.

RESULTS

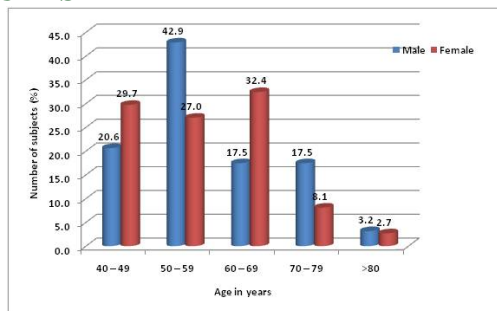


Figure 1: Distribution of subjects according to age and sex

Our study contains 63 males and 37 females. Maximum number of type-2 diabetic patients in the age group of 50-59 years (39 patients, 39.9%) and the least patients were in the group of 80 years (2 patients, 20%). The youngest patient was 40 years and the eldest patient was 82 years old. The mean age of the patient was 63 years. The sex distribution among the patient groups showed male

preponderance with respect to each age group and as a whole.

Table 1: Fibrinogen level with respect to age group

| Age (years) | N | Fibrinogen level Mean ± SD (g/L) |
|-------------|----|----------------------------------|
| 40-49 | 23 | 6.14±1.17 |
| 50-59 | 37 | 6.29±1.68 |
| 60-69 | 23 | 6.93±1.62 |
| 70-79 | 14 | 6.99±1.01 |
| >80 | 3 | 7.34±0.14 |

In this study, there was age related increase in plasma fibrinogen level among type-2 diabetic patients. Fibrinogen level increases as age increases. The patient in the age group of 40-49 years showed 6.14±1.17 g/L plasma fibrinogen levels. The patients in the age group 50-59 years showed 6.29±1.68 of fibrinogen levels. The patients with 60-69 years had 6.93±1.62, 70-79 years 6.99±1.01 and > 80 years 7.34±0.14 g/L. The correlation coefficient between age and fibrinogen level was 0.74 (p<0.001), which is highly significant. Therefore, there was a positive correlation between age and fibrinogen level, which was significant.

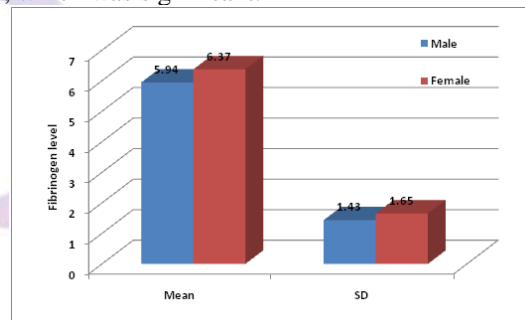


Figure 2: Distribution of fibrinogen according to gender

The above table shows duration of diabetes ranging from less than one year to twenty five years. On applying correlation test, the correlation coefficient was found to be r =-0.7 and F=9.76 (p<0.04 highly significant). So there was a negative correlation between fibrinogen level and duration of diabetes.

DISCUSSION

Age: In the present study, it was found that, there was a positive correlation of fibrinogen level with age. The fibrinogen level increased as age increased. The mean fibrinogen concentration increased steadily from 6.17±1.27 in young adults to about 7.10±0.14 in the elderly, whereas in Lowe GDO study, the mean fibrinogen concentration increased steadily from 2.0 g/L in young adults to about 3.0 g/L in the elderly. The crude rate of increase in fibrinogen concentration was 1% per year over the whole group⁹. In Bruno G *et al* study, in men, plasma fibrinogen level increased with age but in women plasma fibrinogen level increased almost by 0.4

g/L only between premenopausal and post-menopausal ages but no significant linear trend was detected¹⁰. The other studies in which age was positively correlated with fibrinogen level were Temelkova *et al* study¹¹, Lam TH *et al* study¹², Om P. Ganda study⁴, Bruno G *et al* study¹⁰ and Christophe Tribouilloy *et al* study¹¹. But Raynands E *et al* and Esko Vanninen *et al* in their study found no correlation between age and fibrinogen level^{3,12}.

Sex: In the present study, the mean plasma fibrinogen levels were higher in females compared to males. All the females were near peri-menopausal and post-menopausal age group. The females had 6.47±1.72 g/L fibrinogen value and males had 5.80±1.57 g/L fibrinogen values whereas in the study of Bruno G *et al*, the male patient had 3.6±0.9 g/L fibrinogen value and female patient had 3.7±0.9 g/L fibrinogen value¹⁰. In the study of Kenneth Hughes *et al*, the male patient had 2.8 (2.6-3.0) g/L fibrinogen value and female patient had 3.4(3.2-3.6) g/L fibrinogen value¹⁵. Gray TC Ko *et al* in his study of 101 diabetic subjects, there was an 18.5% increase in mean fibrinogen concentration from 3.53 (1.06) g/L at baseline to 3.97 (1.07) g/L at follow-up. The increase was 15.5% in men and 19.5% in women representing a change of 6.7% per year and 8.1% per year in men and women respectively¹⁶. The other studies which found higher fibrinogen values in females compared to males were Balleisen L *et al* study¹⁷, Christophe Tribouilloy *et al* study¹⁰, Mariskar *et al* study¹⁸, William B Kannel *et al* study¹⁹ and Folsom AR *et al* study²⁰. But Amanda J Lee *et al* in his study observed the significant association between fibrinogen and diabetes, only in men but not in woman⁴.

Duration of Diabetes: In the present study, there was negative correlation between mean fibrinogen level and duration of diabetes. The patients who had <1 year duration had mean fibrinogen value 6.09±1.36 compared to those with >20 years duration, whose value was 3.57±0.35 g/L. Hammer MR *et al* in their study found a little variation in the levels of fibrinogen in diabetics followed from the time of diagnosis²¹. According to De Silva *et al*, Om P Ganda *et al*, Rossen M *et al* and Gary TE Ko *et al*, there was no correlation between diabetes duration and plasma fibrinogen levels^{4,21,16}, and are known to be elevated in type-2 diabetics patients regardless of duration.

CONCLUSION

Positive correlation observed between age and fibrinogen level. Females had significantly higher mean plasma fibrinogen levels compared to males. Negative correlation seen between fibrinogen level and duration of diabetes.

REFERENCES

1. Murray CJ, Lopez AD. Mortality by cause for eight regions of the world, Global Burden of Disease Study. *Lancet*. 1997;349:1269-1276
2. Barazzoni R, Zanetti M, Davanzo G, Kiwanuka E, Carraro P, Tiengo A and Tessari P, "Increased fibrinogen production in type-2 diabetic patients without detectable vascular complications; Correlation with plasma glucagon concentration", *The J. of Clinical End. and Metab* 2000; 85(9): 1321-1325
3. Eric Raynand, Antonia Perez-Martin, Jean Frederic Brun, Aomar Aissa Benhaddad, Christine Fedou and Jacques Mercier, "Relationship between fibrinogen and insulin resistance: Atherosclerosis 2000; 150: 365-370
4. Om P Ganda Charles F Arkin, "Hyperfibrinogenemia: An important risk factor for vascular complications in diabetes", *Diabetes Care* 1992; 15: 1245-50.
5. Asakawa H, Tokunaga K, Kawakami F, "Evaluation of fibrinogen and thrombin-antithrombin III complex levels of type-2 diabetes mellitus patients with retinopathy and nephropathy", *J. of Diabetes and its Complication*, May-June 2000; 14(3):121-126.
6. Aso Y, Matsumoto S, Fujiwara Y, Tayama K, Inukai T, Takemura Y, "Impaired fibrinolytic compensation for hypercoagulability in obese patients with type-2 diabetes: Association with increased plasminogen activator inhibitor-1". *Metabolism: Clinical and Experimental* April 2002; 15(4):471-76
7. Lam TH, Liu LJ, Janust ED, Lam KSL and Hedley AJ, "Fibrinogen, other cardiovascular risk factors and diabetes mellitus in Hong Kong: A community with high prevalence of type-2 diabetes mellitus and impaired glucose tolerance", *Diabetic Medicine* 2000; 17: 798-806.
8. Rossen M Missov, Ronald P Stolk, Johanna G, Vander Bom, Albert Hofman *et al*, "Plasma fibrinogen in NIDDM: The Rotterdam Study", *Diabetes Care*, Feb. 1996; 19(No.2): 157-159.
9. Lowe GDO, "Atherosclerosis: The impact of fibrinogen (Topics in Preventive Cardiology Series)", *Amsterdam Experta Medica*, 1993: 8-12.
10. Bruno G, Paolo Cavallo-Perin, Ginseppe Bergero, Mileria Borra, Nicola D'Erro and Gian Franco Pagano, "Association of fibrinogen with glycemic control and albumin excretion rate in patients with NIDDM", *Ann Intern Med* 1996; 125: 653-657.
11. Temelkova-Kurktschiev T, Siegert G, Bergmann S, Henkel E, Koehler C, Jaross W, Hanefeld M, "Subclinical inflammation is strongly related to insulin resistance but not to impaired insulin secretion in a high risk population for diabetes", *Metabolism*, June 2002; 51(No. 6): 743-749.
12. Lam TH, Liu LJ, Janust ED, Lam KSL and Hedley AJ, "Fibrinogen, other cardiovascular risk factors and diabetes mellitus in Hong Kong: A community with high prevalence of type-2 diabetes mellitus and impaired glucose tolerance", *Diabetic Medicine* 2000; 17: 798-806.
13. Christoph Tribouilloy, Marcel Pltier, Laurent Colas, Michele Senni *et al*, "Fibrinogen is an independent marker for thoracic aortic atherosclerosis", *Am. J. Cardiol* 1998; 81: 321-326.

14. Esko Vannien, Laitinen J, Uusitupa M, "Physical activity and fibrinogen concentration in newly diagnosed NIDDM", *Diabetes Care*, Sept. 1994; 17(9): 1031-1038.
15. Hughes K, Maurice Choo, Ponnudurai Kuperan, Choon-Nam Ong and Tar-Choon Aw, " Cardiovascular risk factors in non-insulindependent diabetes compared to non-diabetic control; A population based survey among Asians in Singapore", *Atherosclerosis* Jan 1998; 136(1): 25-31.
16. Gray TC Ko, Juliana CN chan, Lynn LW, Tsang and Clive S, Cockram, "Hyperfibrinogenemia did not improve after treating hyperglycemia in Chinese type-2 diabetic patients", *Ann. Clin. Biochem*, 2000; 37: 655-61.
17. Balleisen L, Bailey J, Epping PH, Schulte H and Van de Loo j, "Epidemiological study on factor VII, factor VIII and fibrinogen in an industrial population: 1. Baseline data on the relation of age, gender, body weight, smokking alcohol, pill using and menopause", *Thromb. Haemost.* 1985; 54(2): 475-479.
18. Mariska Tut and Hans-Werner Hense, "Smoking, other risk factors and fibrinogen levels", *Annals of Epid* May 2001; 11(4): 232-238.
19. William B Kannel, Ralpha BD, Agostino, Peter WF, Wilson, Albert J, Belanger MS *et al*, "Diabetes, fibrinogen and cardiovascular disease: The Framingham Experience", *Am. Heart J.* 1990; 120: 672-676.
20. Folson Ar, "Epidemiology of fibrinogen", *Eur Heart J.* March 1995; 16 Suppl A: 21-3, Discussion 23-24.
21. Hammer MR, John PN, Fluyenn MD, Dellingham Aj, Leshie RD, " Glycated fibrinogen: A new index of short-term diabetic control", *Ann. Clin Biochem* 1989; 26: 58-62.

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