

RESEARCH ARTICLE

Study of Anti-Beta 2 Glycoprotein 1 Antibodies Levels in Acute Myocardial Infarction with Type 2 Diabetes Mellitus in Tertiary Care Hospital: A Cross Sectional Study

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Abstract: Myocardial Infarction is one of the leading causes of death among the non-communicable disorder especially in developing countries like India. In western society 13.7% of all deaths due to ischemic heart disease in comparison with 7.38 million deaths in Indian population. In type 2 Diabetes Mellitus (DM), the incidence of Myocardial Infarction (MI) presentation is one decade earlier compared to non-diabetic patients. Hence this study was conducted with the objective to determine whether high levels of anti-beta 2 glycoprotein is associated with risk of acute myocardial infarction among patients with type 2 diabetes mellitus. **Materials and methods:** A cross sectional study, was conducted at ICU of Department of Medicine, AH & RC, AIMS, Mandya, 150 Patients admitted with type 2 DM and MI with in first 7 days of symptoms onset were included in the study during the Study period between Jan 2022 to June 2022. Infective endocarditis, Infection by HIV or treponema pallidum patients were excluded. Pre tested semi structured questionnaire used to collect relevant data and data analyzed using trial version of IBM SPSS version 20. Chi-square test was the test of significance and p value <0.05 was considered as statistically significant. **Results:** In this study there was male preponderance with 54.7% and female 45.3%. Majority of the participants were in the age group of 41-60 years (60%). Most of the cases presented as STEMI (64%). It was found that, anti-beta 2 glycoprotein 1 (GP1) antibody was elevated among 57.04% patient with type 2 DM who had acute MI. The association between diabetes patient having acute coronary syndrome was significant (p<0.001). **Conclusion:** It was concluded that high levels of anti-beta 2 glycoprotein was associated with risk of acute myocardial infarction among patients with type 2 diabetes mellitus.

Keywords: Anti-beta 2 glycoprotein 1 antibodies, acute myocardial infarction, type 2 diabetes mellitus

INTRODUCTION

India is undergoing an epidemiologic transition in which the prevalence of communicable diseases has been steadily dropping while the prevalence of non-communicable diseases (NCDs) has been rising quickly, resulting in a dual burden (1). Diabetes mellitus (DM) is defined by the Pan American Health Organization (PAHO) as a chronic metabolic disease characterized by hyperglycaemia and disturbances of carbohydrate, fat, and protein metabolism (2). A higher prevalence of diabetes mellitus among Asians is seen from national mortality statistics, hospital activity analysis data, and surveys, with non-insulin-dependent diabetes being more prevalent than usual (3). The more prevalent kind of diabetes is type 2 diabetes mellitus (T2DM), also known as non-insulin-dependent diabetes mellitus, which accounts for about 90% of all cases (4). In the populations where the association has been studied, it is generally acknowledged that clinical diabetes is a risk factor for ischemic heart disease. Acute myocardial infarction (MI) is one of the most common presentations of coronary artery disease (CAD) (5). Particularly in developing nations like India,

myocardial infarction is one of the most common causes of death from non-communicable diseases (6). In comparison to India's 7.38 billion deaths, 13.7% of all deaths in western society are caused by ischemic heart disease (3). Over the past three decades, acute MI prevalence in India has steadily increased, rising from 1.1% to 7.5% in urban areas and from 2.1% to 3.7% in rural areas (7).

Beta 2-glycoprotein 1 is a member of a larger class of autoantibodies known as antiphospholipid antibodies that are directed against phospholipids or phospholipid-protein complexes (8). Platelet adherence to von Willebrand factor is hampered, suggesting that beta 2GPI plays a role in platelet adhesion and the subsequent development of thrombosis (9).

The frequency of anti-beta 2 glycoprotein antibodies, as well as their role in patients with acute myocardial infarction, has been a controversial issue. The exact role and clinical significance of anti-beta 2 GP1 antibodies in MI pathogenesis remains unclear. This limited published literature prompted us to undertake the

present study, with the objective of determining whether high levels of anti-beta 2 glycoprotein are associated with the risk of acute myocardial infarction among patients with type 2 diabetes mellitus.

Methodology:

The cross-sectional study consisted of 150 type 2 DM with acute MI admitted to intensive cardiac care unit (ICCU) of Department of medicine, AH & RC, AIMS, BG Nagara, Mandya, Karnataka. The diagnosis of MI was established using guidelines of ACC/AHA. The study was pre-approved by the institutional Ethical committee board and informed consent was obtained by from the patients. Inclusion criteria were patients with Type 2DM subjects with Acute MI who were admitted AH & RC with in first 7 days of symptoms onset. Patients with infective endocarditis, infection by HIV or treponema pallidum, hereditary causes of thrombosis,

antiphospholipid syndrome or another disease of the connective tissue neoplasia (present or past), thrombotic pulmonary hypertension and patients not willing to participate were excluded from the study. Pre-tested semi structured questionnaire was used to take the complete history along with clinical examination. Blood sample was collected from the patients immediately after admission to the intensive care unit and relevant tests were performed. The study participants were followed up till discharge.

Data was entered in Microsoft excel sheet and analyzed using trial version of IBM SPSS version 20. The socio demographic details were summarized using descriptive statistics. The univariate analysis was carried out to describe the study outcomes and risk factors. Statistical significance will be shown by Chi-square test. Variables were considered to be significant if $P < 0.05$

RESULT:

Among 150 study participants, majority of them belong to age group of 41 to 50 years (40.0%) which constitutes primarily middle-aged population. Then by age group between 51 to 60 years (24.0%), 71 to 80 years (21.3%) and 61 to 70 years (14.7%). There was male preponderance with 54.7% and female constituted 45.3%. Among the study participants, majority of them had STEMI 96 (64 %) followed by NSTEMI 39 (26 %) and unstable angina 15 (10%). Among study participants, 51.3% had elevated levels of anti-beta 2 glycoprotein 1 antibody (Table 1).

Table 1: Profile of study participants

		Frequency (n =150)	Percentage
Age Distribution	41– 50 years	60	40.0%
	51– 60 years	36	24.0%
	61 – 70 years	22	14.7%
	71 - 80 years	32	21.3%
Gender	Female	68	45.3%
	Male	82	54.7%
Type of MI	STEMI	96	64%
	NSTEMI	39	26%
	Unstable angina	15	10%
Anti-beta 2 glycoprotein 1 ab	Increased	77	51.3%
	Normal	73	48.7%

Table 2: Association between MI and anti-beta 2 glycoprotein 1 antibody

	Anti-beta 2 glycoprotein 1 antibody		Total
	Elevated	Not elevated	
Acute myocardial infarction	77 (57.04%)	58 (42.96%)	135
Unstable angina	0 (0%)	15 (100%)	15
Total	77 (51.33%)	73 (48.67%)	150

Chi square value-17.580, df-1 , P-value= <0.001*

Among the 150 study participants, 135 patients had acute myocardial infarction (MI), of whom 77 (57.04%) exhibited elevated levels of anti-beta 2 glycoprotein 1 antibody, while 58 (42.96%) had normal levels. In contrast, all 15 patients with unstable angina had normal levels of anti-beta 2 glycoprotein 1 antibody, with no elevation observed. The difference in anti-beta 2 glycoprotein 1 antibody levels between patients with acute MI and those with unstable angina was statistically significant, as indicated by a Chi-square value of 17.580 with 1 degree of freedom (p -value < 0.001). This p -value suggests a highly significant association between elevated anti-beta 2 glycoprotein 1 antibody levels and acute MI, indicating that such elevations are unlikely to occur due to random chance and may play a role in the pathogenesis of MI. (Table 2)

DISCUSSIONS

In this study among 150 participants, the majority belonged to the age group of 41 to 50 years (40.0%), which constitutes primarily middle-aged populations. This was followed by the age group between 51 and 60 years (24.0%). The findings of this study were consistent with a cross-sectional study conducted by Feaz Bandwah et al. in two urban clinics in East and South Trinidad, which found that most patients with T2DM were between the ages of 45 and 64 years (60.6%) (10). Similarly, a case-control study conducted by Zodpey Sanjay P. et al. showed that the majority of their study subjects were in the age group of 41–70 years (11).

It was found that 54.7% of the participants in the current study were men, while 45.3% were women. Similar results were observed by Zodpey Sanjay P. et al., whose study included 70% male and 30% female participants (11). Another study by Feaz Bandwah et al. found that the greatest percentage of men (34.4%) fell into the 55–64 years age group and the greatest percentage of women (31.8%) was seen in the 45–54 years age group (10). A retrospective observational study conducted by Anna Lopez de Andres et al. (2016–2018) using the Spanish National Hospital Discharge Database (SNHDD) reported that men accounted for 71.11% and women 28.89% (12). These findings suggest that men are more affected than women.

In this study, the majority of the individuals experienced STEMI, accounting for 64% of cases, followed by NSTEMI (26%) and unstable angina (15%). These findings align with the study conducted by Anna Lopez de Andres et al., which found that among men with T2DM, the incidence of STEMI was approximately two-fold higher and that of NSTEMI was almost three-fold higher at 95% CI than among men without T2DM. Similarly, in women with T2DM, the incidence of STEMI and NSTEMI was significantly higher than in non-T2DM women (12).

Previous studies have highlighted the role of anti-β2GP1 antibodies in the pathogenesis of thrombotic events. Anti-β2GP1 antibodies are part of the antiphospholipid antibody family, which has been implicated in thrombosis due to their interaction with phospholipid-protein complexes, potentially leading to platelet activation and clot formation (13). In the present study, anti-beta 2 glycoprotein 1 antibody levels were elevated in 57.04% of patients with T2DM who had acute MI, whereas no such elevation was observed in patients with unstable angina. The observed difference was statistically significant (p -value <0.001). A study conducted by Soltész P. et al. found that the frequency of anti-β2 GPI antibodies was significantly higher (14.4%) in acute coronary syndrome (ACS) compared to control healthy subjects (2%). In

subclasses of ACS, anti-β2 GPI IgA antibodies were elevated in myocardial infarction with STEMI and NSTEMI (14). Another study conducted by Woods KL et al. in the coronary care unit at Leicester Royal Infirmary demonstrated a significant association between diabetes and myocardial infarction among Asians, with an age-adjusted relative risk of 3.3 (15).

A recent study by Kharbanda et al. (16) reported that elevated anti-β2GP1 levels are more prevalent in patients with acute thrombotic events compared to those with stable coronary artery disease, supporting the findings of this study. Additionally, O’Leary et al. (17) demonstrated that anti-β2GP1 antibodies are linked to increased platelet aggregation and pro-inflammatory cytokine release, further corroborating their role in MI pathogenesis.

CONCLUSION

The present study showed that high levels of anti-beta 2 glycoprotein was associated with risk of acute myocardial infarction among patients with type 2 diabetes mellitus. The increasing trend on non-communicable diseases calls for a policy control measures particularly directed towards those with diabetes. Awareness on the importance of golden hour and early diagnosis and treatment will have huge economic impact as sizeable number of patients present late. Our findings should be taken into consideration when planning future actions to improve the treatment and care these patients receive.

Limitations and Future Directions

While this study provides valuable evidence, certain limitations must be addressed. The cross-sectional design precludes establishing a causal relationship between elevated anti-β2GP1 antibody levels and acute MI. Additionally, the study was conducted in a single tertiary care center, which may limit the generalizability of the findings. Future multicentric, longitudinal studies are warranted to confirm these associations and explore the potential of anti-β2GP1 antibodies as a therapeutic target.

Conflict of interest: Nil

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