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Analyze whether RBBB is associated with in-hospital death

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ARTICLE INFO | **ABSTRACT** | **ORIGINAL RESEARCH ARTICLE**

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Key Words:
Right bundle branch block (RBBB), ST elevation myocardial infarction (STEMI, cardiovascular events.

Background: Left bundle branch block and right bundle branch block (RBBB) have been implicated with raised in-hospital and long-term mortality in patients with acute ST elevation myocardial infarction (STEMI).
Aim of the study: The purpose of this study is to determine whether RBBB is connected with in-hospital death.
Methods: This study was a prospective observational study conducted in Department of Cardiology, National Institute of Cardiovascular Diseases, Dhaka, Bangladesh, from August 2015 to September 2016. The study included 108 patients with RBBB (Group I) and 108 patients without RBBB (Group II). All data was collected, documented in a Microsoft Excel work sheet, and analyzed using descriptive statistics in SPSS 17.0.
Results: The average age was 54.31±12.51 years in Group I and 51.34±10.80 years in Group II. A statistically significant difference in LV ejection fraction was identified among the study subjects (p=0.001). The new, old, and age undetermined RBBB was 33.33%, 25.9%, and 40.74%, respectively.

Bi-fascicular block and isolated were 40.7% and 59.3%, respectively. 37.0% were transient, while 63.0% were permanent. In all, 27.8% of patients in Group I suffered heart failure in Killip class II, compared to 13% in Group II, with a statistically significant difference (p =0.007). The mortality rate for new, old, and age undetermined RBBBs was 18.9%, 14.3%, and 25.6%, respectively.

Conclusion: Acute STEMI patients with RBBB had a greater in-hospital mortality rate than those without it. Acute STEMI patients with RBBB are more likely to develop complications such as heart failure, cardiogenic shock, ventricular tachycardia, total heart block, and the need for a temporary pacemaker.

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INTRODUCTION

Cardiovascular disease (CVD) has been the leading cause of death worldwide in the recent decade. According to the Global Burden of Disease Study 2010, CVD was responsible for 30% of all fatalities, whereas coronary heart disease (CHD) accounted for 13.3% of all deaths globally in 2010. Bangladesh is seeing an epidemiological shift from infectious diseases to no communicable diseases (NCDs) [1]. Tobacco, poor diets, physical inactivity, and alcohol are all preventable risk factors that are growing more prevalent in Bangladesh. The National NCD Risk Factor Survey 2010 revealed that CVD was responsible for 12.5% of all fatalities, with acute myocardial infarction (AMI) accounting for 2.5%. RBBB in AMI is an indicator of potential cardiovascular risk. These patients experience immediate and long-term morbidity and mortality. AMI with RBBB is usually characterized by large infarctions that are frequently accompanied by heart failure, complete AV block, arrhythmias, and a high short-term [2] and long-term mortality [3]. Several studies have found that the incidence of RBBB in AMI varies between 3% and 29% [4]. Risk assessment is an essential aspect of treating individuals with acute coronary syndromes. Juarez-Herrera et al. (2010) [5] propose that bundle-branch block (BBB) should be considered in risk classification to identify high-risk patients. Previous research has found that different forms of RBBB result in distinct outcomes and clinical features [6]. New onset RBBB had the worst outcome, while RBBB of intermediate duration had no substantially difference prognosis than without RBBB. Islam et al. (2002) [7] discovered that there was a dismal prognosis for old RBBB, since several investigations failed to indicate an undesirable outcome in this subset. Bifascicular block causes more complications than isolated RBBB. Kleemann (2008) [8] found that, unlike in acute STEMI, RBBB in NSTEMI was not an independent predictor of all-cause mortality. RBBB of fresh onset is difficult to quantify, hence this information is frequently lacking in RCTs and registries. Not all conduction blocks in patients with acute STEMI are consequences of infarctions, as almost half are present at the time of the first ECG recording and may indicate prior conduction abnormalities. Thrombolytic treatment reduces infarct size [9], lowers mortality [10], and prevents or shortens the duration of BBB [9]. Thus, it is likely that the present widespread use of thrombolytic therapy, higher life expectancy, rising noncommunicable disease rates, and improving socioeconomic level have a significant impact on the importance of BBB in AMI in Bangladesh. With all of this in mind, the purpose of this study is to determine whether RBBB is connected with in-hospital death.

METHODOLOGY

This study was a prospective observational study conducted in Department of Cardiology, National Institute of

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Cardiovascular Diseases, Dhaka, Bangladesh, from August 2015 to September 2016. The study included 108 patients with RBBB (Group I) and 108 patients without RBBB (Group II). Each group was then separated into anterior and inferior acute STEMIs. All data was collected, documented in a Microsoft Excel work sheet, and analyzed using descriptive statistics in SPSS 17.0.

Inclusion criteria

Acute STEMI patients with or without RBBB within 12 hours of chest pain

Exclusion criteria

- Acute STEMI patient with chest pain more than 12 hours
- Acute STEMI patient with LBBB
- Patient with prior MI
- Patient who underwent prior PCI
- Patient who underwent prior CABG
- Patent with severe comorbidity

RESULT

Table-1 depicts the age distribution of the patients. The majority of study participants (49.1% and 41.7%, respectively) were over 55 years old. The average age was 54.31±12.51 years in Group I and 51.34±10.80 years in Group II. Patients in Group I smoked the most (49.1%), followed by hypertension (44.4%), diabetes (42.6%), dyslipidemia (25%), and a family history of coronary artery disease (18.5%). Similarly, 41.66% of patients in Group II smoked, 37.03% had hypertension, 38.89% had diabetes, 21.29 had dyslipidemia, and 17.1% had a family history of coronary artery disease (Table-2). Table-3 shows that the mean ejection fraction was 43.96±6.74% in Group I and 48.02±5.08% in Group II. A statistically significant difference in LV ejection fraction was identified among the study subjects (p=0.001). Table-4 demonstrates that the new, old, and age undetermined RBBB was 33.33%, 25.9%, and 40.74%, respectively. Bi-fascicular block and isolated were 40.7% and 59.3%, respectively. 37.0% were transient, while 63.0% were permanent. In all, 27.8% of patients in Group I suffered heart failure in Killip class II, compared to 13% in Group II, with a statistically significant difference (p =0.007). It was also shown that 4.6% of patients in Group I experienced Killip class III heart failure, compared to 2.8% in Group II, with no statistical correlation (p=0.72) (Table-5). Arrhythmias such as VT, third degree AV block, cardiogenic shock, and mortality were observed substantially (p>0.05) higher in patients with anterior infarction in Group I compared to Group II. In contrast, in acute inferior STEMI, no significant differences in in-hospital outcome were seen between Group I and Group II (Table-6). Table-7 shows the mortality rate for new, old, and age undetermined RBBBs was 18.9%, 14.3%, and 25.6%, respectively. The mortality rate for bi-fascicular blocks (BFBs) was 27.3%, while isolated RBBBs were 15.6%. The mortality rate in transitory and permanent RBBB was 7.5 vs. 27.9%. Figure-1 shows that 79.6% of the study's patients were male, whereas 44 (20.4%) were female. In Group I, 81.5% of the patients were male and 18.5% were female, whereas in Group II, 77.8% were male and 22.2% were female.

Table-1: Comparison of the study population according to age

Age in years	Group I (n = 108)	Group II(n = 108)	P value
	Number (%)	Number (%)	
25 – 34	8 (7.4)	4 (3.7)	
35 – 44	9 (8.3)	19 (17.6)	
45 – 54	38 (35.2)	40 (37.0)	0.06^{ns}
≥ 55	53 (49.1)	45 (41.7)	
Mean ± SD	**54.31±12.51**	**51.34±10.80**	

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Table -2: Comparison of the study patients according to cardiovascular risk factors

Risk Factors	Group I Patients with RBBB (n = 108)	Group II Patients without RBBB (n = 108)	P value
	Number (%)	Number (%)	
Smoking	53 (49.1)	45 (41.66)	0.13^{ns}
Hypertension	48 (44.1)	40 (37.03)	0.26 ^{ns}
Diabetes mallitus	46 (42.6)	42 (38.89)	0.58 ^{ns}
Dyslipidemia			
Family history of premature CAD	27 (25)	23 (21.29)	0.67 ^{ns}
	20 (18.5)	18 (16.67)	0.79^{ns}

Table-3: Comparison of Left ventricular ejection fraction (LVEF) between two groups

LVEF in %	Group I Patients with RBBB (n = 108)	Group II Patients without RBBB (n = 108)	P value
	Number (%)	Number (%)	
≤35 (severe)	15 (13.9)	2 (1.9)	
36-44 (moderate)	38 (35.2)	19 (17.6)	
45-54 (mild)	48 (44.4)	76 (70.4)	0.001^{s}
≥55 (normal)	7 (6.5)	11 (10.2)	
Mean ± SD	**43.96±6.74**	**48.02 ± 5.08**	

Table-4: Distribution of types of RBBB in acute STEMI patients

Variables	Patients with RBBB
	Number (%)
New	36 (33.33)
Old	28 (25.9)
Age Indeterminate	44 (40.74)
Bi-fascicular block (BFB)	44 (40.74)
Isolated	64 (59.3)
Transient	40 (37.0)
Permanent	68 (63.0)

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Table -5: Comparison of patients by in-hospital outcome

In-hospital outcome	Group I Patients with RBBB (n = 108)	Group II Patients without RBBB (n = 108)	P value
	Number (%)	Number (%)	
Acute heart failure			
Killip class II Killip class III	30 (27.8) 5 (4.6)	14 (13.0) 3 (2.8)	0.007^{s} 0.72^{ns}
Arrhythmias			
VT VF	16 (14.8) 8 (7.4)	7 (6.5) 8 (7.4)	0.04^{s} 1.00^{ns}
AV block			
Second- degree Third- degree	5 (4.6) 12 (11.1)	2 (1.9) 5 (4.6)	0.44^{ns} 0.04^{s}
TPM	!0 (9.3)	3 (2.8)	0.04^{s}
Cardiogenic shock	18 (16.7)	8 (7.5)	0.03^{s}
Mechanical complications	2 (1.9)	2 (1.9)	1.00^{ns}
Death	22 (20.4)	8 (7.5)	0.006^{s}

Table -6: Comparison of patients by in-hospital outcome

In-hospital outcome	Anterior STEMI (n=192)			Inferior STEMI (n=24)		
	Group I (n = 96)	Group II (n = 96)	P value	Group I (n = 12)	Group II (n = 12)	P value
Acute heart failure						
Killip class II Killip class III	27 5	14 2	0.02^{s} 0.44^{ns}	3 0	0 1	0.21^{ns} 1.00^{ns}
Arrhythmias						
VT VF	13 8	7 6	0.04^{s} 0.57^{ns}	3 0	0 2	0.08^{ns} 0.49^{ns}
AV block						
Second- degree Third- degree	3 9	2 3	1.00^{ns} 0.04^{s}	2 3	0 2	0.46^{ns} 1.00^{ns}
TPM	7	2	0.04^{s}	3	1	0.58^{ns}
Cardiogenic shock	16	8	0.04^{s}	2	0	0.46^{ns}
Mechanical complications	2	2	1.00^{ns}	0	0	
Death	20	8	0.01^{s}	2	0	0.46^{ns}

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Table-7: Mortality in patients with each type of RBBB

Variables	No. of patients (%)	No. of death	Mortality rate (%)
New Old Age Indeterminate	36 (33.33) 28 (25.9) 44 (40.74)	7 4 11	18.9 14.3 25.6
Bi-fascicular block (BFB) Isolated	44 (40.7) 64 (59.3)	12 10	27.3 15.6
Transient Permanent	40 (37.0) 68 (63.0)	3 19	7.5 27.9

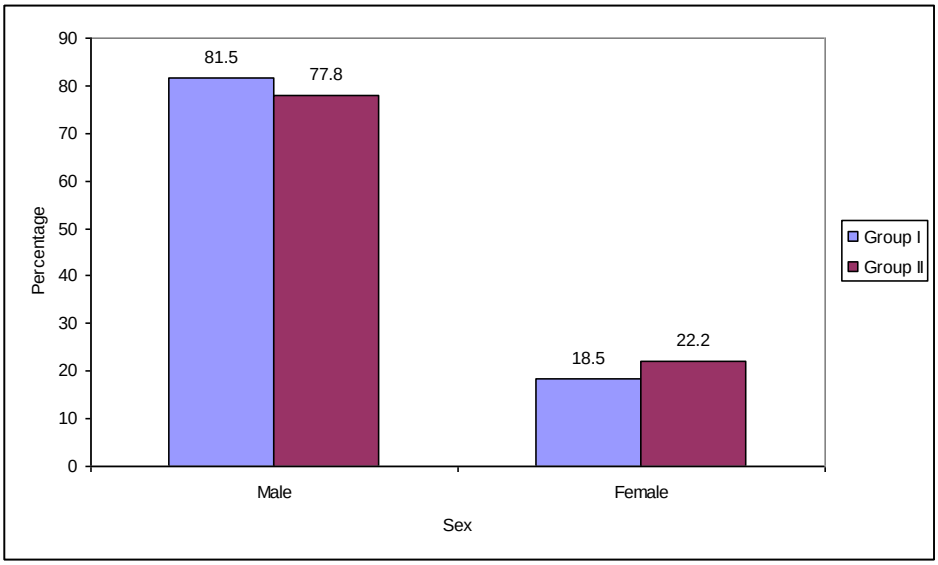

Figure-1: Sex distribution among the study patients by bar diagram (n=216)

DISCUSSION

The average age was 51.46±10.35 years for acute STEMI with RBBB (Group I) and 51.65±8.98 years for acute STEMI without RBBB (Group II). The mean age of both groups was 51.49 ± 10.09 years. In a study conducted in Bangladesh [11], patients with IHD had an average age of 50.15 ± 8.8 years. Male patients dominated the entire research population. In Group I, 81.5% of the study's patients were men and 18.5% were women. In Group II, 77.8% of patients were men and 22.2% were women. Almost all IHD investigations showed a similar male majority. In another study in Bangladesh [11], the male-female ratio was 7.01:1. Patients in Group I smoked the most (49.1%), followed by hypertension (44.4%), diabetes (42.6%), dyslipidemia (25%), and a family history of coronary artery disease (18.5%). According to Akanda et al. (2011) [11], smoking is the most common risk factor (60%) among Bangladeshi individuals with coronary artery disease. Islam and Majumder

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(2013) showed a significant frequency of hypertension (40-65%) in the elderly Bangladeshi population, which contributes to CAD [7]. Groups I and II had mean LVEFs of 43.96±6.74% and 48.02±5.08%, respectively. Islam et al. (2002) found a decreased LVEF (38±11) in AMI with RBBB [7]. The average hospital stay was 5.8 ± 1.58 days in Group I and 4.17 ± 1.00 days in Group II. Longer hospital stays reflect a poor overall hospital result. We discovered new RBBB in a percentage (33.33%) equal to that of Islam et al. (2002) [7] and Moreno et al. (1997) [3], but significantly lower than the 64% identified by Ricou et al. (1991) [12], who did their investigation only in anterior infarction patients, who are more frequently complicated with RBBB. Our old RBBB was 18.18%, while the age-indeterminate RBBB was 40.74%. This was lower than the 27.4% old RBBB of Islam et al. (2002) [7] and the 34% old RBBB of Moreno et al. (1997) [3]. For age-indeterminate RBBB, our value is comparable to Moreno et al. (1997) at 38%, but higher than Islam et al. (2002) at 33.25% [7]. The explanation for the discrepancy was that a previous ECG was not available in all cases. So we had fewer vintage RBBBs. We discovered that RBBB is related with fascicular block 40.0% less than others, 61% in Ricou et al. (1991) [12].However, our results are consistent with those of Moreno et al. (1997) [3] and Islam et al. (2002) [7]. Our transient RBBB was 37%, which is lower than the 49% reported by Moreno et al. (1997) [3]. We discovered that acute STEMI patients with RBBB were more likely to develop acute LV systolic dysfunction, acute heart failure, VT, third degree AV block requiring TPM, and cardiogenic shock than acute STEMI patients without RBBB. These findings were similar with Islam et al. (2002) [7] and Moreno et al. (1997) [3]. In this study, RBBB patients had an in-hospital death rate nearly 2.7 times greater than that of patients without RBBB (20.4% vs 7.5%), a disparity found by Moreno et al. (1997) [3]. We also attempted to determine the effect of RBBB on acute inferior STEMI. We discovered 16.66% mortality, 33.33% heart failure, and 25% VT in RBBB patients with acute inferior STEMI. These findings were consistent with those of Iwasaki et al. (2009) [13], who reported a poor prognosis for this class. However, the results were not statistically significant because to the small number of acute inferior STEMI patients.

Limitation of the study:

The study featured a single focus point and minimal sample sizes. As a result, the study's conclusions may not completely reflect the entire situation.

CONCLUSION & RECOMMENDATION

Acute STEMI patients with RBBB had a greater in-hospital mortality rate than those without it. Acute STEMI patients with RBBB are more likely to have complications such as heart failure, cardiogenic shock, ventricular tachycardia, total heart block, and the use of a temporary pacemaker. RBBB in acute anterior STEMI was an independent predictor of in-hospital death in this study's multivariate analysis.

REFERENCES

[1] Karar, Z.A., Alam, N., Streatfield, K.2009. Epidemiological transition in rural Bangladesh, 1986–2006. Glob Health Action. 2(Supplements), pp.1–9.

[2] Ahmadi, A., Soori, H., Mehrabi, Y., Etemad, K. and Khaledifar, A., 2015.Epidemiologic pattern of myocardial infarction and modelling risk factors relevant to in-hospital mortality: the first results from the Iranian Myocardial Infarction Registry. Kardiologia Polska, 73, pp.451–457.

[3] Moreno, A.M, Tomás, J.G, Alberola, AG., Chavarri, M.V, Francisco, J., Soria, C., Sánchez, E.M, Sánchez, J.G and Gallego, J.A., 1997. Incidence, Clinical Characteristics, and Prognostic Significance of Right Bundle-Branch

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Block in Acute Myocardial Infarction,A Study in the Thrombolytic Era. Circulation, 96, pp.1139-1144.

[4] Mullins, C.B. and Atkins, J.M.1976. Prognoses and management of ventricular conduction blocks in acute myocardial infarction. Modern Concepts Cardiovasclar Disease.45, pp.129-134.

[5] James, T.N., and Burch, G.E., 1958. Blood supply of the human interventricular septum. Circulation, 17, pp. 393-396.

[6] Wong, C.K., Stewart, R.A., Gao, W., French, J.K., Raffe,l. C., White, H.D. 2006. Prognostic differences between different types of bundle branch block during the early phase of acute myocardial infarction: Insights from the Hirulog and Early Reperfusion or Occlusion (HERO)-2 trial. European Heart Journal, 27(1) pp.21–28.

[7] Islam, M.N., Ali, M.A., Saha, G.K., Islam, M.F., Islam, K.Q. and Rahman, M.S. 2002. Incidence and Prognostic Significance of Right Bundle Branch Block Complicating Acute Myocardial Infarction, Bangladesh Medical Research Council. 2002/ 28(1) pp.26-35.

[8] Kleemann T, Juenger C, Gitt AK, et al.2008. Incidence and clinical impact of right bundle branch block in patients with acute myocardial infarction: ST-elevation myocardial infarction versus non–ST-elevation myocardial infarction. . American Heart Journal. 156, pp.256–261.

[9] White, H.D., Norris,R.M. ,Broun, M.A., Takayama, M., Maslowsky, A., Bass, N.M, et al.1987. Effect of intravenous streptokinase on left ventricular function and early survival after acute myocardial infarction. New England Journal of Medicine,17, pp. 850-858.

[10] Nicod, P., Zimmerman, M., Schrrer, U. 1993. The challenge for further reducing cardiac mortality in the thrombolytic era. Circulation, 87, pp. 640-642.

[11] Akanda, M. A., Ali, S. Y., Islam, A., Rahman, M. M., Parveen, A., Kabir, M. K., Begum, L. and Barman, R. C., 2011. Demographic Profile, Clinical Presentation & Angiographic Findings in 637 Patients with Coronary Heart Disease. Faridpur Medical College Journal, 6(2), pp.82-85.

[12] Ricou, F., Nicod, P., Gilpin, E., Henning, H., Ross, J.1991. Influence of right bundle branch block on shoft and long term survival after acute anterior myocardial infarction. Journal American College Cardiology ,7, pp. 858-863.

[13] Iwasaki, J ., Kono,K., Katayama,Y., Takahashi,N., Takeuchi,K., Tanakaya,M., Osawa,K., Shiraki,T., and Sai, D., 2009. Prognostic Significance of Right Bundle Branch Block in Patients with Acute Inferior Myocardial Infarction, Acta Medica . Okayama, Vol.63,1, pp.25-33.

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