

## Original Article

## Association of Mortality in Patients with Right Bundle Branch Block in Patients Presented with Anterior Wall Myocardial Infarction during Hospital Stay

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### Abstract

**Objective:** To determine the association of mortality with right bundle branch block in individuals presenting with acute anterior wall myocardial infarction during hospital stay.

**Methods:** This Cohort study was done in Department of Cardiology, University of Lahore hospital, Lahore during September 2022 to March 2023. Sample size of 160 individuals; 80 in each group were enrolled. Then, ECG will be performed at admission and individuals were divided in two groups i.e. exposed and unexposed. During follow-up, if patient died within hospital stay, then in-hospital mortality was labeled. Data was collected in proforma and analysed in SPSS version 25.

**Results:** In exposed group, the mean age of individuals was  $47.51 \pm 10.56$  years and in unexposed group was  $49.99 \pm 12.82$  years. In exposed group, there were 36 (45.0%) males and 44 (55.0%) females. In unexposed group, there were 33 (41.3%) males and 47 (58.8%) females. In exposed group, 17 (21.3%) individuals died during hospital stay. In unexposed group, 5 (6.3%) individuals died during hospital stay. There is significant association exist between right bundle branch block and in-hospital mortality i.e. Relative risk = 1.693, 95% confidence interval = 1.266, 2.264, p-value = 0.006).

**Conclusion:** Thus, there is a significant association of right bundle branch block with mortality in individuals with acute anterior wall STEMI.

**Key words:** in-hospital mortality, acute myocardial infarction, electrocardiography, right bundle branch block, anterior wall ST-elevation myocardial infarction

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### Introduction

In the case of an acute ST-elevation myocardial infarction (STEMI), myocardial damage or necrosis is caused by transmural ischemia.<sup>1</sup> There are around 550,000 new cases of myocardial infarction and another 200,000 recurrences per year in the United States. A first myocardial infarction typically occurs between the ages of 65.1 in males and 72 in women. About 38% of individuals admitted to the hospital with acute coronary syndrome had a myocardial infarction with ST-elevation.<sup>2</sup> The risk of post-STEMI sequelae and heart failure may be minimised with early detection and prompt reperfusion, which reduces myocardial ischemia and infarct size.<sup>3</sup>

STEMI is a warning indication in and of itself, but there are additional dangerous ECG patterns that are linked to higher rates of death and morbidity. The right bundle of arteries receives its blood supply from the left coronary artery system. Right bundle branch block would seem to foreshadow a poorer outcome since it indicates more widespread myocardial involvement.<sup>4</sup>

Seven percent of individuals diagnosed with STEMI also had right bundle branch block. Acute STEMI has a high mortality rate because of the prevalence of conduction abnormalities.<sup>5</sup> Acute anterior-wall ST-elevation MI is seldom studied in the literature, and even less is known about its electrocardiographic and angiographic

features.<sup>6,7</sup> When the QRS complex lasts longer than 120 ms, it indicates a full block of the right bundle of electrical impulses. Injuries to the right bundle branch are more common than those to the left because it is a superficial branch with a less robust blood supply.<sup>8,10</sup> It is associated with high risk of death in individuals suspected of having a myocardial infarction, according to the most recent recommendations from the European Society of Cardiology.<sup>11</sup>

This research set out to answer the question, "Does right bundle branch block increase the risk of death in individuals with acute myocardial infarction in the anterior wall?" Literature shows that individuals with right bundle branch block after acute anterior wall STEMI have an increased risk of death while hospitalised. However, there is no proof of a regional context. So, we decided to undertake this research to provide proof to the general public. In order to use the results of this research to screen individuals with anterior wall STEMI for right bundle branch block and make more accurate prognostic and therapeutic decisions.

## Methods

This cohort research was conducted between September 2022 and March 2023 at the University of Lahore hospital's Department of Cardiology. The predicted sample size of 160 individuals, 80 in each group, was based on the percentage of death (16.9% in instances with right bundle branch block and 3.5% in cases without right bundle branch block), the power of the research (80%), and the significance level (5%).<sup>12</sup>

**Inclusion and Exclusion Criteria:** Individuals aged 30-70 years of either gender presenting with acute anterior wall myocardial infarction that was defined as presence of ST segment elevation >1mm on ECG in lead V1 in anterior wall. Exposed individuals were those who were diagnosed to have right bundle branch block, which was defined as QRS > 120ms on ECG, while unexposed individuals were those who were not diagnosed with right bundle branch block (on ECG assessment). Individuals with recurrent MI, already had PCI or CABG, individuals with arrhythmias or develop Right Bundle Branch Block after >2 hours of anterior wall STEMI were excluded from the study.

**Data Collection Procedure:** 130 individuals fulfilled the selection criteria were enrolled in study from medical emergency using Non-probability, purposive sampling technique. Informed consent was taken from attendants. Demographics (name, age, sex, h/o diabetes, hypertension, smoking, alcoholism, dyslipidemia, family history of cardia disease, duration of symptoms, Killip class, TIMI score) will also be taken. Then, ECG will be performed at admission and individuals were divided in two groups i.e. exposed and unexposed. Individuals

were admitted and managed as per hospital protocol. Individuals were examined daily for 5 days during hospital stay. During follow-up, if patient died within hospital stay, then in-hospital mortality was labeled. A redesigned proforma was used to collect the information. The data was analysed in SPSS version 25. Relative risk was calculated to measure association of Right Bundle Branch Block with in-hospital mortality, with RR>1 as significant.

## Results

In exposed group, the mean age of individuals was 47.51 ± 10.56 years and in unexposed group was 49.99 ± 12.82 years. In exposed group, there were 36 (45.0%) males and 44 (55.0%) females. In unexposed group, there were 33 (41.3%) males and 47 (58.8%) females. In exposed group, there were 39 (48.8%) diabetics while in unexposed group, there were 41 (51.3%) diabetics. In exposed group, there were 41 (51.3%) hypertensive while in unexposed group, there were 40 (50.0%) hypertensive. In exposed group, 42 (52.5%) individuals had dyslipidemia while in unexposed group, 40 (50.0%) individuals had dyslipidemia. In exposed group, 22 (27.5%) individuals were smokers while in unexposed group, 21 (26.3%) individuals were smokers. In exposed group, 18 (22.5%) individuals were alcoholic while in unexposed group, 16 (20.0%) individuals were alcoholic. In exposed group, 14 (17.5%) individuals had family history of heart attack while in unexposed group, 14 (17.5%) individuals had family history of heart attack. In this study, mostly were females and were house wives (34 (42.5%) vs. 38 (47.5%), respectively). In exposed group, out of 80 individuals, 26 (32.5%) individuals came from rural area, 34 (42.5%) individuals came from urban area and 20 (25.0%) individuals came from semi urban area. In unexposed group, out of 80 individuals, 29 (36.3%) individuals came from rural area, 28 (35.0%) individuals came from urban area and 23 (28.8%) individuals came from semi urban area. In exposed group, out of 80 individuals, 24 (30.0%) individuals belonged to low socioeconomic class, 31 (38.8%) individuals belonged to middle socioeconomic class and 25 (31.3%) individuals belonged to high socioeconomic class. In unexposed group, out of 80 individuals, 30 (37.5%) individuals belonged to low socioeconomic class, 23(28.8%) individuals belonged to low socioeconomic class and 27 (33.8%) individuals belonged to low socioeconomic class. In exposed group, the mean duration of STEMI symptoms was 6.76 ± 3.20 hours. In unexposed group, the mean duration of STEMI symptoms was 6.53 ± 3.12 hours. In exposed group, 46 (57.5%) individuals received thrombolysis, while in unexposed group, 38 (47.5%) individuals received thrombolysis. TIMI risk score and Killip class details were given in

**Table 1:** Demographics and medical history of individuals in both groups

	Group	
	Exposed	Unexposed
n	80	80
Age (in years)	47.51 ± 10.56	49.99±12.82
<b>Sex</b>		
Male	36 (45.0%)	33 (41.3%)
Female	44 (55.0%)	47 (58.8%)
<b>Medical history</b>		
Diabetes	39 (48.8%)	41 (51.3%)
Hypertension	41 (51.3%)	40 (50.0%)
Dyslipidemia	42 (52.5%)	40 (50.0%)
Smoking	22 (27.5%)	21 (26.3%)
Alcoholism	18 (22.5%)	16 (20.0%)
Family history of heart attack	14 (17.5%)	14 (17.5%)
<b>Occupation</b>		
Business	14 (17.5%)	14 (17.5%)
Job	17 (21.3%)	15 (18.8%)
Farmer	15 (18.8%)	13 (16.3%)
House wife	34 (42.5%)	38 (47.5%)
Working hours	9.16 ± 1.98	8.89 ± 2.07
<b>Residence</b>		
Rural	26 (32.5%)	29 (36.3%)
Urban	34 (42.5%)	28 (35.0%)
Semi urban	20 (25.0%)	23 (28.8%)
<b>Socioeconomic status</b>		
Low	24 (30.0%)	30 (37.5%)
Middle	31 (38.8%)	23 (28.8%)
High	25 (31.3%)	27 (33.8%)
Duration of symptoms (hours)	6.76 ± 3.20	6.53 ± 3.12
<b>Killip class</b>		
I	28 (35.0%)	27 (33.8%)
II	29 (36.3%)	24 (30.0%)
III	23 (28.8%)	29 (36.3%)
Thrombolysis received	46 (57.5%)	38 (47.5%)
<b>TIMI score</b>		
I	27 (33.8%)	31 (38.8%)
II	20 (25.0%)	28 (35.0%)
III	33 (41.3%)	21 (26.3%)

table below. Table 1

In exposed group, 17 (21.3%) individuals died during hospital stay. In unexposed group, 5(6.3%) individuals died during hospital stay. There is significant association observed between right bundle branch block and in-hospital mortality i.e. Relative risk = 1.693, 95% confidence interval = 1.266, 2.264, p-value = 0.006). Table 2

**Table 2:** Association of in-hospital mortality with right bundle branch block

In-hospital mortality	Group	
	Exposed	Unexposed
Yes	17 (21.3%)	5 (6.3%)
No	63 (78.8%)	75 (93.8%)

Relative risk = 1.693, 95% confidence interval = 1.266, 2.264, p-value = 0.006)

## Discussion

STEMI is life-threatening complication of coronary heart disease, which is a significant cause of mortality globally. STEMI is a warning indication in and of itself, but there are additional dangerous ECG patterns that are linked to higher rates of death and morbidity.<sup>4</sup>

Between 0.2 and 1.3% population has right bundle branch block, which may be a random finding on an ECG or a symptom of a more serious underlying condition, such as a congenital heart defect or ischemic heart disease or pulmonary illness (pulmonary embolism).<sup>13</sup> We found that among the individuals in the exposed group, 21.3% passed away while hospitalised, whereas just 5.3% of those in the control group passed away. Right bundle branch block was shown to have a statistically significant correlation with death when hospitalised (95% confidence interval: 1.266, 2.264; p = 0.006).

In a comparable research, Wong et al. found that individuals with right bundle branch block were significantly more likely to die during hospitalisation (16.9% vs. 3.5%, p<0.05) than those without right bundle branch block.<sup>12</sup> In a comparable research, Paul et al. showed that 42.6% of individuals hospitalised with a diagnosis of STEMI with right bundle branch block died while in the hospital.<sup>6</sup>

According to research by Juárez-Herrera et al., individuals with right bundle branch block have a higher risk of dying from their condition in the hospital than those with left bundle branch block do (odds ratio: 1.70, confidence interval; 1.19--2.42, p-value < 0.003). Therefore, presenting to the emergency department with right bundle branch block and STEMI regardless of site was an independent predictor of high mortality while hospital stay.<sup>14</sup> These results were consistent with our own study's findings.

In a patient presenting with classic STEMI and ischemic symptoms, the presence of new-onset right bundle branch block raises suspicion of critical proximal left anterior descending coronary blockage.<sup>15</sup> Individuals with this electrocardiographic pattern for occlusive myocardial infarction should be given special care since they are at high risk for a poor prognosis and early death. Acute myocardial infarction individuals have a dismal prognosis, therefore it's crucial that they get the life-saving reperfusion treatment they need as soon as possible.<sup>4,16</sup> In contrast, Shrivastav et al. found that individuals with Anterior Wall STEMI with right bundle branch block had a significantly higher death rate (9.19% vs. 15.30%;  $p < 0.0001$ ). Right bundle branch block in the context of anterior wall STEMI was linked with a 60% increase in the risk of in-hospital mortality after adjustment (Hazard Ratio 1.60, 95% confidence interval; 1.54 - 1.66;  $p < 0.001$ ).<sup>17</sup>

Brilakis et al. distinguished between previously unrecognised right bundle branch block and previously recognised right bundle branch block in their investigation. Newly diagnosed right bundle branch block was associated with significantly higher rate of mortality than preexisting right bundle branch block (33.5% vs. 5.3%), supporting the finding reached by Hod et al. (39% vs. 8.8%).<sup>18</sup> Wong CK et al., found that the mortality rate of individuals with newly diagnosed right bundle branch block was 33% greater than that of individuals with preexisting right bundle branch block.<sup>19</sup> Individuals with cardiomyopathy, valve illness, pulmonary disease, and the general population may all present with preexisting right bundle branch obstruction. Those who have right bundle branch block but no symptoms often do not get any therapeutic care. However, a proximal blockage of the coronary artery and a bigger infarct size are common in cases of acute STEMI with a new diagnosis of right bundle branch block. Heart failure, irregular heartbeats, and a higher death rate are all linked to it.<sup>8</sup> Anterior Wall STEMI along with right bundle branch block is associated with poor outcomes when the patient has comorbidities, a high Killip class, a large ST elevation, complicated coronary artery disease, and is medicated.<sup>20</sup>

### Conclusion

Thus, there is a significant association of right bundle branch block with mortality in STEMI individuals. Now in future, we are able to implement the screening of anterior wall STEMI individuals for right bundle branch block to predict the prognosis and appropriate treatment protocols.

**Conflict of interest:** *None*

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