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Effectiveness of anti-hypertensive medications in prevention of cardiovascular disease: In cases of myocardial infarction

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Abstract
Comparative effectiveness of antihypertensive medications was evaluated in 100 Myocardial Infarction (MI) cases (52 STEMI and 48 NSTEMI). The information of antihypertensive medications being used prior to MI event was recorded in all the patients carefully.

Demographic parameters revealed high preponderance of male in STEMI cases and female preponderance was recorded in NSTEMI cases. The mean age ±SD of the STEMI and NSTEMI cases were 58.85± 11.18 and 59.83±12.84 in males and 59.44±13.3 and 60.3±10.29 years in females respectively.

Analyses of number of coronary arteries involved in STEMI and NSTEMI were compared and interestingly supported the severity of disease. Single Vessel block was seen in 2:3 ratios, whereas on the contrary Triple vessel block was evident in 3:2 ratios in STEMI and NSTEMI respectively.

PTCA was performed in 47 cases (46.8% STEMI & 53.2% NSTEMI) and CABG was performed in 30 cases (63.3% STEMI & 36.7% NSTEMI). Effectiveness of antihypertensive drugs revealed that Angiotensin Converting Enzyme inhibitors (ACE'I), Angiotensin Receptor Blockers (ARB) and Calcium Channel Blockers (CCB) are potent for first choice of drugs while patients on Beta Blockers (BB) ended up more frequently with TVD.

Keywords: antihypertensive drugs, myocardial infarction, STEMI, NSTEMI, TVD

1. Introduction

Evaluation of effectiveness of antihypertensive medications for primary prevention of cardiovascular disease was reported in a considerable number of studies. In a Meta analyses on this aspect researchers concluded that no specific class of drug could stand out as superior as analyzed by multiple outcomes [1]. The only significant finding was that Beta blockers were inferior to ARB'S in preventing all cause mortality. ACE inhibitors were inferior to CCB in reducing the risk of stroke but superior in reducing the risk of heart failure [2]. In another study, it was shown that ACE inhibitors were better than ARB's in reducing MI and cardiovascular deaths. A study on effectiveness of CCB over ARB's reported that CCB were effective in reducing stroke and MI risk [3].

The objective of the present study was to investigate if there exists a relationship between the type of antihypertensive treatment and outcome in terms of severity of disease like number of vessels blocked, Killips severity scale, Ejection fraction, in cases of MI. Moreover a comparative analyses has also been carried out between STEMI and NSTEMI cases with respect to age at onset, gender, number of coronary arteries involved (as determined by CAG) and procedures involved for the management of MI cases i.e. PTCA or CABG.

2. Materials and Method

The present study evaluated the effectiveness of antihypertensive medication in STEMI and NSTEMI cases who suffered from MI episode. Prior to initiation of this study Institutional Ethics committee (IEC) approval was obtained.

A total of 100 cases (52 STEMI and 48 NSTEMI) were selected consecutively who were admitted to intensive care unit (ICU) of cardiology department of Princess Esra Hospital, DCMS, Hyderabad.

A careful history of antihypertensive medication prescribed to them prior to MI was recorded in Case report form (CRF) along with echo cardio graphic(2D-echo) and angiographic(CAG) details like number of vessels involved and ejection fraction. The informed consent form was also ventured by all patients and their personnel details were assured to be kept confidential.

3. Results

Details of number of STEMI and NSTEMI cases, gender ratio and their mean ages are provided in table-1. Angiographic findings like number of vessels involved and procedure followed for the management of cases (PTCA & CABG) are also provided in the table.

Out of total 100 Myocardial Infarction cases studied, 52 cases were of ST-elevated MI and 48 cases of NST-elevated MI. Male preponderance was noted in STEMI group ass 34:18 (1.9:1) while in the NSTEMI the Male: Female ratio was 18:30 (1:1.6).The mean ages of the patients were as follows: male (STEMI) 58.85±11.18 and NSTEMI group

59.83±12.84 years. In cases of females the mean ages were 59.44±13.3 and 6.03±10.29 years respectively for STEMI and NSTEMI groups.

Analyses of number of vessels involved revealed that 38% cases had double vessel disease, 37% had single vessel disease while the number of cases with triple vessel block were 25%. However, similar analysis in STEMI and NSTEMI groups revealed interesting results. In STEMI group maximum cases had DVD with no significant difference in number of patients with SVD and TVD, while in NSTEMI pattern mimics the extent of severity i.e. SVD >DVD >TVD. On observation we inferred that the number of patients with TVD were 2.75 times more in males than in females in STEMI; contrary to this in NSTEMI, number of patients with TVD were more than double in females(7) than in males(3).

As for the PTCA and CABG procedures are concerned, PTCA was performed on 22 STEMI cases while CABG on 19 cases. It is generally considered that CABG is a difficult and invasive procedure and is performed on those cases where PTCA is not possible. Consequently, CABG was more frequently done in STEMI cases 46.13% compared to 30.5% cases in NSTEMI.

As mentioned earlier, all the cases prior to MI event were on antihypertensive medications. Details of antihypertensives being used by these patients were carefully recorded. It was observed that ARB was the most frequently used Antihypertensive in 22% cases while ACE inhibitors were given to 8% cases. CCB's were the first choice of drug in 14% cases. In 8% cases Beta Blockers was the first choice of medication. Apart from those, various combinations of antihypertensives were also given to patients as shown in the table-2.

4. Discussion

As for the gender ratio is concerned male preponderance was observed in STEMI with 1.9:1(male: female). Comparable male: female ratio was reported earlier [4]. This observation is also supported by another study who reported male preponderance in STEMI with a male to female ratio of 4:1.9 [3]. Female preponderance was observed in NSTEMI group as shown in table-1. There are reports in literature claiming female preponderance in lesser extent of severity [5].

According to the results obtained in the present study, ACE inhibitors and ARBs were found reasonably well in controlling hypertension with the minimal risk of TVD. Calcium channel blockers were more efficient in preventing the occurrence of TVD both individually and in combination as well. Whereas contrary to them, beta blockers did not satisfy their role when used in monotherapy. Nearly 50% of the cases that were using beta blockers as their antihypertensive drug ended up with TVD. Similar pattern was seen in beta blocker and diuretic combination where 100% of cases ended up with TVD.

Although ejection fraction is clinically important in assessing the ventricular dysfunction, it also share some etiology with acute coronary syndrome, including atherosclerosis, stenosis, hyperlipidemia, obesity and uncontrolled Blood Pressure. The correlation of EF with target vessel and disease severity is shown in table-3. The occurrence of TVD above EF>50% is significantly nil, where as with the decrease in EF, there is a remarkable increase in the incidence of DVD and TVD when compared to SVD. The no. of cases under the class interval 41-45% and 36-40% are likely to be more in STEMI to that of NSTEMI but is not clinically significant.(OR=0.62, CI=0.26-1.47, p= 0.196)

Table 1: Charecteristics of the MI Patients with ST and Non ST Segment Elevation

		TOTAL			STEMI		NSTEMI	
TOTAL NO. OF CASE		100			52		48	
MALE/FEMALE		52/48			34/18		18/30	
		TOTAL	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE
MEAN AGE ± SD		59.64 ±11.75	59.32 ±12.18	59.97 ± 11.38	58.85 ±11.18	59.44 ±13.3	59.83 ±12.84	60.3 ±10.29
NO. OF VESSELS INVOLVED	SVD	37	17	20	08	07	09	13
	DVD	38	21	17	15	07	06	10
	TVD	25	14	11	11	04	03	07
PROCEDURE	PTCA	47	22	25	13	9	9	16
	CABG	30	18	12	13	6	5	6

Table 2: Relation of anti hypertensive drug with no. Of vessels involved in MI

	TOTAL	ACE Inhibitor	ARB	BB	CCB	ARB + BB	ARB+ CCB	ARB+D	BB+D	BB+CCB	ARB+CCB+D
Total	100	8	22	8	14	11	4	15	4	10	4
SVD	37	4	3	3	7	5	1	6	-	7	1
DVD	38	4	16	1	6	5	2	3	-	1	-
TVD	25	-	3	4	1	1	1	6	4	2	3

Table 3: correlation of ejection fraction with target vessel& MI

Ejection fraction	Total	No. Of Vessels			MI	
		SVD	DVD	TVD	STEMI	NSTEMI
	100	37	38	25	52	48
< 55%	13	7	5	1	3	10
51-55 %	5	5	-	-	2	3
46-50%	13	2	7	4	7	6
41-45%	25	10	12	3	15	10
36-40%	26	6	10	10	18	8
31-35%	13	6	2	5	4	9
> 30%	5	1	2	2	3	2

5. Conclusion

From the present study it is concluded that largest proportion of cases (22%) were on ARB of which only 3 (13.6%) developed TVD, an indication of disease severity. CCB were the first choice of drug for 14% patients of which only 1 (7.1%) developed TVD indicating its effectiveness in preventing TVD. It was interesting to see that none of the case with ACE inhibitors showed TVD. Similar observations were also reported by other researchers who concluded that Beta Blockers may not be the first choice drug [1]. Similar findings were observed by us in the present study.

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