Research Article

CLINICAL STUDY OF CARDIAC MARKERS IN POST MYOCARDIAL INFARCTION PATIENTS ON ANTIHYPERTENSIVE DRUG THERAPY

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A B S T R A C T

Aim and objective: To assess the level of cardiac markers during anti-hypertensive drug therapy in post myocardial infarction patients.
Materials and methods: A prospective – observational study was carried out in total 108 post - MI patients aged >40 years with history on single drug antihypertensive therapy. In this study, the effectiveness of antihypertensive drug therapy on cardiac workload was evaluated with the help of cardiac markers by using one way ANOVA followed by Tukey-Kramer multiple comparison test. Patient information leaflet was prepared and assessed.
Results: The study result showed that Ramipril has a greater control on troponin – I and CK-MB profile of the patients (P< 0.01) when compared to Nicorandil. After Ramipril, Amlodipine showed a significant control (P< 0.05) when compared to Nicorandil on Troponin - I profile.
Conclusion: Duration of antihypertensive drug treatment among the study population revealed that Ramipril decreases the incidence of second MI symptoms for longer duration and decrease the release of cardiac markers compared to other drugs. It may due to decrease in workload of heart by ACE inhibitors. Patient information leaflet was prepared and distributed through cardiology department to improve patients understanding of disease management and the developed leaflet was found to be very useful by the patients.

INTRODUCTION

In myocardial infarction, a level of cardiac markers is of crucial importance. In cardiac muscle they are tightly bound to the contractile apparatus and therefore plasma concentrations are extremely low. During myocardial injury, there is release of markers into the serum. Each markers can risk stratify patients with chest pain but their specificities for myocardial injury, release and clearance characteristics differ. [1, 2] The use of anti hypertensive drug therapy has been shown to reduce the risk of stroke and CHD in long term randomized controlled trials. It also confirmed that the long-term survival advantages associated with improved adherence to antihypertensive therapy after acute myocardial infarction.[3] So in this present study we have evaluated the effect of antihypertensive drugs on cardiac workload with the help of cardiac markers in post myocardial infarction patients.

MATERIALS AND METHODS

A prospective observational study was carried out in total 108 post myocardial infarction patients aged > 40 years with history on single antihypertensive drug therapy.

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Patients with chronic renal failure, hypothyroidism and on multi-antihypertensive drug therapy was excluded from the study. We have evaluated the effectiveness of antihypertensive drug therapy on cardiac workload with the help of cardiac markers by using one way ANOVA followed by Tukey-Kramer multiple comparison test. Patients were provided with information leaflet to improve understanding of disease management.

RESULTS

The study comprised of 108 patients diagnosed as post myocardial infarction. In this study population, 48.1% were in the age group of 40 – 60 years, 44.4% in the age group of 60 – 80 years and 7.4% were in the age group of 80 – 90 years. Males were accounted for 77.7% and females were accounted for 22.2%. Majority of the patients were having normal body mass index (BMI - 18.5-24.9). Smokers were accounted for 57.4%, non-smokers were accounted for 42.5% and 61.1% were alcoholic and 38.8% were non-alcoholic. Duration of antihypertensive drug treatment among the study population are shown in Table1. Effects of antihypertensive drugs on troponin-I are shown in Table2, Table3 Table4 and Table5. Effects of antihypertensive drugs on CK-MB are shown in Table6, Table7 and Table8. Scores of patient information

leaflet usefulness assessment questionnaire (PILUAQ) are shown in Table 9.

Table 1 Duration of antihypertensive drug treatment among the study population

S.no	Drug treatment	Number of patients	Duration of treatment in years (mean ± SD)
1.	Ramipril	12	9.58 ± 2.77
2.	Nicorandil	12	5.1 ± 1.80
3.	Nebivolol	12	5.41 ± 1.20
4.	Amlodipine	12	7 ± 1.53
5.	Carvedilol	12	6 ± 1.70
6.	Clinidipine	12	5.75 ± 2.49
7.	Metoprolol	12	6.5 ±2.54
8.	Telmisartan	12	5.08 ± 2.61
9.	Atenolol	12	6.16 ± 2.36

Table 2 Effect of Ramipril vs Nicorandil on troponin- I profile of the patients

S.no	Treatment	Mean ± SD
1.	Ramipril	2.65 ± 0.49 * *
2.	Nicorandil	8.48 ± 6.8

Table 3 Effect of Nicorandil vs Amlodipine on troponin- I profile of the patients

S.no	Treatment	Mean ± SD
1.	Nicorandil	8.48 ± 6.89
2.	Amlodipine	3.98 ± 1.36*

Table 4 Effect of different antihypertensive drugs on troponin – I profile of the patients

S.no	Treatment	Mean ± SD
1.	Ramipril	2.65 ± 0.49 * *
2.	Nicorandil	8.48 ± 6.89
3.	Nebivolol	4.85 ± 3.17
4.	Amlodipine	3.98 ± 1.36 *
5.	Carvedilol	5.43 ± 1.87
6.	Clinidipine	6.43 ± 3.64
7.	Metoprolol	4.75 ± 1.24
8.	Telmisartan	4.43 ± 1.27
9.	Atenolol	6.12 ± 4.10

Table 5 Compilation of mean difference in antihypertensive drugs on troponin – I profile

s. no	Drug names	Mean difference of antihypertensive drugs								
		Ramipril	Nebivolol	Amlodipine	Telmisartan	Clinidipine	Metoprolol	Atenolol	carvedilol	Nicorandil
1.	Ramipril	-	2.203	1.328	1.778	3.778	2.095	3.470	2.778	5.828
2.	Nebivolol	2.203	-	0.8750	0.4250	1.575	0.1083	1.267	0.5750	3.625
3.	Amlodipine	1.328	0.8750	-	0.4500	2.450	0.6833	2.142	1.450	4.500
4.	Telmisartan	1.778	0.4250	0.4500	-	2.000	0.3167	1.692	1.000	4.050
5.	Clinidipine	3.778	1.575	2.450	2.000	-	1.683	0.3083	1.000	2.050
6.	Metoprolol	2.095	0.1083	0.6833	0.3167	1.683	-	1.375	0.6833	3.733
7.	Atenolol	3.470	1.267	2.142	1.692	0.3083	1.375	-	0.6917	2.358
8.	Carvedilol	2.778	0.5750	1.450	1.000	1.000	0.6833	0.6917	-	3.050
9.	Nicorandil	5.828	3.625	4.500	4.050	2.050	3.733	2.358	3.050	-

Table 6 Effect of Ramipril vs Nicorandil on CK – MB profile of the patients

S. no	Treatment	Mean ± SD
1.	Ramipril	23.33 ± 19.97 * *
2.	Nicorandil	78.6 ± 45.7

DISCUSSION

Duration on antihypertensive drug therapy resulted that the incidence rate of second MI was decreased in Ramipril than Nicorandil, Nebivolol, amlodipin, carvedilol, Clinidipine, metoprolol, telmisartan and atenolol.(Table:1). Doson Chua[4] *et. al.,* resulted that the routine use ACE inhibitors in MI patients reduce reinfarction and mortality risk. Our result coincides with Doson Chua *et. al.,* that ACE inhibitors

decrease the incidence of second MI. Our study revealed that the Ramipril showed a greater control on troponin – I profile of the patients when compared to other drugs. In this, Ramipril (2.65 ± 0.49) showed a significant control (P< 0.01) on troponin – I profile when compared to Nicorandil (8.48 ± 6.8) (Table: 2).

After Ramipril, Amlodipine showed a greater control on troponin – I profile of the patients when compared to other drugs. In this, amlodipine (3.98 ± 1.36) showed a significant control (P< 0.05) on troponin – I profile when compared to Nicorandil (8.48 ± 6.89). (Table: 3).

Ramipril (2.65 ± 0.49) showed a significant control than amlodipine (3.98 ± 1.36) and showed a greater control than Telmisartan (4.43 ± 1.27), Metoprolol (4.75 ± 1.24), Nebivolol (4.85 ± 3.17), carvedilol (5.43 ± 1.87), Atenolol (6.12 ± 4.10), Clinidipine (6.43 ± 3.64) and Nicorandil (8.48 ± 6.89). Among the nine drugs Ramipril showed a greater control in troponin – I profile of the patients. (Table: 4) (Table: 5, 6) shows compilation of mean difference of antihypertensive drugs on troponin-I and CK-MB profile of the patients. In present study, Ramipril showed a greater control on CK – MB profile of the patients when compared to other drugs. In this, Ramipril (23.3 ± 19.97) showed a significant control (P< 0.01) on CK - MB profile when compared to Nicorandil (78.6 ± 45.7). (Table: 7). Ramipril (23.3 ± 19.97) showed a significant control than Nebivolol (33.44 ± 28.16) and showed a greater control than Amlodipine (34 ± 23.77), Telmisartan (44.33 ± 24.73), clinidipine (45.72 ± 27.04), Metoprolol (55 ± 46.21), Atenolol (61.69 ± 34.92), Carvedilol (68.25 ± 49.09) and Nicorandil (78.66 ± 45.76). Among the nine drugs Ramipril showed a greater control in CK – MB profile of the patients. (Table: 8). Kamble[1] *et. al.,* says that the metabolic state of severely infarct myocardium is indicated by the increase of marker CK and CK – MB. They reported that Enalapril (ACE inhibitor) was found to have promising effect than atenolol.

Our results coincides with the results of kamble *et. al.* that ACE inhibitors was found to have greater control in troponin - I and CK – MB profile in myocardial infarction patients. The developed patient information leaflet was assessed for usefulness using the PILUAQ which is a 5 item questionnaire. It results that 76.6% of the population found the amount of information provided in the leaflet was adequate. About 52% of respondents found information provided was very useful and 64% of respondents stated that the leaflet was very easy to read. About 56% respondents found that the content in the leaflet was easy to understand and 54% found that the leaflet was very useful to them in understanding about their disease condition. (Table: 9)

Table 7 Effect of different antihypertensive drugs on CK - MB profile of the patients

S.no	Treatment	Mean ± SD
1.	Ramipril	23.33 ± 19.97 * *
2.	Nicorandil	78.66 ± 45.76
3.	Nebivolol	33.44 ± 28.16
4.	Amlodipine	34 ± 23.77
5.	Carvedilol	68.25 ± 49.09
6.	Clinidipine	45.72 ± 27.04
7.	Metoprolol	55 ± 46.21
8.	Telmisartan	44.33 ± 24.73
9.	Atenolol	61.69 ± 34.92

CONCLUSION

In this study the effect of antihypertensive drugs like Ramipril, Nicorandil, Nebivolol, Amlodipine, Carvedilol, Clinidipine, Metoprolol, Telmisartan and Atenololon cardiac workload with help of Troponin-I and CK – MB level in post myocardial infarction patients was evaluated. Our study revealed that Ramipril has significant control on troponin-I and CK-MB level in post MI, While Amlodipine showed a significant control only on troponin-I.

Table 8 Compilation of mean difference in antihypertensive drug treatment on CK-MB profile

s. no	Drug names	Mean difference of antihypertensive drugs								
		Ramipril	Nebivolol	Amlodipine	Telmisartan	Clinidipine	Metoprolol	Atenolol	carvedilol	Nicorandil
1.	Ramipril	-	10.108	10.667	21.000	22.392	31.667	38.358	44.917	**55.333**
2.	Nebivolol	10.108	-	0.5583	10.892	12.283	21.558	28.250	34.808	45.225
3.	Amlodipine	10.667	0.5583	-	10.333	11.725	21.000	27.692	34.250	44.667
4.	Telmisartan	21.000	10.892	10.333	-	1.392	10.667	17.358	23.917	34.333
5.	Clinidipine	22.392	12.283	11.725	1.392	-	9.275	15.967	22.525	32.942
6.	Metoprolol	31.667	21.558	21.000	10.667	9.275	-	6.672	13.250	23.667
7.	Atenolol	38.358	28.250	27.692	17.358	15.967	6.672	-	6.558	16.975
8.	Carvedilol	44.917	34.808	34.250	23.917	22.525	13.250	6.558	-	10.417
9.	Nicorandil	55.333	45.225	44.667	34.333	32.942	23.667	16.975	10.417	-

Table 9 Scores of patient information leaflet usefulness assessment questionnaire (PILUAQ)

S.no	Questions		Number answered	Average
1.	**Amount of information**			
	a)	Too much	27	18%
	b)	Adequate	115	76.6%
	c)	Too little	8	5.3%
2.	**Usefulness of the information**			
	a)	Very useful	78	52%
	b)	Useful	61	40.6%
	c)	Not useful	11	7.3%
3.	**Readability of the leaflet**			
	a)	Very easy	96	64%
	b)	Easy	52	34.6%
	c)	Very difficult	2	1.3%
4.	**Understandability of the content**			
	a)	Very easy	58	38.6%
	b)	Easy	84	56%
	c)	Very difficult	8	5.3%
5.	**Usefulness of the PIL**			
	a)	Very useful	81	54%
	b)	Useful	57	38%
	c)	Not useful	12	8%

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