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RESEARCH ARTICLE

EFFECT OF ATORVASTATIN ON E.C.G CHANGES IN CORONARY ARTERY DISEASE

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ABSTRACT

E.C.G is the most widely used test for both the diagnosing and estimating the prognosis of CAD. ST segment and T wave changes are most commonly evaluated parameters of E.C.G. Atorvastatin have found to decrease ischemic events apart from its hypolipidemic effect. The main objective of this open prospective randomized, controlled study was to evaluate the effect of addition of atorvastatin to conventional antianginal treatment on ST segment and T wave changes on E.C.G. The study was conducted for duration of 2 months in 30 patients of CAD (15 in each group). Group A was started on conventional antianginal treatment and group B was started on Atorvastatin 20 mg once a day at night in addition to conventional treatment. The ECG changes were recorded after 15, 30, 45 and 60 days using 12 lead E.C.G. At the end of the study, no significant difference was found in E.C.G changes between the group A and group B. A slight improvement in ST segment changes in group B patients was observed but the effect was statistically not significant. So, addition of atorvastatin to conventional antianginal treatment did not have a significant effect on reversal of ischemic changes on ECG in patients of CAD.

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INTRODUCTION

Coronary artery disease (CAD) is becoming more prevalent every day. There is no longer any doubt that an increase in serum cholesterol is the main reason for the development and the progression of atherosclerosis. Therefore lowering cholesterol level is a key factor in controlling this disease. It is suggested that the association of statins and conventional treatment in patients with stable angina reduces the incidence of ischemia. (Verri *et al.*, 2004) The most widely used test for both the diagnosing and estimating the prognosis of CAD involves recording of electrocardiogram (ECG). In case of acute infarction, ST elevation is typically followed by T wave inversion, Q wave occurring in the same lead. When ischemia is transmural it produces ST elevation and sometime earliest stages of ischemia show tall T wave so called hyperacute T wave. When ischemia is confined to subendocardium it leads to ST segment depression in anterior precordial leads and ST segment elevation in aVR lead. The most important test for diagnosis of CAD & estimating the prognosis involve 12-lead ECG before, during & after exercising on a treadmill. (Goldberger, 2012) As the infarct evolves, the ST segment elevation diminishes and the T waves begin to invert.

The ST segment elevation associated with an inferior myocardial infarction may take up to two weeks to resolve. T wave inversion may also persist for many months and occasionally remains as a permanent sign of infarction. (Morris and Brady, 2002) Statins e.g. atorvastatin lower elevated LDL cholesterol levels, results in substantial reduction in coronary events and deaths from CHD. Therapeutic benefits of statins include plaque stabilization, improvement of coronary endothelial function, inhibition of platelet thrombus formation, and anti-inflammatory activity (Finkel *et al.*, 2009).

It has been found that statins have consistently reduced the cardiovascular risk in both primary and secondary prevention of cardiovascular adverse outcomes. Part of these effects is induced by lipid-independent mechanisms, which render statins a potentially useful therapy in a wide spectrum of patients with CAD. (Schoming *et al.*, 2002) Atorvastatin is one of the most frequently prescribed statin. There are many studies in the literature which shows the effectiveness of atorvastatin and other statins in the prevention of coronary artery studies (Blumenthal *et al.*, 2000; Gaddam *et al.*, 2002; Amarenco *et al.*, 2006; Vondrakova *et al.*, 2010), but there is hardly any study on the role of statins in the reversal of E.C.G changes in CAD patients. The present study was designed to evaluate the effect of addition of atorvastatin to conventional antianginal treatment on ST segment and T wave changes on E.C.G.

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MATERIALS AND METHODS

The present study was conducted by Department of Medicine in association with Department of Cardiology of Andhra Medical College and King George Hospital, Visakhapatnam. 30 patients of CAD were enrolled from both inpatient and outpatient department of Medicine. These cases were selected on the basis of following criteria:-

Inclusion criteria

- Age > 40 years.
- Patient showing the ECG changes of old ischemia
- Patients with ischemia precipitated by stress
- test.

Exclusion criteria

- Patients of hypertension leading to CHF.
- Patients showing hypersensitivity to any drug in the study
- Patients with rheumatic valvular lesion and congenital heart disease on clinical examination.
- Patients with hepatic or renal failure.

Study design and statistical analysis

It was an open prospective randomized, controlled study conducted for duration of 2 months in patients of CAD. The patients fulfilling the inclusion criteria and have none of the exclusion criteria were included after taking written informed consent. The study was conducted with the permission of institutional ethical committee. A detailed history of all patients was obtained and recorded, complete clinical examination was done and ST segment and T wave changes in conventional 12 lead electrocardiogram were recorded at baseline. Then, these patients were randomly divided into two groups of 15 each. Group A was started on conventional treatment like nitrates, antiplatelet drugs (aspirin/clopidogrel), beta-blockers, calcium channel blockers, angiotensin converting enzyme inhibitors depending upon the decision of the physician.

Group B—was started on Atorvastatin 20 mg once a day at night in addition to conventional treatment. The ECG changes were recorded after 15, 30, 45 and 60 days. The changes were statistically analyzed by using chi square and fisher's exact test based on the data, and was analyzed by using SPSS version 20. P value of less than 0.05 was considered as statistically significant.

RESULTS

At baseline

In group A, ST segment was depressed in 3, elevated in 1 and no change was found in 11 patients. In group B, ST segment was depressed in 5, elevated in 2 and no change was found in 8 patients. T wave inversion was present in 15 patients in group A. T wave inversion was present in 12 and absent in 3 patients in group B. Statistical analysis of ECG changes between two groups was insignificant. So both groups were comparable.

ST segment changes in group A:

At 15 days, ST segment was depressed in 3 patients and no change was found in 12 patients, at 30 days, ST segment was depressed in 3 patients and no change was found in 12 patients. At 45 days, ST segment was depressed in 3 patients and no change was found in 12 patients At 60 days, ST segment was depressed in 2 patients and no change was found in 13 patients. ST segment changes were statistically not significant at all visits.

ST segment changes: in group B: At 15 days, ST segment was depressed in 5 patients, elevated in 1 patient and no change was found in 9 patients. At 30 days, ST segment was depressed in 4 patients and no change was found in 11 patients. At 45 days, ST segment was depressed in 3 patients and no change was found in 12 patients and at 60 days, ST segment was depressed in 2 patients and no change was found in 13 patients. After statistical analysis, ST segment changes were not significant at all visits.

Table 1. Comparison of Group A and B patients with and without ST changes

At different time intervals:

St Segment		Depressed No	%	Elevated No	%	No Change No	%	PValue	Significance
Baseline	Group A	3	20	1	6.67	11	73.3	0.58	NS
	Group B	5	33.3	2	13.3	8	53.3		
After 15 days	Group A	3	20.0	0	0	12	80.0	0.38	NS
	Group B	5	33.3	1	6.67	9	60.0		
After 30 days	Group A	3	20.0	0	0	12	80.0	1.00	NS
	Group B	4	26.7	0	0	11	73.33		
After 45 Days	Group A	3	20.0	0	0	12	80.0	1.00	NS
	Group B	2	13.3	0	0	13	86.7		
After 60 days	Group A	2	13.3	0	0	13	86.7	1.00	NS
	Group B	2	13.3	0	0	13	86.7		

Table 2. Comparison of Group A and B patients with ST and T changes with addition of Atorvastatin in addition to conventional treatment

T wave inversion		Absent No	% age	Present No	% age	'p' Value	Significance
Baseline	Group A	0	0	15	100	0.22	NS
	Group B	3	20.0	12	80		
After 15 days	Group A	0	0	15	100	0.22	NS
	Group B	3	20.0	12	80.0		
After 30 days	Group A	0	0	15	100	0.22	NS
	Group B	4	26.7	11	73.3		
After 45 Days	Group A	1	6.67	14	93.3	0.33	NS
	Group B	4	26.7	0	73.3		
After 60 days	Group A	1	6.67	14	93.3	0.33	NS
	Group B	4	26.7	11	73.3		

T wave changes in group A: At 15, 30, 45 and 60 days after treatment, T wave inversion was present in 15,15,14,14 and absent in 0,0,1,1 patients respectively. After statistical analysis T wave inversion changes were not significant at all visits.

T wave changes in group B: At 15, 30, 45 and 60 days after treatment, T wave inversion was present in 12,12,11,11 and absent in 3,3,4,4 patients respectively. After statistical analysis T wave inversion changes were not significant at all visits.

DISCUSSION

The use of atorvastatin has clear cut role in reducing the ischemic events and this effect has been well studied by many authors. The antianginal role of atorvastatin can be attributed to both lipid lowering and non lipid lowering effects. In this study we tried to evaluate whether this anti-ischemic effect leads reversal of E.C.G changes in patients of CAD. The observed mean age of patients of group A was 56.07 ± 4.7 years and group B was 55.80 ± 5.2 years. The study groups were comparable in all respects. We observed that there was slight improvement in ST segment changes in patients on Atorvastatin in addition to conventional treatment (group B) but this effect was statistically not significant. No such improvements were seen in study group A where only conventional antianginal therapy was given. When inter group comparison was done, no significant difference was found between ST segment changes between the both groups. There was no improvement in T wave inversion in either of the study groups. It is known that once infarction sets in, T wave inversion persist for many months and occasionally remains as a permanent sign of infarction (Morris and Brady, 2002). Although statistically not significant, the improvement in ST segment changes towards normal in patients given atorvastatin in addition to conventional treatment demand some additional well designed studies of longer duration and involving adequate sample size. There were some limitations of this study e.g. the study was not blinded, control group was on different drugs depending upon their clinical condition, the study was not powered to detect this difference in E.C.G changes as the sample size was small and sample size calculation was not done before the start of this study. Also the adverse effect profile was not noted during the trial.

From the above discussion, it can be concluded that addition of atorvastatin to conventional antianginal treatment did not have a significant effect on reversal of ischemic changes on E.C.G and studies for longer duration with large number of patients of CAD are required to further explore this effect.

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