ORIGINAL ARTICLE

A Study on Effect of Statins on Development of Type 2 Diabetes Mellitus in a Tertiary Care Hospital, Bangalore, India

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ABSTRACT

Aim: To find out the impact of statins on development of Type II diabetes and effect of statins therapy on blood glucose levels in diabetic patients.
Methodology: A Retrospective and Prospective cross sectional observational study was conducted in inpatient and outpatient of cardiology and internal medicine department of Tertiary Care Hospital. And totally 150 sample collected. Descriptive statistical analysis has been carried out in the present study. Simple percentage and significant P value calculations were conducted to arrive at the conclusion of study.
Result: Out of 98 patients, 54 patients (55.10%) using atorvastatin out of which 35 male patients (64.81%) and 19 female patients (35.18%) had diabetes. 44 patients (44.89%) using rosuvastatin out of which 28 male patients (63.63%) and 16 female patients (36.36%) had diabetes. Out of 31 patients,13 patients (41.93%) using atorvastatin out of which 6 male patients (46.15%) and 7 female patients (53.84%)had no diabetes.18 patients (58.06) using rosuvastatin out of which 14 male patients (77.77) and 4 female patients (22.22%) had no diabetes. Out of 31 patients, 12 patients (38.70%) using statins for IHD, 7 male patient (22.58%) and 5 female patients (16.12%) had no diabetes. 10 patients (32.25%) using statins for dyslipidemia, 8 male patient (25.80%) and 2 female patient (6.45%)had no diabetes. 9 patients (29.03%) using statins other than IHD and dyslipidemia treatment, 5 male patients (16.12%) and 4 female patient (12.90%) had no diabetes.
Conclusion: The patients being prescribed statins should be informed of potential diabetes risks, giving an additional incentive to undertake life style changes which could help diabetic risk as well as lowering CVD risks. Study reveals that there is a risk of developing type 2 diabetes mellitus after statin use between the intervals of 7-10 years' gap. The data suggest that Atorvastatin group decreases lipid profiles though rosuvastatin group markedly reduced.
Key words: Statin, Diabetic, Rosuvastatin, Atorvastatin, blood pressure

INTRODUCTION

The effect of statins on the advancement of type 2 diabetes mellitus (DM) has been contemplated in both randomized controlled preliminaries and meta-examinations[1–5]. In view of the outcomes, the danger of new-beginning DM has been added to names of statins by the US Food and Drug Administration [6]. Notwithstanding, in light of the fact that DM itself is regularly connected with dyslipidemia, hypertension, corpulence, and raised glucose levels, it stays disputable whether just patients who are now at high hazard for creating DM are powerless to statin-initiated DM or patients who are at generally safe for type 2 DM additionally have a hazard for statin-instigated DM. Thusly, all these bewildering variables ought to be considered to decide if a sex distinction exists in helplessness to the improvement of new-beginning DM related with statin use.

Particularly, it has been demonstrated that hypertensive patients without DM have an expanded danger of creating diabetes and a high predominance of insulin obstruction, when contrasted and the hazard and commonness in normotensive subjects[7,8]. Besides, antihypertensive treatment, including both beta-blockers and diuretics, has been appeared to build the danger of new-beginning DM[9,10]. Subsequently, late rules don't prescribe thiazides or beta-blockers in patients with hypertension who are at high danger of creating diabetes[11]. In this way, it is required to consider the nearness of hypertension independently while surveying the effect of statins on the advancement of type 2 DM.

Cardiovascular sicknesses are the main source of horribleness and mortality in created and creating countries[12]. In Brazil, it is the main source of death, with passing from cerebrovascular malady (generally by cerebral ischemic stroke) and ischemic coronary illness (for the most part, intense myocardial localized necrosis – AMI, representing 2/3 of cardiovascular passing – Datasets, 2013). In 2010, the passing rate balanced for age by ischemic myocardial ailment in men was 94/100,000, and in ladies, 62.8/100,000 occupants. In the decade from 2000 to 2010, this death rate remained for all intents and purposes stable, with no proof of noteworthy decrease. In any case, a potential development in this rate will be seen in the coming years, because of the expansion in mortality saw in certain districts of the country[13].

Decreasing the financial effect of cardiovascular illnesses, especially those that have atherosclerosis as their essential pathophysiology, can be accomplished in two different ways: by better control of hazard factors and the improved treatment of the intense ailment itself[14]. Therefore, appropriate treatment of changes in plasma cholesterol levels is of key significance. The expansion in plasma cholesterol is a significant hazard factor for AMI[15], additionally contributing altogether to vascular inclusion in other blood vessel territories[16]. Increases in the degrees of cholesterol contained in low-thickness lipoprotein (LDLc) are firmly related with expanded cardiovascular hazard, paying little respect to age[17]. On the other hand, the decrease of LDLc is obviously connected with chance decrease, especially with the utilization of statins[18]. Statins

decrease the convergence of LDLc by hindering 3-hydroxy-3-methyl-glutaryl-CoA reductase (HMG-CoAR), prompting a corresponding decrease in the danger of cardiovascular disease[18-21] This decrease in hazard is seen in both essential counteractive action and optional, as appeared in a meta-examination directed by the cholesterol treatment trialists' (CTT) joint effort, which remembered information for roughly 170,000 people from 26 randomized preliminaries (statin versus fake treatment, or high-portion versus low-portion statin). This meta-investigation demonstrated a cardiovascular hazard decrease of around 20% for each 39mg/dL decline in LDLc. This hazard decrease is accomplished with a low rate of unfriendly impacts. The principle symptoms with their utilization are myopathy and myalgia. In outrageous cases, there might be rhabdomyolysis, especially simvastatin 80mg, a measurement previously prohibited in certain nations. Treatment with statins was demonstrated to be commonly sheltered and without critical impacts on passing because of disease or other non-vascular causes. Consequently, this class of medications has gotten the most ordinarily recommended on the planet. In the United States, over 25% of grown-ups matured in any event 45 years (30 million people) got statins somewhere in the range of 2005 and 2008, and an expected 56 million might be qualified for treatment with statins under the new American rules[22,23]

Notwithstanding the viability and sufficient wellbeing profile, current proof proposes the relationship between the utilization of statins and the danger of creating type 2 diabetes. More prominent regard for the issue has been given since the distribution of the Justification for the Use of Statins in Primary Prevention: An Intervention Trial Evaluation Rosuvastatin (JUPITER study)[25], which indicated noteworthy advantage of rosuvastatin contrasted with fake treatment in decreasing cardiovascular hazard in grown-ups without cardiovascular malady or determined diabetes to have LDLc <130 mg/dL and PCR ≥2mg/L. In this investigation, we watched an expanded number of patients with recently analyzed diabetes in the gathering that got statin. This outright increment was little yet factually critical in the quantity of announced instances of diabetes. These consequences of the JUPITER study varied from a post hoc investigation performed by The West of Scotland Coronary Prevention Study (Woscops),[26]which included men with critical hypercholesterolemia in essential counteractive action. In this examination, there was an outright lessening of about 1%, and 30% diminishing in relative hazard for creating diabetes related with pravastatin 40mg/day contrasted and fake treatment. The clearly predictable defensive impact was credited by the creators to the conceivable calming impacts of statin. The facts confirm that the quantity of diabetes cases in the Woscops was moderately little, just 139 new cases, and the diabetes indicative criteria were not as per current rules. Investigation of concentrates led after the Woscops demonstrated conflicting connection between statin use and diabetes[27,28].

MATERIALS AND METHODS

A Retrospective and Prospective cross sectional observational study was conducted in inpatient and outpatient of cardiology and internal medicine department of Tertiary Care Hospital. And totally 150 sample collected. The samples are divided into three groups:

Group-A- with diabetes and statin therapy.
Group-B- without diabetes and statin therapy.
Group-C-Without statin therapy and with diabetes.

Patient data profile forms were collected in clinical pharmacy and laboratory department of the hospital and cases with statins and Type 2 diabetes were checked and collected, interview was made with patient to record years' interval for statins first use and development of diabetes. The assessed information was documented and subjected for suitable statistical method. Descriptive statistical analysis has been carried out in the present study. Simple percentage and significant P value calculations were conducted to arrive at the conclusion of study.

RESULT AND DISCUSION

65.33%) using statins out of which 65 male patients (66.32%) with maximum number of 21 at ages between (61-70) and 33 female patients (33.67%) with maximum number of 11 at ages Out of 150 patients in our study,98 patients (between (61-70) had diabetes.31 patients (20.66%)using statins out of which 20 male patient (64.51%) with maximum number of 7 at ages between (71-80) and 11 female patients (35.48%) with maximum number of 5 at ages between (71-80) had no diabetes. In total comparison of 150 patients,65 males (66.32%) and 33 females (33.67%) indicates the presence of diabetes by using statins. 20 males (64.51%) and 11 females (35.48%) indicates absence of diabetes by using statins as shown in Table-1. Stating that males are more prone with and without diabetes by using statins.

Out of 98 patients, 54 patients (55.10%) using atorvastatin out of which 35 male patients (64.81%) and 19 female patients (35.18%) had diabetes. 44 patients (44.89%) using rosuvastatin out of which 28 male patients (63.63%) and 16 female patients (36.36%) had diabetes. Out of 31 patients,13 patients (41.93%) using atorvastatin out of which 6 male patients (46.15%) and 7 female patients (53.84%)had no diabetes.18 patients (58.06) using rosuvastatin out of which 14 male patients (77.77) and 4 female patients (22.22%) had no diabetes. Stating that 129 patients using statins with or without diabetes. The use of atorvastatin (67%) is more than rosuvastatin (66%).

Out of 98 patients,35 patients (35.71%) using statins for IHD, 25 male patient (25.51%) and 10 female patients (10.20%) had diabetes. 32 patients (32.65%) using statins for dyslipidemia, 24 male patient (24.48%) and 8 female patient (8.16%)had diabetes.31 patients (31.63%)using statins without any special disease ,16 male patients (16.32%) and 15 female patients (15.30) had diabetes. Statins (presence of diabetes) are more used as follows: IHD (35.71%)>dyslipidemia (32.65%)>other disease (31.63%).

Out of 31 patients, 12 patients (38.70%) using statins for IHD, 7 male patient (22.58%) and 5 female patients (16.12%) had no diabetes. 10 patients (32.25%) using statins for dyslipidemia, 8 male patient (25.80%) and 2 female patient (6.45%)had no diabetes. 9 patients (29.03%) using statins other than IHD and dyslipidemia treatment, 5 male patients (16.12%) and 4 female patient (12.90%) had no diabetes. Statins (absence of diabetes) are more used as follow: IHD(38.70%)>dyslipidemia> (32.25%)>other disease (29.03%)as shown in table 1.

Out of 150 patients, 21 patients (14%) without using statins have diabetes.5 patients (23.80%) have IHD, 3 male patients (14.28%) and 2 female patients (9.52%).13 patients (61.90%) have dyslipidemia ,8 male patients (38.09%) and 5 female patients (23.80%). 3 patients (14.26%) have obesity ,2 male patients (9.52%) and 1 female patient (4.76%). dyslipidemia with (61.90%) can be the major causes of diabetes. In this comparison, out of 98 patients, 36 patients (36.73%)was studied, others were screened for obesity, hypertension, smoking, family history of diabetes, occurrences of diabetes before starting use of diabetes (Table 2).

The occurrence of diabetes was more for the age group between 51-70 years (10 years' interval for statins first use and development of diabetes). The occurrence of diabetes was more for the age group between31-50 years (8 years' interval for statins first use and development of diabetes). The occurrence of diabetes was more for the age group between 71-90 years (7years interval for statins first use and development of diabetes) (Table 3, Fig. 2).

Table 1: Statin Use for The Treatment of Disease

Statin Use For Disease	Presence Of Diabetes		Absence Of Diabetes	
	Male	Female	Male	Female
Ischemic Heart Disease	25(25.51%)	10(10.20%)	7(25.58%)	5(16.12%)
Dyslipidemia	24(24.48%)	8(8.16%)	8(25.80%)	2(6.45%)
Other Disease	16(16.32%)	15(15.30%)	5(16.12%)	4(12.90%)

Figure 1:Ttype of statins used in patient

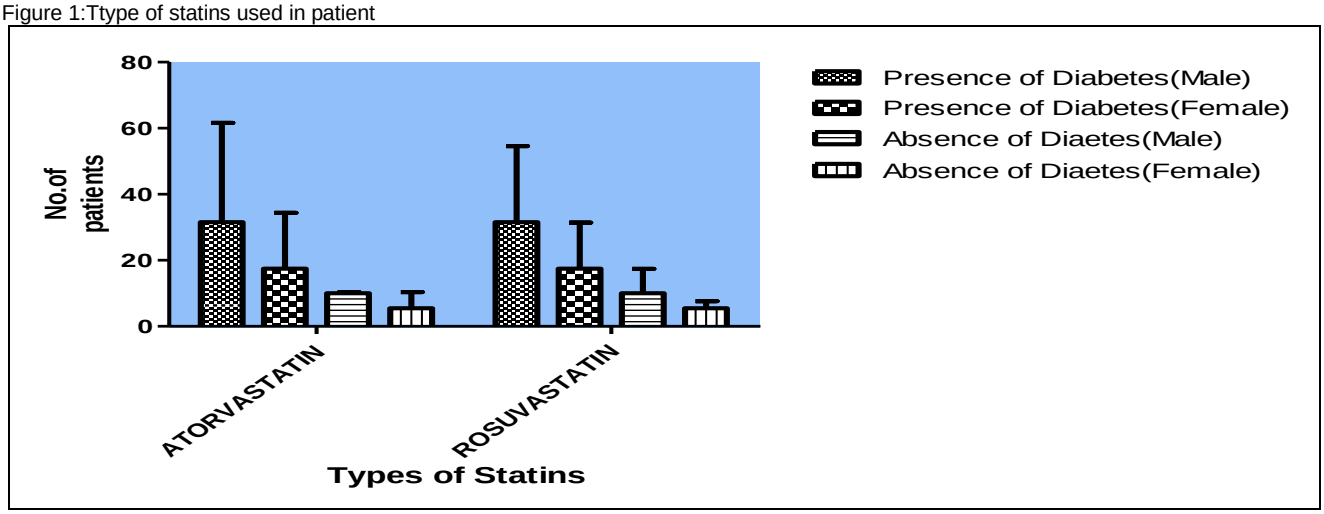


Table 2: Age Wise Distribution- Occurrence of Diabetes

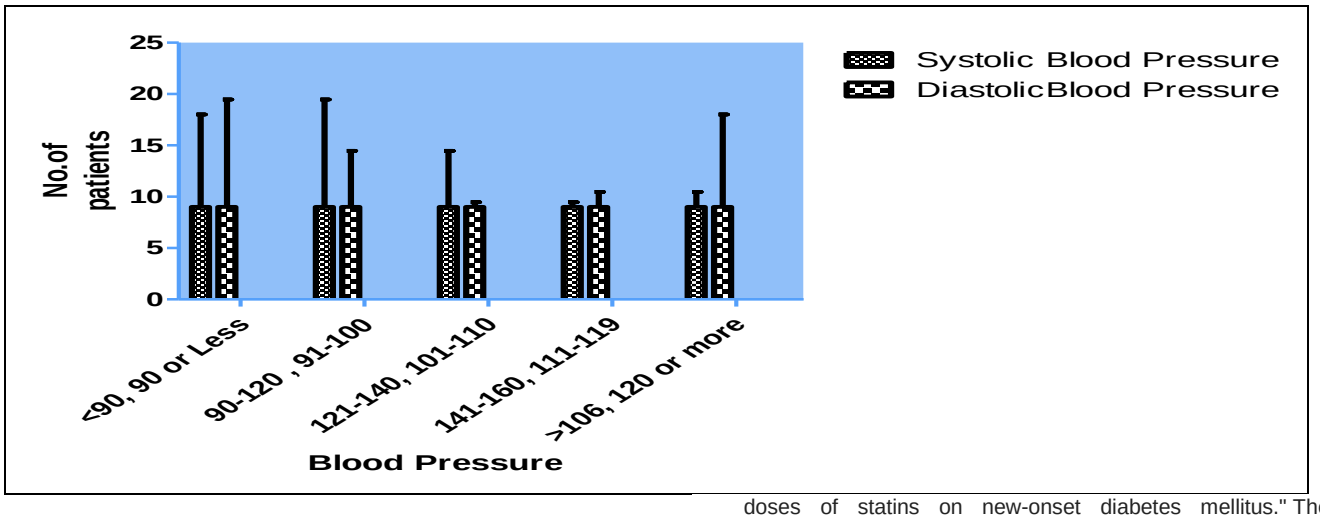
Age Distribution	Statin Use for The First Time		Occurrence Of Diabetes		P value
	Male	Female	Male	Female	
31-50	42 39 42 41 43 47 39	41 40 39	50 48 48 49 46 50 46	49 47 48	P<0.05*
51-70	55 52 54 51 60 58 53 53 56 61 62 52 55 53	54 52 48 59 53 56	66 69 57 60 69 65 67 65 64 70 69 63 65 59	62 65 59 68 60 63	P<0.05*
71-90	73 72 74 77	72 71	80 79 86 84	79 78	P<0.05*
Total number of Patients	25	11	25	11	

*P value<0.05 indicates significant.

Table 3: Effects of Statins On Lipid Parameters

Lipid Parameters	Types Of Statin Given	
	Atorvastatin	Rosuvastatin
LDL(50-130 mg/dL)	86.33mg/dl	99.4mg/dl
HDL(35-60 mg/dL)	44.23mg/dl	46.24 mg/dl
TC(120-200 mg/dL)	152.57mg/dl	164.93 mg/dl
VLDL (5-40 mg/dL)	28.98mg/dl	22.51mg/dl

Figure 2: blood pressure in patient



CONCLUSION

The evidence now available suggests that statins are associated with increased risk of diabetes, with high risk for type 2 diabetes. However, people with existing cardiovascular disease or any disorders (dyslipidemia, stroke and ischemic heart disease) given the overwhelming lifesaving benefits statins. The patients being prescribed statins should be informed of potential diabetes risks, giving an additional incentive to undertake life style changes which could help diabetic risk as well as lowering CVD risks.

Study reveals that there is a risk of developing type 2 diabetes mellitus after statin use between the intervals of 7-10 years' gap. The data suggest that Atorvastatin group decreases lipid profiles though rosuvastatin group markedly reduced.

In our study, some physicians prescribe statins without presence of high lipid profile and other heart problems, just for the prevention of future heart problem at any age, this irrational using of statins and risk for onset of diabetes must be clarified and starting age for use of statins must be guide lined. More research should be done on this study in future for more clarification.

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