Effect of Statin therapy on blood glucose level in Diabetic patients

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Abstract

OBJECTIVES: To investigate the effect of statin therapy in random glucose level and fasting plasma glucose and to analyze whether statin use increases the risk of Diabetes Mellitus. To improve the health-related quality of life in hyperlipidemic and diabetic patient. **METHODS:** A prospective observational study was conducted in 93 diabetic patients for a period of 6 months at Vivekanandha Medical Care Hospital, Tiruchengode. The drugs Atorvastatin and Rosuvastatin prescribed for Hyperlipidaemia were analyzed for its effect on blood glucose level in Type 2 Diabetes Mellitus patient. Microsoft Excel 2019 and SPSS version 16.0 software was used to analyse the data. **RESULTS:** Among patients with diabetes, RBG increased with statin use from 171 mg/dL to 303 mg/dL. The mean change from baseline to endpoint in RBG was 132mg/dL in statin users and Fasting blood glucose among diabetes patients with statin use increased from 148 mg/dL to 20 mg/dl. **CONCLUSION:** Statin use is associated with rise of blood glucose levels over a mean duration of 6 months in patients with diabetes. Periodic screening and monitoring glucose levels are warranted during prolonged statin therapy in patients at higher risk of developing diabetes.

KEYWORDS: Type 2 Diabetes Mellitus, Hyperlipidemia, Atorvastatin, Rosuvastatin, Blood glucose level.

INTRODUCTION

Dyslipidaemia plays an important role in mortality and development of Coronary Heart Disease. The only way to reduce the chances of coronary heart disease is by lowering the plasma cholesterol level. Statins are used for regulating hyperlipidemia and coronary heart disease risk [1]. Statin therapy has been shown to be effective in lowering low-density lipoprotein cholesterol (LDL-C) levels 20-50%, as well as lowering triglyceride levels 10-20% and causing a possible rise in serum high-density lipoprotein cholesterol (HDL-C) levels (5-10%). Although these drugs have a good safety profile, there is an increased risk of developing diabetes [2].

The major mechanism is glucose transporter 4 (SCL2A4 or GLUT4) is responsible for peripheral insulin-mediated glucose influx which mediates glucose uptake in adipocytes and striated muscle cells (skeletal muscles). Signaling pathway is initiated by GLUT4 recruitment from its intracellular storage to the plasma membrane, stimulated by insulin-receptor tyrosine kinase phosphorylation. Statin has been shown to induce insulin resistance through reduction of GLUT4 translocation to the cell membrane [3]. So in this study effect of statin on blood glucose level was assessed in this study.

MATERIALS AND METHOD

This is a Prospective Observational Study. A protocol was prepared and submitted, which was approved by Institutional Ethics Committee (Ref. No: SVCP/IEC/JAN/2019/07 dated 10/01/2019) of Vivekanandha Medical Care Hospital, Tiruchengode, which is tertiary care hospital. In this study 105 patients were screened and 93 diabetic patients were included in the study after getting patient's consent. All the information of patients aged 18 years and above was recorded. Provision was given in the format for entry of details like blood sugar levels, hematology, biochemistry, laboratory investigations and diagnosis. The drug chart covers drug name, dose, frequency, route of administration, days of treatment and any interventions.

STATISTICAL ANALYSIS

The data was analysed using Microsoft Excel 2019 and SPSS version 16.0. Collected data was entered in Microsoft excel Spreadsheet for further interpretations. Patient demographics and blood glucose levels of statin users were assessed by descriptive statistics. The paired t-student test was analysed using SPSS version 16.0.

RESULTS

This study was conducted on 93 type 2 diabetes mellitus patients in the department of diabetology and general medicine at a 300 bedded tertiary care teaching hospital.

Table 1: Effect of Statin on Random Blood Glucose Levels (n=93)

Study Groups	Random Blood Glucose Levels (mg/dL) [mean±SD]		p-value
	Baseline	**Endpoint**	
Control group (n=31**)**	116.61±13.69	129.12±17.15	<0.0001
Diabetes with Statin users (n=62**)**	171.93±26.28	303.90±67.27	

Table 2: Effect of Statin on Fasting Blood Glucose Levels (n=93)

Study Groups	Fasting Blood Glucose Levels (mg/dL) [mean±SD]		p-value
	Baseline	**Endpoint**	
Control group (n=31**)**	81.81±9.64	92.06±14.52	<0.0001
Diabetes with Statin users (n=62**)**	148.23±29.14	203.57±54.74	

DISCUSSION

In this prospective observational study using random and fasting blood glucose level, there was a statistical significant between statin therapy and increase in blood glucose level in diabetic individuals. The mean value of random blood glucose increased from 171mg/dL to 303mg/dL in diabetes patients with statin use and the mean fasting blood glucose among diabetes patients with statin use increased from 148 mg/dL to 203 mg/dl. This results shows use of statins had positive effects on changes in blood glucose level.

A study based on risk of diabetes in patients who treated with HMG-CoA reductase inhibitors, it is retrospective study done by Cho, Y., Choe 2015, in which 3,680 patients without DM or impaired FBS who started receiving statin treatment for cholesterol control. The incidence of DM was significantly higher in the Pravastatin group when compared to that with the other statins. This study is a controversy about whether the risk of DM differs among statins. They concluded that Pravastatin has greater risk of new-onset DM when compared with that of Simvastatin [4].

The pilot study was done to assess the effect of atorvastatin on insulin resistance and pancreatic beta-cell function by homeostasis model assessment-2 (HOMA2) index. 51 patients were randomly allocated into 2 groups and FPG was obtained as baseline. Results showed Atorvastatin non-significantly increased fasting serum insulin and there was a decrease in percent beta-cell function. The study concluded that atorvastatin did not produce statistically significant effects in insulin resistance and pancreatic beta-cell function in type 2 diabetes patients [5].

The effect of three different regimens of simvastatin vs rosuvastatin vs simvastatin/ezetimibe on parameters of insulin resistance was compared among 153 patients randomly allocated to receive for 12 weeks. At week 12 results showed all three treatment regimens significantly increase HOMA-IR and fasting insulin levels. No significant changes in FPG, HbA1c and HOMA-B levels were noted in all three groups. Thus study concluded the three treatments regimens are associated with adverse effect on insulin resistance [6].

Population based cohort study analyzed relationship between particular statins and new onset diabetes. Patients aged 66 and older without diabetes and started treatment with statin were included. Simvastatin, atorvastatin and rosuvastatin showed increased risk of NOD compared with pravastatin. There was no significant risk among fluvastatin and lovastatin [7].

An experimental study using atorvastatin, pravastatin, rosuvastatin, and pitavastatin was done to determine the effect of different statins on the induction of diabetes mellitus. Results shows that atorvastatin and pravastatin decreased glucose transporter (GLUT)-2. Atorvastatin, Pravastatin, and Rosuvastatin inhibited GLUT-4, p-AKT, p-GSK-3β, and p-p38 MAPK levels in HSkMCs. Study concluded that statins increase risk new-onset T2DM increasing with higher doses of statin therapy [8].

To maintain the cardio vascular benefit and to minimize the adverse hyperglyemic effect of statin screening for diabetes on the initiation of statins would be helpful for diagnosis and proper glucose control in patients on statin therapy.

CONCLUSION

The study concluded that statin use was associated with rise of blood glucose levels over a mean duration of 6 months in patients with diabetes. Periodic screening and monitoring glucose levels are warranted during prolonged statin therapy in patients at higher risk of developing diabetes. Due to increased prevalence of statin usage in day-to-day practice, it is important for further investigation. Careful consideration regarding the benefits and risks when determining statin treatment is necessary.

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