Original Article

Effect of Rosuvastatin Alone and Combination with Omega-3 Fatty Acid on Cholesterol and Fasting Blood Glucose Levels in Hypercholesterolemic and Diabetic Patients

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ABSTRACT

Objective: To compare the effect of rosuvastatin and rosuvastatin omega-3 fatty acid on serum cholesterol and fasting blood glucose levels in hypercholesteremic and diabetic patients.

Study Design: Cross-Sectional Study

Place and Duration of Study: This study was conducted at the department of pharmacology and therapeutics with the collaboration of Cardiology OPD and ward LUHMS Jamshoro/Hyderabad for six months from March, 2020 to September, 2020.

Materials and Methods: Serum cholesterol & fasting blood sugar level was done from gel tubes bottles by using serum after centrifugation at 3,500 revolutions per minute for 10 minutes. The data was entered and analyzed using SPSS version 23.0.

Results: In this study total of 240 patients of hypercholesteremia and diabetics were studied. patients were divided into two groups as per treatment. Baseline serum cholesterol and fasting blood sugar were found to be statistically insignificant in both groups. After 30 days' average serum cholesterol was significantly decreased 201.55±28.19 mg/dL in group B, as compared to group A as 230.62±32.74 mg/dL (p-0.001). However, after 30 days' average of FBS was statistically insignificant. After 60 days of treatment, the average serum cholesterol was significantly decreased to 180.17±18.10 mg/dL in group B, as compared to group A as 210.59±25.44 mg/dL (p-0.001). However, after 30 days' average of FBS was decreased but still statistically insignificant according to study groups (p-0.451).

Conclusion: It was concluded that serum cholesterol significantly decreased among the combined treatment group**.** Administration of Omega-3 fatty acids play important role in preventing hyperglycemia among statin treatment patients**.**

Key Words: Serum cholesterol, FBS**,** rosuvastatin, mega-3 fatty acid

Citation of article: Solangi AA, Kumar G, Rathi N, Qazi N, Mughal MA, Zaman Q. Effect of Rosuvastatin Alone and Combination with Omega-3 Fatty Acid on Cholesterol and Fasting Blood Glucose Levels in Hypercholesterolemic and Diabetic Patients. Med Forum 2021;32(12):19-23.

INTRODUCTION

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Received: July, 2021
Accepted: October, 2021
Printed: December, 2021

All across the world, patients with or at risk for cardiovascular disease are prescribed statins (hydroxy-3-methylglutaryl coenzyme A reductase inhibitors) (CVD).[1] Cardiovascular disease (CVD) can be prevented in large part by lowering the level of LDL cholesterol in the blood. "Coronary heart disease risk equivalent": Diabetes is now widely accepted as a risk factor. [2] Individuals with type 2 diabetes are more likely to suffer from dyslipidemia, which has been linked to an increased risk of cardiovascular disease death in these patients (CVD). [2]

Diabetic patients with dyslipidemia are typically treated with statins as the first line of pharmacological intervention.

It is well accepted that statin medication lowers LDL-C levels, although other lipoproteins, such as HDL-C, also have a role.[3] Currently, seven FDA-approved statins are widely used, and each has a unique benefit-risk profile.

According to the American Heart Association (AHA), CVD influences 83.6 million people in the US, accounting for 32.3% of all deaths, and is a major cause

of mortality.[4] According to the AHA, 0.0154 billion Americans are affected by atherosclerotic CVD.[4] In the US, CHD, which encompasses CAD, MI, UA, and HF, is the greatest cause of mortality for both females and males.[4] The incidence of CHD is expected to increase by 106 billion dollars in direct healthcare expenditures by 2030.[4] Because greater LDL-c levels have been linked to atherosclerotic CVD in both epidemiologic and experimental investigations, pharmacological methods to reduce risk have centered on LDL-c lowering as a major objective.[4,5] Low HDL-c concentrations have been reported as independent markers of CHD in epidemiologic studies, demonstrating an inverse relationship between CVD and HDL-c.[5] Combining niacin or fibrate with any statin can enhance HDL-c and lower triglycerides more effectively than statin treatment individually.[5] In 2009, the AHRQ published an evidence study contrasting statin intensification with combinations of various lipid-modifying drugs.[5,6] The NCEP's ATP-3 guidelines included recommendations for when to start lipid-lowering medication depending on LDL-c levels and CHD risk factors, as well as LDL-c targets for ideal CHD risk minimization.[6] These studies show that "add-on" combined treatment improves cholesterol outcomes but does not diminish atherosclerosis or lower rates of CVD-associated death, MI, stroke, or revascularization.[6] This research puts into question earlier beliefs that reducing LDL-c or boosting HDL-c is a good predictor of better clinical results, and it emphasizes the necessity of patient-centered health outcomes in assessing the efficacy of lipid-modifying medications.[6,7] Long-term usage of rosuvastatin produces a rise in transaminase (hepatic enzyme), which is destructive to hepatocytes, as well as DM through raising insulin resistance.[8,9]

MATERIALS AND METHODS

This cross-sectional study was performed on 240 patients with a history of hypercholesterolemia in the department of pharmacology and therapeutics with the collaboration of Cardiology OPD and ward LUHMS Jamshoro/Hyderabad for six months from 08-03-2020 to 07-09-2020. Adult patients of either sex, age 30 to 70 years, and diagnosed cases of hypercholesterolemia with diabetes were included while those patients with a history of hepatitis, renal failure, carcinomas, Pregnant and lactating mothers were excluded. All the patients were divided into two equal groups. Group A (n = 120) consisted Rosuvastatin 10 mg O.D and Group B (n = 120) consisted Rosuvastation 10mg 1O.D+Omega-3 fatty acids 500mg 1 O.D. Patients were enrolled through informed consent for participation in my study and admitted with diagnosed cases of hypercholesterolemia and diabetes in cardiac-OPD Department of cardiology LUHMS Jamshoro/ Hyderabad. The sample was labeled by patient's codes & date, then the sample was sent immediately to the DR laboratory.

Serum cholesterol & fasting blood sugar level was done from gel tubes bottles by using serum after centrifugation at 3,500 revolutions per minute for 10 minutes. Tests were performed through Hitachi Cobas C 311 analyzer (for Serum cholesterol and fasting blood sugar).

Statistical analysis:

After the collection of data, the analysis was conducted by using Statistical Package for Social Science (SPSS) software, version 20.0. Frequency and percentage were computed for a qualitative variable like gender. Mean and standard deviation was computed for quantitative variables like age, blood Pressure; serum cholesterol. P-value ≤ 0.05 was considered statistically significant.

RESULTS

In this study total of 240 patients of hypocholesteremia and diabetics were studied. patients were divided into two groups as per treatment. The mean age was 43.33$\pm$7.56 years in group A (Rosuvastatin10 mg) and 43.33$\pm$7.56 years was in group B (p-0.087) (p-0.087). **Table.1**

Out of 120 patients of group A, 58 were males and 65 were females, while out of 120 patients of group B 62 were males and 55 were females. However, gender comparison among both groups was statistically insignificant (p-0.075). **Table**.1

Out of all patients of group A overweight (25-30 or >30 Kg/m2) patients were 68 and the remaining were seen with normal BMI, while in group B overweight (25-30 or >30 Kg/m2) patients were 72 and 52 were presented with normal BMI. **Table.1**

In this study baseline, average serum cholesterol was 260.22$\pm$33.32 mg/dL in group A (Rosuvastatin 10 mg) and 153.19$\pm$19.57 mg/dL was in group B (Rosuvastation 10 mg 1 O.D+Omega-3 fatty acids 500mg), the average of serum cholesterol was statistically insignificant as per study group at baseline (p-0.866). Bassline average of FBS was 155.33$\pm$20.11 in group A (Rosuvastatin 10 mg) and 153.19$\pm$19.57 mg/dL was in group B (Rosuvastation 10mg 1O.D+Omega-3 fatty acids 500mg), these findings of FBS average were also statistically insignificant according to study groups (p-0.472). Table.2

In this study after 30 days' average serum cholesterol was significantly decreased 201.55$\pm$28.19 mg/dL in group B (Rosuvastation 10mg 1O.D+Omega-3 fatty acids 500mg), as compared to group A (Rosuvastation 10 mg) as 230.62$\pm$32.74 mg/dL (p-0.001). However, after 30 days average of FBS was decreased to 120.33$\pm$20.11 in group A (Rosuvastatin10 mg) and 135.19$\pm$19.57 mg/dL was in group B (Rosuvastation 10mg 1O.D+Omega-3 fatty acids 500mg), while these findings of FBS average were still statistically

insignificant according to study groups (p-0.148). Table 2.

Table No.1: Distribution of patients according to the baseline characteristics between the treatment groups (n=240)

Baseline characteristics	Group A (n=120)	Group (B n=120)	p-value
Age (Mean ±SD)	46.34±6.35	43.33±7.56	0.087
Gender			
Male	58	65	0.64
Female	62	55	
Body Mass Index (Kg/m^2)			
<18 Kg/m2	04	06	0.066
18-25 Kg/m2	48	42	
25-30 or >30 Kg/m2	68	72	

Group A= Rosuvastatin 10 mg O.D
Group B= Rosuvastation 10mg 1 O.D+Omega-3 fatty acids 500 mg 1 O.D

Table No.2: Distribution of patients according to the comparison of mean cholesterol and Fasting Blood Sugar values at baseline, after 30 and 60 days between the treatment groups (n=240)

At baseline	Group A (n=120)	Group (B n=120)	p-value
Fasting blood sugar (baseline)	155.33±20.11 mg/dL	153.19±19.57 mg/dL	0.866
Serum cholesterol (baseline)	260.22±33.32 mg/dL	248.30±40.55 mg/dL	0.472
After 30 days			
Fasting blood sugar	135.19±19.57 mg/dL	120.33±20.11 mg/dL	0.148
Serum cholesterol	230.62±32.74 mg/dL	201.55±28.19 mg/dL	0.001
After 60 days			
Fasting blood sugar	130.55±18.24 mg/dL	118.20±21.44 mg/dL	0.451
Serum cholesterol	210.59±25.44 mg/dL	180.17±18.10 mg/dL	0.001

Results are presented as Mean ± Standard Deviation
* P-value is statistically significant calculated by student's t test
Group A= Rosuvastatin10 mg O.D
Group B= Rosuvastation10mg1O.D+Omega-3 fatty acids 500mg 1 O.D

After 60 days' treatment the average serum cholesterol was significantly decreased as 180.17±18.10 mg/dL in group B (Rosuvastation 10mg 1O.D+Omega-3 fatty acids 500mg), as compared to group A (Rosuvastation 10 mg) as 210.59±25.44 mg/dL (p-0.001). However, after 30 days' average of FBS was decreased to 118.20±21.44 mg/dL in group B (Rosuvastation 10mg 1O.D+Omega-3 fatty acids 500mg), as compared to group A (Rosuvastatin10 mg) as 130.55±18.24 mg/dL, while these findings of FBS average were still statistically insignificant according to study groups (p-0.451). Table 2.

DISCUSSION

In this study total of 240 patients of hypocholesteremia and diabetics were studied. The findings of this study showed that after 30 days' average serum cholesterol was significantly decreased 201.55±28.19 mg/dL in group B (Rosuvastation 10mg 1 O.D+Omega-3 fatty acids 500mg), as compared to group A (Rosuvastatin 10 mg) as 230.62±32.74 mg/dL (p-0.001).

In this study, after 60 days treatment the average serum cholesterol was significantly decreased as 180.17±18.10 mg/dL in group B (Rosuvastation 10mg 1 O.D+Omega-3 fatty acids 500mg), as compared to group A (Rosuvastatin 10 mg) as 210.59±25.44 mg/dL (p-0.001). This was similar to the study of Hisao Ogawa et al.[10] who reported that Low-density lipoprotein cholesterol levels were also decreased at 12 months: −34.79% in the rosuvastatin group and −32.78% in the atorvastatin group.

However, after 30 days' average of FBS was decreased to 118.20±21.44 mg/dL in group B (Rosuvastation 10mg 1 O.D+Omega-3 fatty acids 500mg), as compared to group A (Rosuvastatin 10 mg) as 130.55±18.24 mg/dL, while these findings of FBS average were still statistically insignificant according to study groups (p-0.451). Samir Maruti Adsule et al.[11] found that Rosuvastatin reduced levels of serum cholesterol after a 12-week treatment. The statistical significance of the changes in lipid parameters following treatment was strong (P 0.001). The pilot trial with rosuvastatin undertaken by Gleuck et al. at. The Cholesterol Center, Jewish Hospital, Cincinnati, USA, is in agreement with these finding.[12] A statistically significant difference was detected between atorvastatin and rosuvastatin in the lowering of LDL-C levels after 12 weeks of treatment, according to Hrishikesh Kashyapa and colleagues.[13] According to the results of this study, diabetic dyslipidemic patients agree with the findings of the ANDROMEDA and URANUS trials, as well as the CORALL and LISTEN studies, which were all conducted on diabetic patients.[10,14–16]

Another study found that both atorvastatin and rosuvastatin increased HDL-C levels significantly after 6 weeks and 12 weeks of medication, however, the difference between the two groups was not statistically significant at 6 weeks. When it came to HDL-C levels at the end of 12 weeks, rosuvastatin had a statistically significant advantage over atorvastatin (11.16 percent vs 7.1 percent). This study's findings are comparable to those of this one. The LISTEN and ASTRO-2 trials on Japanese patients and the investigation by Adsule et al. on Indian volunteers yielded the same results.[10,17,18] It

has been found that atorvastatin and rosuvastatin+omega-3 fatty acid have statistically significant effects on HDL-C levels in diabetic dyslipidemic patients, however, there are no significant differences across groups.[14–16]

Results from this study show that both regimens are safe and tolerable, which is consistent with earlier studies.[10,15,16]

An alternative trial in patients with type 2 diabetes mellitus (URANUS) demonstrated no statistically significant differences between rosuvastatin and atorvastatin in terms of HDL-C levels after four weeks of treatment.[19] This finding contrasts with that of Hunninghake et al., who found that rosuvastatin led to greater increases in HDL-C concentration.[20]

Rosuvastatin 10 mg and rosuvastatin+omega-3 fatty acid was found to be comparable in patients with hypercholesterolemia in earlier research.

In three different studies, rosuvastatin 10 mg and rosuvastatin+omega-3 fatty acid was more effective than atorvastatin 10 mg alone a reducing LDL-C after six weeks of treatment in patients with hypercholesterolemia (LDLC 160 and 250 mg/dL [4.1 and 6.5 mmol/L]), CHD and low HDL-C in 461 patients (aged 40–80 years), and type 2 diabetes in 263 patients (45.8 percent vs. 42.6 percent)[21–23], rosuvastatin 10 mg was also considerably more effective than other statins at reducing LDL-C (47.0 percent vs. 43.7 percent, p 0.001) in an 8-week study of 3140 high-risk patients with hypercholesterolemia and CHD, atherosclerosis, type 2 diabetes or a 10-year CHD risk > 20%.[24].

CONCLUSION

As the study concluded the combined therapy of rosuvastatin with Omega-3 fatty acids was found to be effective in the treatment of hypercholesteremia among diabetes patients. Administration of Omega-3 fatty acids play important role in preventing hyperglycemia among statin treatment patients. More large-scale studies are recommended on this subject**.**

Author's Contribution:

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Conflict of Interest: The study has no conflict of interest to declare by any author.

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