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Efficacy of Rosuvastatin vs Atorvastatin in High Risk Dyslipidemic Patients

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Abstract

Objectives: To compare the lipid lowering efficacy of rosuvastatin and atorvastatin in high risk dyslipidemic patients.

Study design: Randomized controlled trial

Place and duration of study: Department of cardiology, PAEC General Hospital, Islamabad, from 1st of December 2023 to 31st of March 2024.

Methods:

A total of 230 high risk dyslipidemic patients above the age of 18 years reporting at out-patient department were added in this study. These patients were divided in to 2 equal groups where patients in Group R were given rosuvastatin 20 mg/day while patients in Group A were given Atorvastatin 20 mg/day for 8 weeks. Venous blood samples were arranged at the start and at the end of study with patients having at least 12 hours fasting.

The efficacy of both the treatments were evaluated on the basis of effects on the total cholesterol (TC), low density lipoproteins cholesterol (LDL C), triglycerides (TG) and high density lipoprotein cholesterol (HDL C) levels. The percentage of patients achieving the target levels of TC and LDL C was also compared between the 2 groups.

Results: The Mean±SD of age in this study was 55.54±8.05 years. After 8 weeks of treatment, the results showed a significantly decreased levels of TC (184.98±20.84 Vs 192.55±18.84, p=0.004) and LDL C (128.59±19.65 Vs 134.09±18.01, p=0.028) in Group R compared to Group A. Moreover, significantly more patients achieved the target levels of TC (64.34% Vs 50.43%, p=0.032) and LDL C (20.87% Vs 10.43%, p=0.029) in Group R compared to Group A. There were also decreased levels of TG and increased levels of HDL C in Group R compared to Group A, however, this difference was statistically non-significant.

Conclusion: Rosuvastatin provides better lipid-lowering efficacy compared to atorvastatin in high risk dyslipidemic patients.

Keywords: Atorvastatin, Dyslipidemic, High risk patients, Rosuvastatin.

Introduction:

Coronary heart disease (CHD) is among the major causes of global incidences of mortality and is linked to variety of risk factors including obesity, smoking and dyslipidemia.[1,2] Dyslipidemia is characterized by elevated low density lipoprotein cholesterol (LDL C) and/or triglyceride (TG) and lowered high density lipoprotein cholesterol (HDL C) levels. The global statics reveal that dyslipidemia doubles the cardiovascular disease (CVD) risk, including it in the list of most commonly found risk factors for CVD and ranked 3rd after hypertension and dietary anomalies.[3,4]

The data from the majority of European countries mention hypercholesterolemia as the most common cardiovascular (CV) events risk factor.[5] A Chinese report estimates an approximate number of CV events linked to this increased levels of serum cholesterol as high as 9.2 Million by end of year 2030.[6] Even in the low economic African nations, the prevalence of dyslipidemia is reported to be 25.5%, where raised levels of LDL C was found in 28.6% and raised levels of TGs in 17% of the population and lowered levels of HDL C in 37.4%of population. [7]

There is plenty of data sharing that the lipid-lowering treatment reduces the CHD events in high risk (HR) patients.[8] Optimization of lipid lowering strategies is therefore crucial to prevent CV events and premature mortality.[4] Statins are a class of drugs which work by inhibiting the actions of the enzyme HMG-CoA reductase, involved in the synthesis of cholesterol. They are considered the most effective drugs along with dietary guidance and exercise which controls the hypercholesterolemia and decreases the risk of CV disease.[9,10,11] A number of statins have been introduced and studied during last decade including simvastatin, atorvastatin, pravastatin, pitavastatin and rosuvastatin.[12]

Atorvastatin and rosuvastatin are the 2 most commonly used statins and their efficacy has been reported in different clinical trials.

Rosuvastatin has a unique sulfur structure which has given special clinical properties to this drug. Clinical trials show that rosuvastatin is more effective at lowering the levels of cholesterol across all dose ranges (10-40 mg per day) compared to other molecules in this class. With this efficacy, rosuvastatin is proven to reduce the CV events while causing lesser adverse effects than other statins.[13]

As mentioned above, statin has been shown to benefit patients in different trials, however, all statins don't have similar efficacy in achieving the desired levels especially in patients with high risk of developing CHD. It is also found that genetic and ethnic variety has impact on the effectiveness of treatment among populations.[14,15] Some international studies have also compared the efficacy of these 2 important statins in different type of patients, however, very few studies have been conducted in Pakistani population comparing rosuvastatin and the other commonly used lipid lowering agent, atorvastatin in patients with high risk dyslipidemia (HRD).

This study was therefore planned to determine the efficacy of rosuvastatin in comparison to atorvastatin in HRD patients in our local population. The results of this study will help our clinicians to select the evidence based statin for providing effective control of dyslipidemia and to reduce the future CV risk.

Methodology:

This randomized controlled trial was conducted at the Department of cardiology, PAEC General Hospital, Islamabad, from 1st of December 2023 to 31st of March 2024 over a period of 4 months.

Sample size was calculated with following assumptions using OpenEpi calculator:

Alpha = 5% (two sided), Power= 80%

p1 (Patients achieving the targets of total cholesterol with rosuvastatin) = 51.1%

p2 (Patients achieving the targets of total cholesterol with atorvastatin) = 32.6%.[16]

Estimated sample size:

n1= 111, n2=111, estimated sample size was 222 however we included 230 patients in the trial.

A total of 230 HRD patients above the age of 18 years reporting at out-patient department were added in this study and then divided in to two equal groups through computer generated sheet.
Exclusion criteria was set as primary hypothyroidism, nephritic syndrome, un explained increases in creatine kinase (CK) levels to three times upper limit of normal, allergy to the class of statins, continued use of thiazide diuretics, use steroid hormones which may increase risk of rhabdomyolysis. Patients with secondary hyperlipidemia, renal failure or active liver disease were also excluded.
Patients in Group R were given rosuvastatin 20 mg/day while patients in Group A were given atorvastatin 20 mg/day for 8 weeks.
Venous blood samples were arranged at the start and at the end of study with patients having at least 12 hours fasting.
The efficacy of both the treatments was evaluated on the basis effects on the levels of total cholesterol (TC), LDL C, TGs and HDL C. The percentage of patients achieving the target levels of TC and LDL C was also compared between the 2 groups.
HRD was declared on the basis of guidelines for the prevention dyslipidemia in adults (ATP III guidelines) when LDL-C levels were between 130-160 mg/dl while TC levels between 200-240 mg/dl with at least one or more risk factors out of, age (males ≥45/ females ≥55 years), HDL C≤ 40mg /dl, family history of early onset of CHD, obesity and smoking.[1]
Target level of TC was set as <200 mg/dl while target for LDL-C was < 100 mg/dl in accordance with ATP III guidelines. [2]
Approval of conducting the study was taken from hospital's ethical committee before start of the study.
The purpose of study was informed to the participants and written consent was obtained.
Data was analyzed using SPSS version 25. Quantitative variables were calculated in form of Mean±SD while qualitative variables were presented in form of frequency and percentage. Study outcomes were compared between the 2 groups by applying Chi-square test and independent t-test, where p ≤0.05 was considered statistically significant.

Results:
The Mean±SD of age in this study was 55.54±8.05 years while the age range of 40-69 years. The number of male patients was 137 (59.57%) while the number of females was 93 (40.43%). The details of demographics and clinical findings in both the groups are shown in Table-I.

Table-I: Demographics and clinical findings
n=230

Demographics and Clinical findings		**Group R n=115**	**Group A n=115**
Age (Mean±SD) years		56.20±7.96	55.04±8.18
Gender	**Male n (%)**	67 (58.26)	70 (60.87)
	Female n (%)	48 (41.74)	45 (39.13)
BMI (Mean±SD)		30.47±4.44	29.99±4.86
Smoking n (%)		31 (26.95)	34 (29.56)
Hypertension n (%)		65 (56.52)	70 (60.87)
Diabetes n (%)		49 (42.6)	54 (46.95)

Laboratory investigations were conducted for finding the baseline lipid profile of patients in both the groups as shown in Table-II.

Table-II: Baseline lipid profile
n=230

Baseline lipid profile	Group R n=115	Group A n=115
TC (Mean±SD) mg/dl	220±28.24	226.94±33.68
LDL C (Mean±SD) mg/dl	156.13±7.87	155.44±10.78
TG (Mean±SD) mg/dl	240.86±24.85	236.46±20.75
HDL C (Mean±SD) mg/dl	38.96±6.65	37.97±5.17

The results of laboratory investigations after 8 weeks of treatment showed a significantly decreased levels of TC and LDL C in Group R compared to Group A, however, no significant difference was observed for the levels of TG and HDL C. The number of patients achieving target levels of TC and LDL C was also significantly higher in Group R compared to Group A, as shown in Table-III.

Table-III: Lipid profile after 8 weeks
n=230

Baseline lipid profile	Group R n=115	Group A n=115	p-value
TC (Mean±SD) mg/dl	184.98±20.84	192.55±18.84	0.004
LDL C (Mean±SD) mg/dl	128.59±19.65	134.09±18.01	0.028
TG (Mean±SD) mg/dl	196.18±24.65	203.08±30.11	0.058
HDL C (Mean±SD) mg/dl	42.41±4.80	41.32±3.72	0.055
Patient achieving target TC n (%)	74 (64.34)	58 (50.43)	0.032
Patient achieving target LDL C n (%)	24 (20.87)	12 (10.43)	0.029

Discussions:

The efficacy of statins in improving the lipid profile of patients is well established, however, studies have shown difference among different molecules regarding this efficacy. Moreover, this efficacy also need to be studied in different races and in variety of patient's type.

Wang G compared the efficacy between these two statins in patients with HRD. The results of this study shared that the patients on rosuvastatin had significantly reduced levels of TC and LDL C than atorvastatin (35.2% Vs 29%, P<0.05 and 45.3% Vs 39.2%, P<0.05, respectively). Moreover, higher number of patients achieved the targets of TC and LDL C in rosuvastatin group compared to atorvastatin group (51.2% Vs 36.2% and 55.1% Vs 40%). The researchers thereby concluded that when compared to atorvastatin, rosuvastatin is significantly more effective in patients with HRD.[17]

Zhao S conducted a double blind randomized controlled study and compared the efficacy of these two commonly used statins in patients diagnosed with HRD. The results showed significantly higher reduction in the levels of LDL C with rosuvastatin 10mg compared to atorvastatin 10mg (46.28% Vs 38.67%, p=0.000). Moreover, more than 40 % of the patients in rosuvastatin group were able to achieve the target levels of LDL C. This study concluded that rosuvastatin 10 mg is better than atorvastatin 10mg in lowering the levels of LDL C in patients with HRD.[18]

A meta-analysis on the topic of comparison between the rosuvastatin and atorvastatin in Asian population was conducted by Zhang L. This analysis comprising of 16 randomized controlled trials resulted that just

like the Caucasian patients, rosuvastatin is more effective in Asian patients in reducing the hypercholesterolemia.[19]

A study was conducted in Pakistan by Khokhar SA to determine the efficacy of rosuvastatin 10mg in reducing the levels of LDL C in type-2 diabetic patients. The dose was increased if needed to reach the target levels. At the end of 4 months study period, significantly higher number of patients on rosuvastatin achieved the target levels of LDL C compared to atorvastatin 10mg (94% Vs 88%, $p<0.05$).[20]

Ayyaz M conducted a study with Pakistani population to compare the efficacy of rosuvastatin 20 mg and atorvastatin 20 mg in HRD patients. These high risk patients, as evaluated with the standards of ADP III guidelines, were compared for their levels of TC, LDL C, TG and HDL C. The results of this study shared significantly reduced levels of TC (34.8% Vs 28.1%, $p <0.05$) and LDL C (43.2% and 38.1%, $p <0.05$) in patients taking rosuvastatin 20 mg compared to patients taking atorvastatin 20mg. It was also reported that more patients achieved the target levels of TC and LDL C with rosuvastatin as compared to atorvastatin. The conclusion of this study was also shared as rosuvastatin being more effective than atorvastatin in HRD patients.[16]

The Mean±SD of age in this study was 55.54±8.05 years. Male patients were 59.57% while female patients were 40.43% of overall study population. After 8 weeks of treatment, the results showed a significantly decreased levels of TC (184.98±20.84 Vs 192.55±18.84, $p=0.004$) and LDL C (128.59±19.65 Vs 134.09±18.01, $p=0.028$) in Group R compared to Group A. There were also decreased levels of TG and increased levels of HDL C in Group R compared to Group A, however, this difference was statistically non-significant (196.18±24.65 Vs 203.08±30.11, $p=0.058$, and 42.41±4.80 Vs 41.32±3.72, $p=0.055$, respectively).[16,17,18,19,20]

Moreover, significantly more patients achieved the target levels of TC (64.34% Vs 50.43%, $p=0.032$) and LDL C (20.87% Vs 10.43%, $p=0.029$) in Group R compared to Group A. These results are also in line with the results shared in studies previously done on this topic.[16,17,18,20]

The limitations of our study include small sample size and short term follow up. In future, studies planned with larger sample size and longer follow up will add up to this useful data and will help our clinicians in selecting lipid lowering agents for their high risk patients.

Conclusion:

This study conducted in our local population established that rosuvastatin provides better lipid-lowering efficacy compared to atorvastatin in shape of reducing TC and LDL C in patients with HRD and help these patients to reach the target levels.

Disclaimer:

No

Conflict of interest:

None

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