Comparative Study of Atorvastatin and Rosuvastatin on Serum Lipid Profile in Cardiac Patients with Diabetes

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Abstract
Hyperlipidemia is a disorder of lipoprotein metabolism, which includes a number of abnormalities such as hypercholesterolemia and hypertriglyceridemia. Recently World Health Organization (WHO) has declared that by 2020, 60% of cardiovascular cases will be of Indian origin. Treatment of hyperlipidemia with statins has become an integral part of management of vascular diseases. Indications of statins have been greatly extended over the last 5 years subsequent to the publication of many multicenter prospective trials. There are multiple statins available in the Indian market like atorvastatin, simvastatin, pravastatin, pitavastatin, fluvastatin, cerivastatin and rosvastatin. Hypolipidemic effect of statins is due to inhibition of hydroxymethylglutaryl-CoA reductase (HMG-CoA) and decrease in LDL-C is due to up regulation of LDL receptor activity The objective of this study is to evaluate and compare the efficacy and safety of Rosuvastatin 20 mg and Atorvastation 20 mg among cardiac patients with hyperlipidemia in diabetics and non diabetics.

Introduction
Statins are the first line therapy for lowering lipid levels (Kumar T and Kapoor A 2005). Statins have become the leading prescription drug (Ravi GR et al 2004, Wierzbicki AS et al 1999). Most of the trials compared the fixed-dose regimens of more intensive statin therapy with less intensive statin therapy (Fleg JL et al 2008). Recent studies in patients with stable coronary disease showed greater reduction in C-reactive protein (CRP) with higher dose than with lower dose of statins (Josan K et al 2008). However, various studies suggest that efficacy and safety of various statins in hyperlipidemia differs considerably (Anderson KM et al. 1991). It is difficult for the medical practitioners to select suitable statins for their patients (Kinlay S et al. 2003).

Dyslipidemia is the commonest cause of the blood vessel diseases and their incidence has been rising all over the world thereby increasing the morbidity and mortality due to cardiovascular diseases. Dyslipidemia occurs due to disturbance in the lipid parameters like Total Cholesterol, LDL-C, VLDL, TGs and HDL-C (Brunzell JD et al. 2007, Talbert R L et al 2008).

Dyslipidemia is also one of the component of Metabolic syndrome along with other group of cardiovascular risk factors such as high blood pressure (BP), abdominal obesity, and insulin intolerance, whose concurrent appearance
increases the risk of atherosclerotic cardiovascular disease (Brewer HB Jr. 2003).

Combined or mixed hyperlipidemia (CHL) is a lipid disorder characterized by increased low-density lipoprotein cholesterol (LDL-C), elevated triglycerides (TGs) and decreased high-density lipoprotein cholesterol (HDL-C) which is more common in patients with type 2 diabetes mellitus (Farnier M, Picard S 2001).

National cholesterol education program—Adult Treatment Panel–III (NCEP-ATP III) has set a goal to treat these dyslipidemic patients and which can be achieved by proper treatment with lipid lowering drugs especially statins (National CEP-ATP III, 2002).

A number of lipid lowering drugs e.g. statins, fenofibrate, niacin, ezetamibe, bile sequestrants etc. are being used to treat this disorder (Talbert RL 2008).

Many studies are carried out on these drugs out of which few have been made in the people of North India especially in the Majhar region of Punjab because their socio-economic background and standard of living is quite different from the people of Western countries (Bhopal Raj et al. 1999).

Hypolipidemic effect of statins is due to inhibition of hydroxymethylglutaryl-CoA reductase (HMG-CoA) and decrease in LDL-C is due to up regulation of LDL receptor activity (Ellen RL, McPherson R 1998).

Outcome trials of statins have proved conclusively that these drugs decrease LDL-C levels, resulting in a significant reduction of cardiovascular events in many high-risk patients (Bakker-Arkema et al. RG 1996, Cannon CP et al. 2004). Rosuvastatin has been considered superior in achieving greater LDL-C level reductions as compared to atorvastatin, simvastatin, or pravastatin use (Mc Kenney JM et al. 2003).

Statins or fibrates affect different aspects of lipoprotein metabolism. Hence, statin or fibrate monotherapy becomes difficult to modify the lipid profile of patients with combined hyperlipidemia according to the recent investigations of the American Diabetes Association (Haffner SM, 2002).

Combined therapy with statins and fibrates is more effective in controlling lipid profile in patients with mixed hyperlipidemia (CHL) (Haffner SM 2002, Vega et al 2003, Fievet C, Staels B 2009, Athyros VG et al. 1997, Kiorttisis DN et al 2000).

**Aims and Objectives**

The aims and objective of our study were as follows:

To compare efficacy of equivalent doses of Rosuvastatin and Atorvastatin lowering LDL-C levels.

Compare the safety and efficacy of Rosuvastatin and Atorvastatin in reducing cardiovascular events in patients with coronary artery disease and elevated lipid levels.

**Material and Methods**

Present study was randomize, parallel group, open-label study conducted at SRG hospital & Jhalawar Medical College, Jhalawar, Rajasthan, India. Hundred hyperlipidemia patients each taking atorvastatin 20 mg and rosuvastatin 20 mg tablets were selected for the study after clinical and baseline investigations. The patients reviewed after 5th week of statin therapy for lipid profile.

The present study was carried out in the Department of Biochemistry in collaboration with Department of Medicine, Jhalawar Medical College, Jhalawar.

**Nature of the study**

Open label, randomize, parallel group, comparative, prospective clinical Study.

**Source of patient**

The patients attending outpatient department (O.P.D.) of Medicine enrolled into the present study.
Study population
A total of 100 subjects diagnosed with combined hyperlipidemia screened for the entry into the study and were randomly allocated into two groups of fifty each.

Inclusion criteria
Male patients (35-85 years) and female patients (35-85 years) having low density lipoprotein cholesterol (LDL-C) higher than 100 mg/dl and triglycerides (TG) more than 200 mg/dL will be included in the study. All patients with Hypertension, Diabetes mellitus, Obesity and coronary artery disease included in the study.

Exclusion criteria
Patients with Renal and hepatic failure, Pregnancy and lactation, Hypothyroidism, Malignancy, Myopathy, Patients undergoing bypass surgery and those with concurrent medications like warfarin, verapamil,

Methodology
The total hundred (n=100) patients enrolled in the study and randomly allocated into two groups of fifty (n=50) each, using a randomization chart. Initial readings of plasma lipid levels like TC, TG, HDL, LDL and VLDL for both the groups were taken as baseline values before assigning the treatment. Then, Group I received Tab. Atorvastatin 20 mg and Group II received Tab. Rosuvastatin 20 mg. Both the groups received 1 tablet once a day at night for 5 weeks. Patients assessed after 5 weeks and their Serum Lipid profile was done.

Biochemical Examination
Collected 5 ml blood in plane vial from subject and the serum is separated. Following investigations were carried out:

Lipid Profile
Determination of serum lipid profile:

Estimation of Serum Total Cholesterol: by kit reagents (supplied by ERBA Diagnostics) on Semi autoanalyzer.

Estimation of HDL Cholesterol: Estimation of serum HDL cholesterol will be carried out on semi automatic analyzer

Method: Burstein method (Burstein et al 1974).

Estimation of Triglycerides: The estimation of serum Triglycerides was carried out on semi automatic analyzer

Method: Modified Wako, McGowan and Fossati method. (Wako et al 1983).

Estimation of Low Density Lipoprotein Cholesterol
Serum LDL is calculated by Friedwald’s equation

LDL cholesterol = Total Cholesterol – (HDL Cholesterol + VLDL Cholesterol)

LDL was estimated by direct method when TG values were > 400 mg/dl

Estimation of Very Low – Density Lipoprotein Cholesterol.
VLDL Cholesterol is calculated by Friedwald’s equation

The criteria for selection of the patients was that they must have a total serum cholesterol level >200 mg/dl, LDL Cholesterol level of > 130 mg/dl and serum triglyceride level of <350 mg/dl measured within first 24 hours after the onset of the acute coronary syndrome or upto six months earlier if no sample had been obtained during first 24 hours.

The patients were studied under two groups as follows:

| Groups | No. Of Patients | Drug With Dose     |
|--------|----------------|--------------------|
| A      | 50             | ATORVASTATIN 20 mg |
| B      | 50             | ROSUVASTATIN 20mg  |

All patients were followed up after 5 weeks.

Results & Discussion
The present study is conducted to make the best and most effective results and the 5 lipid parameters are evaluated statistically in this study to show the significant actions of therapies. In order to describe the results, table 1 shows The mean age of subjects which received atorvastatin is 60.42 and the age of patients receiving rosvastatin is 59.76 and there is no significant difference between the mean age of treatment groups. (p>0.05), it means patient have age matched in both treatment groups.
There is equal ratio of gender for both treatment group and have no significant difference in gender receiving the treatment. (p>0.05)
There is no significant difference in mean glucose level in both treatment groups. (p>0.05). the mean glucose level of atorvastatin group is 258.84 and in rosuvastatin group is 275.3.
There is no significant difference in mean serum cholesterol level in both treatment groups (p>0.05). The mean serum cholesterol level of atorvastatin group is 258.84 and in rosuvastatin group is 247.68. There is no significant difference in mean HDL Cholesterol level in both treatment groups (p>0.05). The mean HDL Cholesterol level of atorvastatin group is 42.7 and in rosuvastatin group is 44.12.
There is no significant difference in mean LDL Cholesterol level in both treatment groups (p>0.05). the mean LDL Cholesterol level of atorvastatin group is 158.74 and in rosuvastatin group is 146.57.
There is no significant difference in mean Triglyceride level in both treatment groups (p>0.05). the mean Triglyceride level of atorvastatin group is 287 and in rosuvastatin group is 284.94.
According to Distribution of Serum lipid profile After treatment in relation to Groups There is significant difference in mean serum cholesterol level in both treatment groups (p<0.05). the mean serum cholesterol level of atorvastatin group is 193.08 and in rosuvastatin group is 176.5. And according to mean rosuvastatin 20 mg have less serum cholesterol in respect to atorvastatin group after treatment. There is significant difference in mean HDL Cholesterol level in both treatment groups (p<0.05). The mean HDL Cholesterol level of atorvastatin group is 41.17 and in rosuvastatin group is 44.63.
According to Distribution of Serum lipid profile After treatment according to Gender in Atorvastatin 20mg shows no significant difference in mean serum cholesterol level in both gender (p>0.05). The mean serum cholesterol level of male is 255.85 and in female is 262.63. There is significant difference in mean HDL Cholesterol level in both genders (p<0.05). The mean HDL Cholesterol level of male is 44.12 and in female is 46.74.
According to Distribution of Serum lipid profile After treatment in relation to Groups There is significant difference in mean serum cholesterol level in both treatment groups (p<0.05). the mean serum cholesterol level of atorvastatin group is 193.08 and in rosuvastatin group is 176.5. And according to mean rosuvastatin 20 mg have less serum cholesterol in respect to atorvastatin group after treatment. There is significant difference in mean HDL Cholesterol level in both treatment groups (p<0.05). The mean HDL Cholesterol level of atorvastatin group is 44.42 and in rosuvastatin group is 46.74.
According to Distribution of Serum lipid profile After treatment according to Gender in Atorvastatin 20mg shows no significant difference in mean serum cholesterol level in both gender (p>0.05). The mean serum cholesterol level of male is 156.88 and in female is 161.1. There is no significant difference in mean serum cholesterol level in both gender (p>0.05). the mean serum cholesterol level of male is 288.96 and in female is 284.5. There is no significant difference in mean serum cholesterol level in both gender (p>0.05). the mean serum cholesterol level of male is 57.79 and in female is 56.9.
According to Distribution of Serum lipid profile After treatment according to Gender in Atorvastatin 20mg shows no significant difference in mean serum cholesterol level in both gender (p>0.05). the mean serum cholesterol level of male is 156.88 and in female is 161.1. There is no significant difference in mean serum cholesterol level in both gender (p>0.05). the mean serum cholesterol level of male is 288.96 and in female is 284.5. There is no significant difference in mean serum cholesterol level in both gender (p>0.05). the mean serum cholesterol level of male is 57.79 and in female is 56.9.
level in both genders (p<0.05). The mean HDL Cholesterol level of male is 42.96 and in female is 46.27. And according to mean male have less HDL cholesterol in respect to female before treatment. There is no significant difference in mean serum cholesterol level in both gender (p>0.05). the mean serum cholesterol level of male is 115.12 and in female is 116.6. There is no significant difference in mean serum cholesterol level in both gender (p>0.05). The mean serum cholesterol level of male is 164.21 and in female is 164.72. There is no significant difference in mean serum cholesterol level in both gender (p>0.05). the mean serum cholesterol level of male is 32.84 and in female is 32.94. Distribution of Serum lipid profile before and after treatment in Atorvastatin 20mg shows significant difference in before and after treatment mean serum cholesterol level(p<0.05), and according to mean serum cholesterol level is reduced in after treatment in atorvastatin group. There is significant difference in before and after treatment mean HDL cholesterol level(p<0.05). and according to mean HDL cholesterol level is increased in after treatment in atorvastatin group. There is significant difference in before and after treatment mean Triglyceride level(p<0.05), and according to mean Triglyceride level is reduced in after treatment in atorvastatin group. There is significant difference in before and after treatment mean VLDL level(p<0.05), and according to mean VLDL level is reduced in after treatment in atorvastatin group. Distribution of Serum lipid profile before and after treatment according to Gender in Rosuvastatin shows no significant difference in mean serum cholesterol level in both gender (p>0.05). the mean serum cholesterol level of male is 244.83 and in female is 252.31. There is no significant difference in mean HDL Cholesterol level in both genders (p>0.05). The mean HDL Cholesterol level of male is 44.32 and in female is 43.78. There is no significant difference in mean serum cholesterol level in both gender (p>0.05). the mean serum cholesterol level of male is 143.54 and in female is 151.5. There is no significant difference in mean serum cholesterol level in both gender (p>0.05). the mean serum cholesterol level of male is 284.83 and in female is 285.1. There is no significant difference in mean serum cholesterol level in both gender (p>0.05). the mean serum cholesterol level of male is 56.96 and in female is 57.02. Distribution of Serum lipid profile After treatment according to Gender in Rosuavastatin shows no significant difference in mean serum cholesterol level in both gender (p>0.05). The mean HDL Cholesterol level of male is 46.93 and in female is 46.42. There is no significant difference in mean serum cholesterol level in both gender (p>0.05). the mean serum cholesterol level of male is 99.5 and in female is 98.11. There is no significant difference in mean serum cholesterol level in both gender (p>0.05). the mean serum cholesterol level of male is 157.64 and in female is 147.84. There is no significant difference in mean serum cholesterol level in both gender (p>0.05). the mean serum cholesterol level of male is 31.52 and in female is 29.56. Distribution of Serum lipid profile before and after treatment in Rosuavastatin shows significant difference in before and after treatment mean serum cholesterol level(p<0.05), and according to mean serum cholesterol level is reduced in after treatment in atorvastatin group. There is significant difference in before and after treatment mean HDL cholesterol level(p<0.05), and according to mean HDL cholesterol level is reduced in after treatment in atorvastatin group. There is significant difference in before and after treatment mean LDL cholesterol level(p<0.05), and according to mean LDL cholesterol level is reduced in after treatment in atorvastatin group.
level is reduced in after treatment in atorvastatin group. There is significant difference in before and after treatment mean Triglyceride level (p<0.05), and according to mean Triglyceride level is reduced in after treatment in atorvastatin group. There is significant difference in before and after treatment mean VLDL level (p<0.05), and according to mean VLDL level is reduced in after treatment in atorvastatin group.

Percentage changes in biomedical parameters shows no significant difference found in percentage changes (before to after) in serum cholesterol level in both treatment groups (p>0.05). and mean changes in atorvastatin group is 24.78 and in rosuvastatin group is 28.29. There is significant difference found in percentage changes (before to after) in HDL cholesterol level in both treatment groups (p<0.05). and mean changes in atorvastatin group is -4.09 and in rosuvastatin group is -6.11. And according to mean HDL cholesterol level is higher in atorvastatin group. There is no significant difference found in percentage changes (before to after) in LDL cholesterol level in both treatment groups (p>0.05). and mean changes in atorvastatin group is 25.12 and in rosuvastatin group is 31.2. There is no significant difference found in percentage changes (before to after) in Triglyceride level in both treatment groups (p>0.05). and mean changes in atorvastatin group is 42.62 and in rosuvastatin group is 45.5. There is no significant difference found in percentage changes (before to after) in VLDL level in both treatment groups (p>0.05). and mean changes in atorvastatin group is 27.69 and in rosuvastatin group is 32.45.

Distribution of SERUM CHOLESTEROL/HDLC before treatment according to Groups shows significant difference in mean serum cholesterol/HDLC level in both treatment groups (p<0.05). the mean serum cholesterol/HDLC level of atorvastatin group is 4.40 and in rosuvastatin group is 3.81. And according to mean rosuvastatin 20 mg have less serum cholesterol/HDLC in respect to atorvastatin group after treatment.

Distribution of SERUM CHOLESTEROL/HDLC before and after treatment in Atorvastatin 20mg shows significant difference in mean serum cholesterol/HDLC level (p<0.05). and according to mean serum cholesterol/HDLC level is reduced in after treatment in atorvastatin group.

Distribution of SERUM CHOLESTEROL/HDLC before and after treatment in Rosuvastatin shows significant difference in mean serum cholesterol/HDLC level (p<0.05). and according to mean serum cholesterol/HDLC level is reduced in after treatment in Rosuvastatin group.

Table 17 There is no significant difference found in percentage changes (before to after) in LDL/HDL level in both treatment groups (p>0.05). and mean changes in atorvastatin group is 27.98 and in rosuvastatin group is 35.26. Distribution of LDL/HDL before & after treatment according to Groups shows significant difference in mean serum LDL/HDL level in both treatment groups (p<0.05). the mean LDL/HDL level of atorvastatin group is 3.79 and in rosuvastatin group is 3.36. And according to mean rosuvastatin 20 mg have less serum LDL/HDL in respect to atorvastatin group before treatment. There is significant difference in mean serum LDL/HDL level in both treatment groups (p<0.05). the mean LDL/HDL level of atorvastatin group is 2.65 and in rosuvastatin group is 2.15. And according to mean rosuvastatin 20 mg have less serum LDL/HDL in respect to atorvastatin group after treatment.

There is significant difference in before and after treatment mean LDL /HDL level (p<0.05). and according to mean LDL/HDL level is reduced in after treatment in Atorvastatin 20mg group.
There is significant difference in before and after treatment mean LDL / HDL C level (p<0.05). and according to mean LDL/HDLC level is reduced in after treatment in Rosuvastatin group.

Atorvastatin and Rosuvastatin significantly decreased Total cholesterol, Triglycerides, LDL-C, VLDL-C. There is significant difference in mean HDL Cholesterol level in both treatment groups (p<0.05).

And according to mean rosuvastatin 20 mg have less LDL cholesterol in respect to atorvastatin group after treatment.

There is significant difference found in percentage changes (before to after) in HDL cholesterol level in both treatment groups (p<0.05). and mean changes in atorvastatin group is -4.09 and in rosvastatin group is -6.11. And according to mean HDL cholesterol level is higher in atorvastatin group.

There is significant difference in mean serum cholesterol/HDLC level in both treatment groups (p<0.05). the mean serum cholesterol/HDLC level of atorvastatin group is 4.40 and in rosuvastatin group is 3.81. And according to mean rosvastatin 20 mg have less serum cholesterol/HDLC in respect to atorvastatin group after treatment.

### Table: Distribution of age according to Groups

| Group               | N  | Mean   | Std. Deviation | T value | P value |
|---------------------|----|--------|----------------|---------|---------|
| Age                 |    |        |                |         |         |
| Atorvastatin 20mg   | 50 | 60.4200| 13.09633       | 0.287   | 0.775   |
| Rosuvastatin        | 50 | 59.7600| 9.64166        |         |         |

### Table: Distribution of Gender according to Groups

| Gender | Atorvastatin 20mg | Rosuvastatin | Total | Chi sq | P value |
|--------|-------------------|--------------|-------|--------|---------|
| Female | 22                | 19           | 41    | 0.372  | 0.542   |
|        | 44.0%             | 38.0%        | 41.0% |        |         |
| Male   | 28                | 31           | 59    |        |         |
|        | 56.0%             | 62.0%        | 59.0% |        |         |
| Total  | 50                | 50           | 100   |        |         |
|        | 100.0%            | 100.0%       | 100.0%|        |         |

### Table: Distribution of BLOOD GLUCOSE according to Groups

| Group         | N   | Mean   | Std. Deviation | T value | P value |
|---------------|-----|--------|----------------|---------|---------|
| BLOOD GLUCOSE | 50  | 258.8400| 40.19613       | 1.754   | 0.083   |
| Atorvastatin 20mg | 50 | 275.3200| 52.88510       |         |         |
| Rosuvastatin  | 50  |         |                |         |         |

### Table: Distribution of Serum lipid profile before treatment according to Groups

| Group                | N   | Mean   | Std. Deviation | T value | P value |
|----------------------|-----|--------|----------------|---------|---------|
| SERUM CHOLESTEROL BEFORE | 50  | 258.8400| 36.61569       | 1.654   | 0.101   |
| Atorvastatin 20mg     | 50  | 247.6800| 30.58974       |         |         |
| Rosuvastatin          | 50  | 254.9400| 30.67284       |         |         |
| HDL CHOLESTEROL BEFORE| 50  | 42.7000 | 4.56535        | 1.374   | 0.173   |
| Atorvastatin 20mg     | 50  | 41.1200 | 4.56535        |         |         |
| Rosuvastatin          | 50  | 42.7000 | 4.56535        |         |         |
| LDL CHOLESTEROL BEFORE| 50  | 158.7400| 34.6543        | 1.964   | 0.052   |
| Atorvastatin 20mg     | 50  | 146.5200| 26.79735       |         |         |
| Rosuvastatin          | 50  | 158.7400| 34.6543        |         |         |
| TRIGLYCERIDES BEFORE  | 50  | 287.0000| 21.84267       | 0.340   | 0.734   |
| Atorvastatin 20mg     | 50  | 284.9400| 36.78643       |         |         |
| Rosuvastatin          | 50  | 287.0000| 21.84267       |         |         |
| VLDL BEFORE           | 50  | 57.4000 | 3.68533        | 0.340   | 0.734   |
| Atorvastatin 20mg     | 50  | 56.9880 | 7.35729        |         |         |
| Rosuvastatin          | 50  |        |                |         |         |
### Table: Distribution of Serum lipid profile After treatment according to Groups

| Group                   | N       | Mean    | Std. Deviation | T value | P value |
|-------------------------|---------|---------|----------------|---------|---------|
| SERUM CHOLESTEROL AFTER | Atorvastatin 20mg | 50      | 193.0800       | 27.53094 | 2.858   | 0.005*  |
|                         | Rosuvastatin | 50      | 176.5000       | 30.40089 |         |         |
| HDL CHOLESTEROL AFTER   | Atorvastatin 20mg | 50      | 44.4200        | 5.76439  | 2.289   | 0.024*  |
|                         | Rosuvastatin | 50      | 46.7400        | 4.26093  |         |         |
| LDL CHOLESTEROL AFTER   | Atorvastatin 20mg | 50      | 115.7720       | 23.33745 | 3.077   | 0.003*  |
|                         | Rosuvastatin | 50      | 98.9760        | 30.73748 |         |         |
| TRIGLYCERIDES AFTER     | Atorvastatin 20mg | 50      | 164.4400       | 25.54081 | 2.285   | 0.024   |
|                         | Rosuvastatin | 50      | 153.9200       | 20.18975 |         |         |
| VLDL AFTER              | Atorvastatin 20mg | 50      | 32.8880        | 5.10816  | 2.285   | 0.024   |
|                         | Rosuvastatin | 50      | 30.7840        | 4.03795  |         |         |

#### Atorvastatin 20mg

### Table: Distribution of Serum lipid profile before treatment according to Gender in Atorvastatin 20mg

| Group                   | Gender | N       | Mean    | Std. Deviation | T value | P value |
|-------------------------|--------|---------|---------|----------------|---------|---------|
| SERUM CHOLESTEROL BEFORE| Male   | 28      | 255.8571| 37.75036       | 0.646   | 0.521   |
|                         | Female | 22      | 262.6364| 35.62442       |         |         |
| HDL CHOLESTEROL BEFORE  | Male   | 28      | 41.1786 | 5.57145        | 2.209   | 0.032*  |
|                         | Female | 22      | 44.4364 | 5.39440        |         |         |
| LDL CHOLESTEROL BEFORE  | Male   | 28      | 156.8857| 35.18116       | 0.423   | 0.674   |
|                         | Female | 22      | 161.1000| 34.65150       |         |         |
| TRIGLYCERIDES BEFORE    | Male   | 28      | 288.9643| 23.96832       | 0.714   | 0.479   |
|                         | Female | 22      | 284.5000| 19.05068       |         |         |
| VLDL BEFORE             | Male   | 28      | 57.7929 | 4.79366        | 0.714   | 0.479   |
|                         | Female | 22      | 56.9000 | 4.79366        |         |         |

### Table: Distribution of Serum lipid profile After treatment according to Gender in Atorvastatin 20mg

| Group                   | Gender | N       | Mean    | Std. Deviation | T value | P value |
|-------------------------|--------|---------|---------|----------------|---------|---------|
| SERUM CHOLESTEROL AFTER | Male   | 28      | 190.9286| 25.74077       | 0.619   | 0.539   |
|                         | Female | 22      | 195.8182| 30.40384       |         |         |
| HDL CHOLESTEROL AFTER   | Male   | 28      | 42.9643 | 5.82130        | 2.082   | 0.043*  |
|                         | Female | 22      | 46.2727 | 5.67496        |         |         |
| LDL CHOLESTEROL AFTER   | Male   | 28      | 115.1214| 22.65610       | 0.220   | 0.827   |
|                         | Female | 22      | 116.6000| 24.68969       |         |         |
| TRIGLYCERIDES AFTER     | Male   | 28      | 288.9643| 19.05068       | 0.714   | 0.479   |
|                         | Female | 22      | 284.5000| 19.05068       |         |         |
| VLDL AFTER              | Male   | 28      | 32.8429 | 4.85260        | 0.714   | 0.479   |
|                         | Female | 22      | 32.9455 | 5.53196        |         |         |

### Table: Distribution of Serum lipid profile before and after treatment in Atorvastatin 20mg

| Group                   | N       | Mean    | Std. Deviation | T value | P value |
|-------------------------|---------|---------|----------------|---------|---------|
| SERUM CHOLESTEROL BEFORE| 50      | 258.8400| 36.61569       | 15.054  | <0.0001*|
| SERUM CHOLESTEROL AFTER | 50      | 193.0800| 27.53094       |         |         |
| HDL CHOLESTEROL BEFORE  | 50      | 42.7000 | 5.70803        | 15.031  | <0.0001*|
| HDL CHOLESTEROL AFTER   | 50      | 44.4200 | 5.76439        |         |         |
| LDL CHOLESTEROL BEFORE  | 50      | 158.7400| 34.65643       | 9.604   | <0.0001*|
| LDL CHOLESTEROL AFTER   | 50      | 115.7720| 23.33745       |         |         |
| TRIGLYCERIDES BEFORE    | 50      | 287.0000| 21.84267       | 31.612  | <0.0001*|
| TRIGLYCERIDES AFTER     | 50      | 164.4400| 25.54081       |         |         |
| VLDL BEFORE             | 50      | 57.4000 | 4.36853        | 31.612  | <0.0001*|
| VLDL AFTER              | 50      | 32.8880 | 5.10816        |         |         |
Rosuvastatin

**Table:** Distribution of Serum lipid profile before treatment according to Gender in Rosuvastatin

| Group Statistics               | Gender | N  | Mean     | Std. Deviation | T value | P value |
|-------------------------------|--------|----|----------|----------------|---------|---------|
| SERUM CHOLESTEROL BEFORE      | Male   | 31 | 244.8387 | 30.43145       | 0.836   | 0.407   |
|                               | Female | 19 | 252.3158 | 31.10029       |         |         |
| HDL CHOLESTEROL BEFORE        | Male   | 31 | 44.3226  | 4.98924        |         |         |
|                               | Female | 19 | 43.7895  | 3.88128        | 0.397   | 0.693   |
| LDL CHOLESTEROL BEFORE        | Male   | 31 | 143.5484 | 27.31563       | 0.970   | 0.343   |
|                               | Female | 19 | 151.5053 | 25.88078       |         |         |
| TRIGLYCERIDES BEFORE          | Male   | 31 | 284.8387 | 35.28937       |         |         |
|                               | Female | 19 | 285.1053 | 40.10250       | 0.025   | 0.980   |
| VLDL BEFORE                   | Male   | 31 | 56.9677  | 7.05787        |         |         |
|                               | Female | 19 | 57.0211  | 8.02050        |         |         |

**Table:** Distribution of Serum lipid profile After treatment according to Gender in Rosuvastatin

| Group Statistics               | Gender | N  | Mean     | Std. Deviation | T value | P value |
|-------------------------------|--------|----|----------|----------------|---------|---------|
| SERUM CHOLESTEROL AFTER       | Male   | 31 | 177.9677 | 33.15568       | 0.432   | 0.667   |
|                               | Female | 19 | 174.1053 | 25.96128       |         |         |
| HDL CHOLESTEROL AFTER         | Male   | 31 | 46.9355  | 4.57483        |         |         |
|                               | Female | 19 | 46.4211  | 3.79057        | 0.411   | 0.683   |
| LDL CHOLESTEROL AFTER         | Male   | 31 | 99.5032  | 33.58916       |         |         |
|                               | Female | 19 | 98.1158  | 26.27338       | 0.153   | 0.879   |
| TRIGLYCERIDES AFTER           | Male   | 31 | 157.6452 | 17.09103       |         |         |
|                               | Female | 19 | 147.8421 | 23.66259       | 1.698   | 0.096   |
| VLDL AFTER                    | Male   | 31 | 31.5290  | 3.41821        |         |         |
|                               | Female | 19 | 29.5684  | 4.73252        |         |         |

**Table:** Distribution of Serum lipid profile before and after treatment in Rosuvastatin

| Group Statistics               | Mean     | N  | Std. Deviation | T value | P value |
|-------------------------------|----------|----|----------------|---------|---------|
| SERUM CHOLESTEROL BEFORE      | 247.6800 | 50 | 30.58974       | 16.096  | <0.0001*|
| SERUM CHOLESTEROL AFTER       | 176.5000 | 50 | 30.40089       |         |         |
| HDL CHOLESTEROL BEFORE        | 44.1200  | 50 | 4.56535        | 13.687  | <0.0001*|
| HDL CHOLESTEROL AFTER         | 46.7400  | 50 | 4.26933        |         |         |
| LDL CHOLESTEROL BEFORE        | 146.5720 | 50 | 26.79735       | 11.290  | <0.0001*|
| LDL CHOLESTEROL AFTER         | 98.9760  | 50 | 30.73748       |         |         |
| TRIGLYCERIDES BEFORE          | 284.9400 | 50 | 36.78643       | 26.746  | <0.0001*|
| TRIGLYCERIDES AFTER           | 153.9200 | 50 | 20.18975       |         |         |
| VLDL BEFORE                   | 56.9880  | 50 | 7.35729        | 26.746  | <0.0001*|
| VLDL AFTER                    | 30.7840  | 50 | 4.03795        |         |         |

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