

Clinical Impact of Rosuvastatin Alone and in Combination with Orlistat on Lipid Profiles in Diverse Patient Cohorts

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ABSTRACT

The purpose of the given research was to discover the level of changes in lipid profiles induced by the usage of Rosuvastatin as monotherapeutical agent or combined with Orlistat in different categories of patients and among those who had different diseases. In the discussed study, the changes to the level of triglyceride and Low-Density Lipoprotein (LDL) remained with patients of different health conditions. The patients taking either Rosuvastatin or a combination of Rosuvastatin and Orlistat were included as the study cohort. There were no notable age and gender differences between the cohorts as evidenced at the outset. Analyses using statistics indicated that there was no major gender disparity in both groups. There were interesting results in the analysis of lipid profiles. There was a significant lowering of the triglyceride and LDL level of Rosuvastatin and Rosuvastatin-Orlistat patients. Hypertensive patients having diabetes mellitus and ischemic heart disease were highly influenced because their triglycerides and LDL levels were greatly lowered upon use of these drugs. This observation indicates the possible efficacy of Rosuvastatin and the combined use of Rosuvastatin and Orlistat in lipid profile management, including complicated cases. Based on the results of the study, Rosuvastatin was able to reduce triglyceride and LDL levels in various patient groups such as the ones with hypertension, diabetes, and ischemic heart disease either alone or in combination with Orlistat. Such results indicate how these drugs combinations can be of clinical value in reducing cardiovascular risk factors and improving lipid parameters.

Keywords: Lipid Profiles, Rosuvastatin, Orlistat, Cardiovascular Risk, Combined Therapy

INTRODUCTION

Hypercholesterolemia has been rated as a leading risk factor in the occurrence of cardiovascular disease which is also the leading cause of death in the world [1]. Statins are drugs that are widely prescribed to decrease the level of cholesterol and prevent cardiovascular incidents [2]. Orlistat, however, is a drug that is administered in the treatment of obesity, it prevents the absorption of dietary fats [3]. Statins and orlistat have been studied as a possible therapy line in people with hypercholesterolemia and obesity [4].

Rosuvastatin is a statin which is used in lowering the levels of low-density lipoprotein cholesterol (LDL-C). It acts by blocking the action of enzyme HMG-CoA reductase to produce the cholesterol in liver. Rosuvastatin was applied in other categories of patients such as in diabetes, metabolic syndrome, and chronic kidney disease [2].

Orlistat is also a lipase inhibitor that decreases the dietary fat absorption by about 30 % [3]. It helps obese people to shed weight and offer them improved lipid parameters [3]. Orlistat has been used together with most statins namely fluvastatin, simvastatin, and cerivastatin [4].

Rosuvastatin is able to assist various groups of patients in the reduction of their LDL-C. Rosuvastatin showed an eminent reduction of the LDL-C levels in a type 2 diabetes trial compared to a placebo [5]. In another experiment, rosuvastatin has the advantage of lowering LDL-C levels of patients suffering with metabolic syndrome [6]. Rosuvastatin was discovered in its ability to reduce the levels of LDL-C and enhance other lipid levels to remarkable levels in patients with chronic kidney disease.

Rosuvastatin and orlistat interaction was observed in several populations of patients. When obese diabetic patients were subjected to

a trial, then orlistat and simvastatin used jointly were found to be superior than the individual therapies in minimising LDL-C levels [4]. In another study, it was revealed that orlistat and fluvastatin complimented each other in enhancing the lipid parameters of obese patients having hypercholesterolemia. Combined orlistat and liraglutide acts superior to orlistat monotherapy in a trial of obese and overweight individuals in facilitating weight loss and improving lipid parameters [3].

MATERIALS AND METHODS

Ethical Approval

After collection of the consent forms of all the patients (124) who participated in our study, blood samples (10 ml) were collected. After that, samples were put in sterile containers and kept at the proper temperature for a short while.

Patients Groups

Following a series of tests and examinations, patients of the current study were divided into four subgroups. Patients that have high blood pressure (72 %), patients with Diabetes Mellitus (DM) (62 %), patients with ischemic heart disease (IHD) (54 %) and patients with all three chronic diseases (16.9 %).

Estimation of Total Triglycerides

As directed by the manufacturer, free glycerol and triglyceride detectors were made. Water absorbance was measured at zero wavelength with the spectrometer's wavelength set at 540 nM. To determine the suitable temperature, Free glycerol, and Triglyceride detectors have been incubated to be warmed enough.

The samples were placed in labeled Eppendorf bots and 0.8 ml of free glycerol detector was added to each of them, followed by addition of 10 l of dH₂O to the standard tube, 10 l to a blank tube and 10 l in each of the sample tubes after they had been properly mixed. Tubes were then incubated at 37°C for 5 minutes. Reading and recording of primary absorption were obtained from blank and standard tubes, and sample tubes were read at 540 nM. Then, 0.2 ml of reconstituted triglycerides were added to each tube, followed by gentle mixing, and incubation for 5 minutes at 37 °C. Thereafter, final absorption was obtained from the blank and standard tubes, and sample tubes were read at 540 nM. Finally, calculations for the glycerol concentrations, right triglycerides, and total triglycerides in the samples were performed.

Statistical Analysis

It presents the data in form of mean $\pm$ SE. The student t-test was used in independent variables in order to establish whether there was

significant difference or not between the two groups. Graph Pad Prism was used to perform statistical analysis. The statistical significance of differences was set as $p < 0.05$.

RESULTS

Age and Gender

According to the results of the current investigation, there was no discernible difference in age between the two cohorts of patients—those using Rosuvastatin alone and those taking it together with Orlistat—for either cohort (Figure 1A). Regarding gender, statistical analysis demonstrates, that there was no significant difference in the number of male and female patients who use Rosuvastatin as the single medication. As always, there is no observed considerable variation in the quantity of male and female patients who are being shared in the use of Rosuvastatin and Orlistat (Figure 1B).

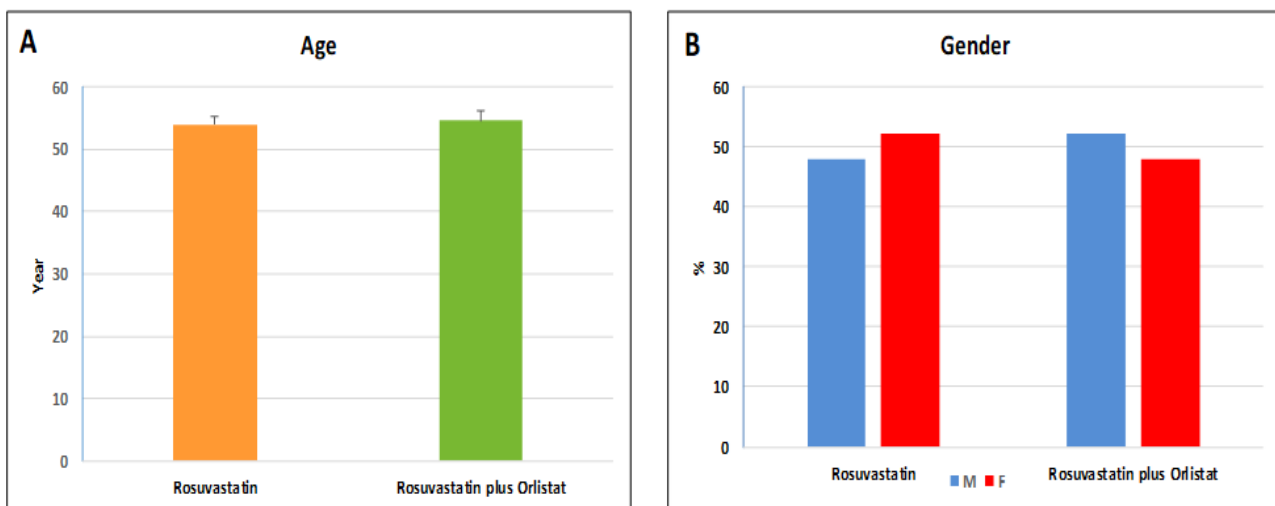


FIGURE 1: (A) Shows the Age Average of both Patients' Cohorts, (B) Shows the Gender Ratio in both Patients' Cohorts, T-test, $P > 0.05$.

Lipid Profile

It has been demonstrated that a high level of triglycerides (Tri), accompanied by high Low-Density Lipoprotein (LDL) (which make up most of the human body's cholesterol), would increase the risk of heart attack. Thus, we investigated the impact of using Rosuvastatin alone

and using a new combination (Rosuvastatin plus Orlistat) on the lipid profile indicated by triglycerides and Low-Density Lipoprotein levels.

We discovered that combining Rosuvastatin and Orlistat resulted in a considerable drop in Tri and LDL levels (Figure 2 A and B).

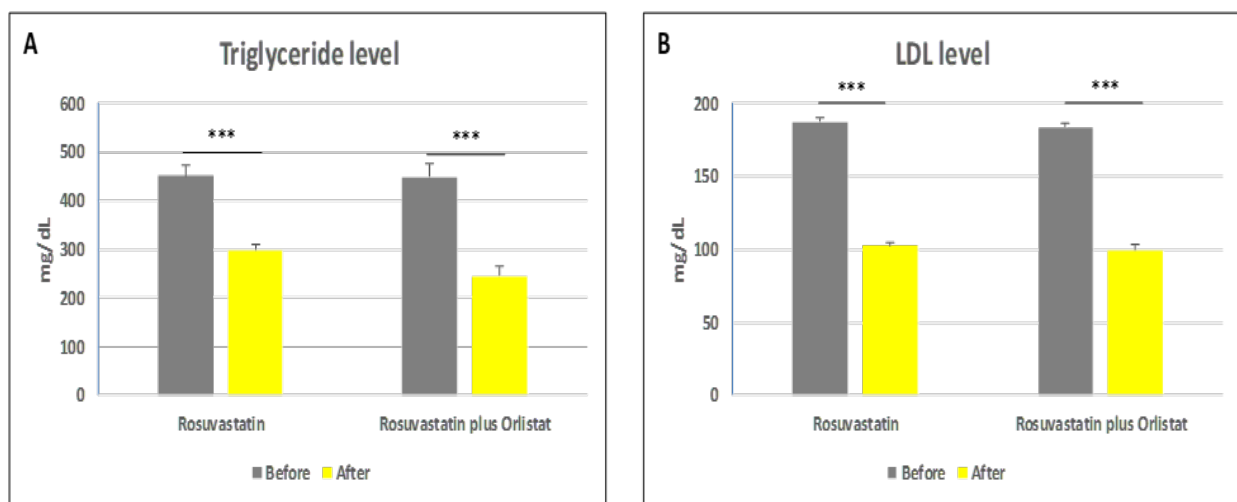


FIGURE 2: (A) Shows the Level of Triglyceride before and after using Rosuvastatin, and Rosuvastatin plus Orlistat, (B) Shows the level of Low-Density Lipoprotein before and after using Rosuvastatin, and Rosuvastatin plus Orlistat, T-test, $***P < 0.001$.

Hypertensive

Increasing blood pressure might result from high levels of triglycerides and Low-Density Lipoprotein. Our search has shown us that despite having the condition of hypertension, the patients fare well when they take Rosuvastatin and a mixture of Rosuvastatin together with Orlistat. Due to the intake of the said medications, the levels of (Tri and LDL) were found to have reduced considerably as observed in (Figure 3 A and B).

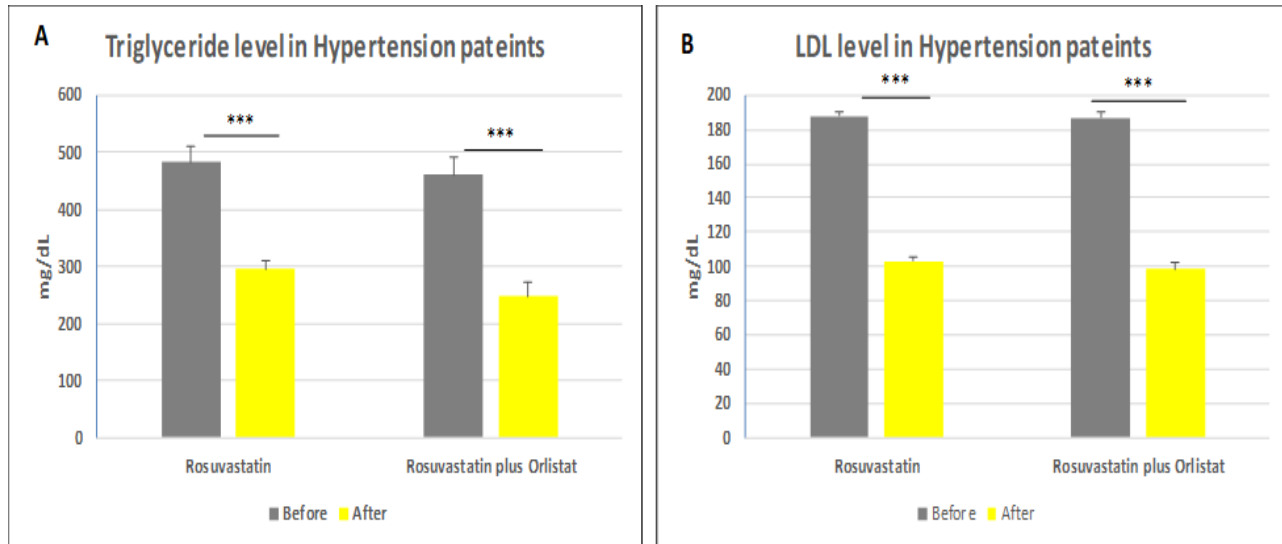


FIGURE 3: (A) Shows the level of Triglyceride in Hypertensive Patients before and after using Rosuvastatin, and Rosuvastatin plus Orlistat, (B) Shows the Level of Low-Density Lipoprotein in Hypertensive Patients before and after using Rosuvastatin, and Rosuvastatin Plus Orlistat, T-test, ***P>0.001.

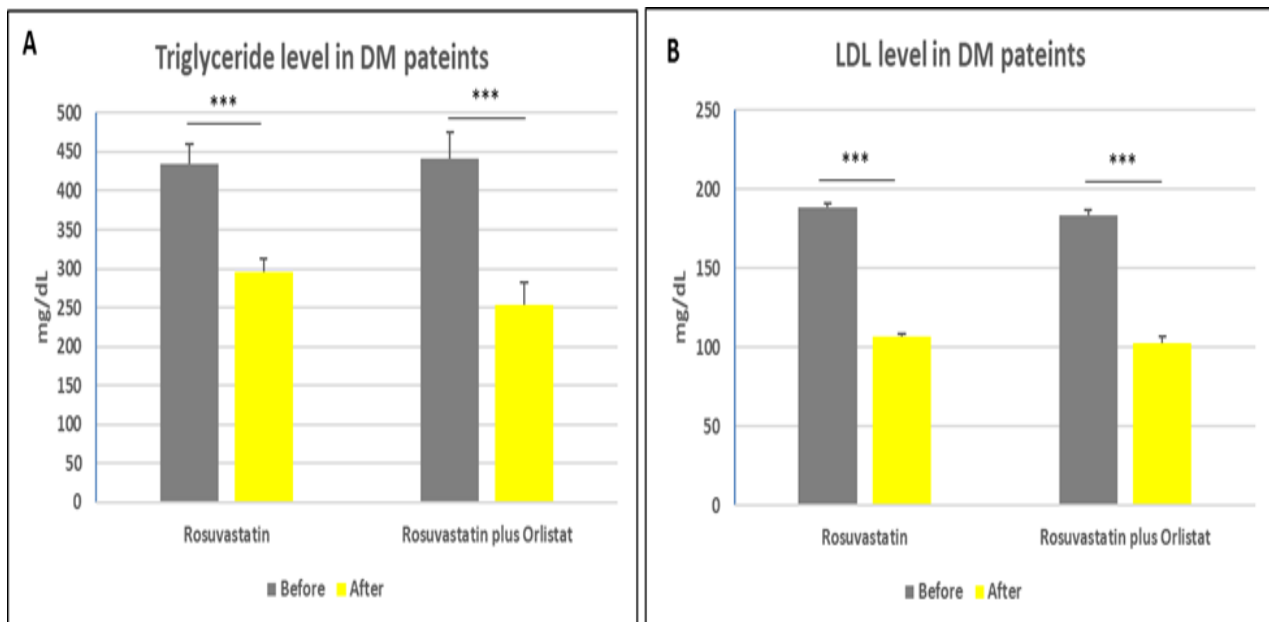


FIGURE 4: (A) Illustrates the Difference in Triglyceride Levels in Individuals with Diabetes Mellitus before and after using Rosuvastatin, and before and after Taking Rosuvastatin with Orlistat, (B). The Levels of LDL in People with Diabetes Mellitus before and after taking Rosuvastatin and Rosuvastatin Plus Orlistat are Contrasted. ***P>0.001 for the T-test.

Ischemic Heart Disease (IHD)

Our study has included patients with ischaemic heart disease. Patients with IHD may experience a number of cardiac issues due to the narrowing of their heart arteries, which results in a reduced flow of oxygen and blood.

Diabetes Mellitus

We looked into how triglycerides and low-density lipoprotein were affected by the use of Rosuvastatin and Rosuvastatin with Orlistat in all individuals with diabetes mellitus. While diabetes mellitus patients display higher levels of (Tri) than (LDL), we found that giving Rosuvastatin alone, or in combination with Orlistat would significantly reduce levels of both triglyceride and low-density lipoprotein, (Figure 4 A and B).

We found that giving Rosuvastatin alone, or Rosuvastatin plus Orlistat would have a striking impact on triglyceride and low-density lipoprotein levels, indicating a significant difference in their levels before and after taking Rosuvastatin alone, and Rosuvastatin plus Orlistat, (Figure 5 A and B).

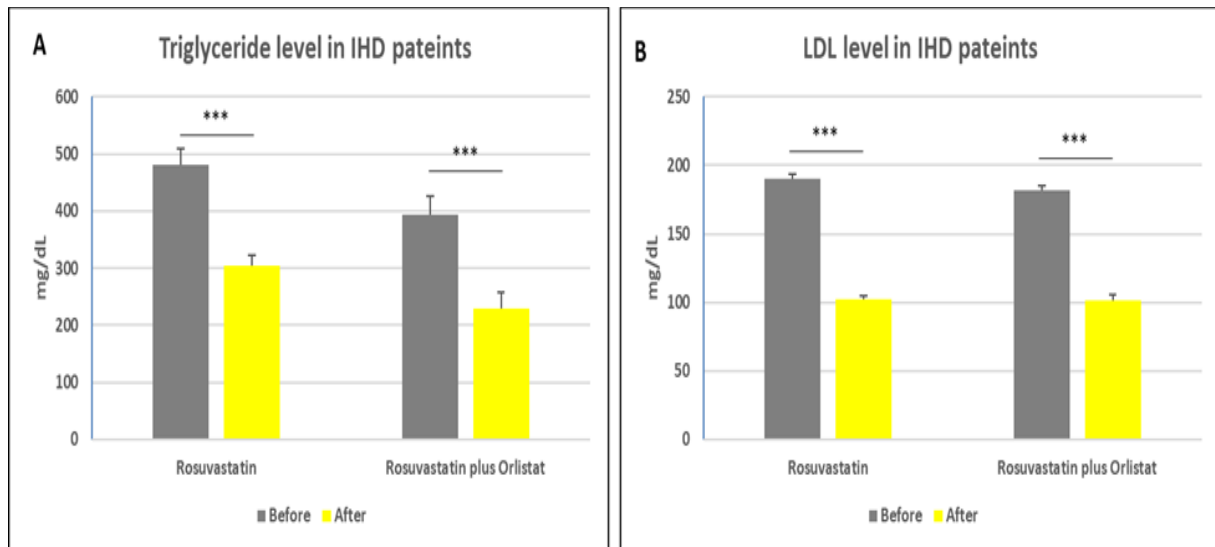


FIGURE 5: Triglyceride Levels in Individuals with Ischaemic Heart Disease are Displayed in (A) both before and after Taking Rosuvastatin and Rosuvastatin Plus Orlistat. In Individuals with Ischaemic Heart Disease, (B) displays the Level of Low-density Lipoprotein before and after taking Rosuvastatin and Rosuvastatin + Orlistat (T-test, *** $P > 0.001$).

Patients with Hypertension, Diabetes Mellitus and IHD

To determine the quality of these drugs (Rosuvastatin alone, and Rosuvastatin plus Orlistat), we tried them on patients suffering from hypertension, diabetes mellitus, and IHD at the same time. Our

research revealed that, even in more complicated cases, rosuvastatin by itself and rosuvastatin plus orlistat significantly affect triglyceride and low-density lipoprotein levels, showing a marked drop in both, with a greater drop in low-density lipoprotein than triglyceride (Figure 6 A and B).

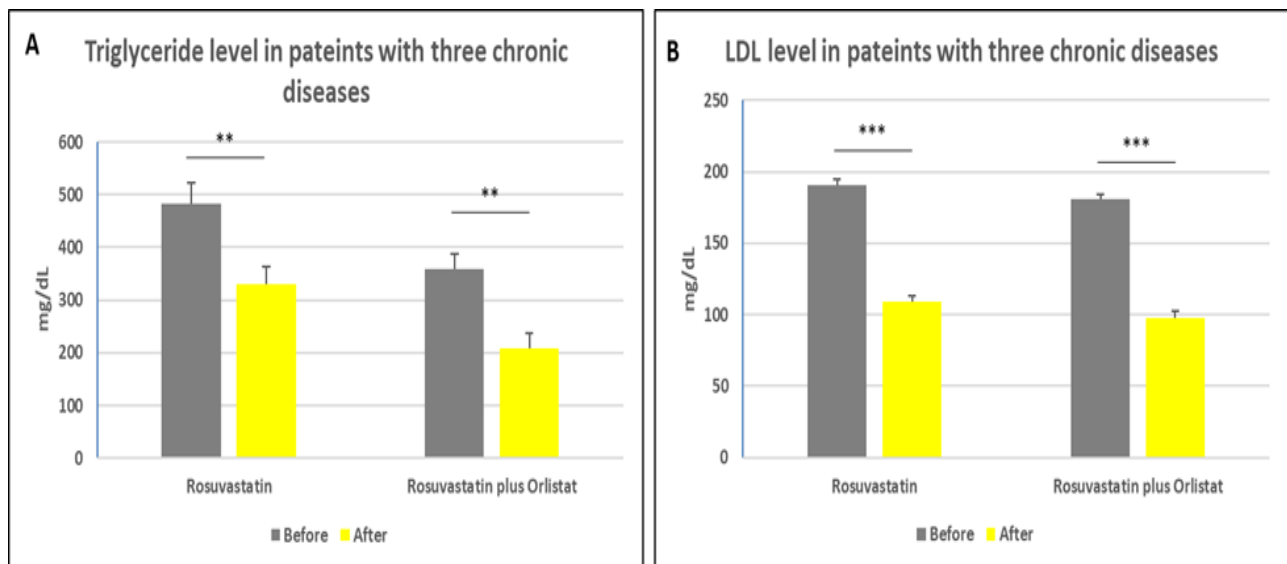


FIGURE 6: (A) Displays the Triglyceride Levels of Individuals with Ischaemic Heart Disease, Hypertension, and Diabetes Mellitus both before and after taking Rosuvastatin and Rosuvastatin with Orlistat. (B) Illustrates the Cry of Low-Density Lipoprotein of People with Ischaemic Heart Diseases, Hypertension, and Diabetes Mellitus before and after Intake of Rosuvastatin and Rosuvastatin Plus Orlistat, T-test, ** $P > 0.01$, *** $P > 0.001$.

Discussion

The age differences between individuals receiving Rosuvastatin alone and those taking Rosuvastatin and Orlistat combined were not statistically significant, according to the current study. Although age was not a component in this study, research studies frequently include gender and age as factors. For instance, a research on time usage across age groups in eleven industrialized nations discovered that gender and age had a significant impact on time-use patterns, with gender differences in time use among countries being particularly significant [7]. The study looked at how rosuvastatin usage, both alone

and in conjunction with orlistat, affected the levels of triglycerides (Tri) and low-density lipoprotein (LDL). The administration of rosuvastatin as well as the combination of rosuvastatin and orlistat elicited results that indicated a significant decrease in the Tri and LDL levels [8].

Research cited the role of cholesterol homeostasis in the generation of the modifications in the levels of lipid that occurred during rosuvastatin treatment. Short-term rosuvastatin treatment significantly lowered the levels of total cholesterol, LDL cholesterol, apolipoprotein B-100, triglyceride, phospholipids, total fatty acids and total free fatty acids [8]. The other study establishes the efficacy of

treatment of mixed dyslipidemia through use of high dose, low dose with fenofibrate and low dose and n-3 fatty acids. The experiment presented a scenario where rosuvastatin at high laxation doses performed exceptionally better in altering the lipid profiles magnetically as compared to the other two mixtures [9]. On the other hand, orlistat was found to cut down the total cholesterol levels in the blood and LDL-C concentration but not weight [10]. This proves that orlistat might directly influence the lipid metabolism.

Hypercholesterolemia is frequently related to hypertension, and the elevated level of triglycerides and LDL may raise blood pressure [11]. Nevertheless, the present study showed that despite having hypertension, patients showed the good response to the use of Rosuvastatin and Rosuvastatin plus Orlistat. These drugs led to a precise decrease in triglycerides and LDL levels [8]. The 27 randomized controlled clinical trial-based systematic review and meta-analysis revealed that the use of Orlistat yielded a significantly decreasing impact on the systolic blood pressure and the diastolic blood pressure [12]. It is a sign that Orlistat might directly influence controlling blood pressure.

A comparative study conducted on the efficacy of high dose of Rosuvastatin, low dose of Rosuvastatin and fenofibrate, low dose of Rosuvastatin and n-3 fatty acids in mixed dyslipidemia has shown that high dose of rosuvastatin was superior in the improvement of lipid profiles. Few studies have ever been conducted to examine antihypertensive effect of statins in patients with hypertension with hypercholesterolemia [9]. It shows that Rosuvastatin may also be beneficial regarding blood pressure.

This research set out to determine what the effects of Rosuvastatin and a combined drug of Rosuvastatin and Orlistat would produce on the triglyceride and low-density lipoprotein level of patients with diabetes mellitus. The result showed that when both of Rosuvastatin and Rosuvastatin and Orlistat were administrated, the concentration of both of the triglyceride and low-density lipoprotein reported a remarkable reduction [13].

Most researches have reported that Rosuvastatin is helpful in lowering the LDL cholesterol of diabetics to recommended levels [13, 14]. In addition, Rosuvastatin slightly raises the HDL cholesterol and concentrations of triglycerides [13]. In a study of the effects the drug, rosuvastatin, has on INS-1 832/13 cells, it was contributed that the drug had potential to increase basal insulin release and reduce insulin response to glucose [15].

Orlistat can even influence directly the lipid metabolism since it was demonstrated to lower the total cholesterolemia and LDL-C, without inducing weight loss [10]. Nevertheless, the effects of orlistat on the insulin secretion were not analyzed in the present study. Statins pose some risk to type 2 diabetes, although this is more intense with statins of high intensity, example rosuvastatin compared with statins which are of moderate intensity [16]. However, the benefits of using Rosuvastatin in reducing lipid levels in diabetics outweigh the risks of developing diabetes.

Patients with Ischemic Heart Disease (IHD) were included in the study, and the results showed that giving Rosuvastatin alone or in combination with Orlistat had a significant impact on triglyceride and low-density lipoprotein levels, indicating a reduction in their levels after taking the drugs [8]. According to studies, rosuvastatin efficiently lowers LDL cholesterol in diabetics to suggested goals, mildly raises HDL cholesterol, and lowers triglycerides [13, 14]. Also, Orlistat was proved to reduce LDL-C and total cholesterol blood concentrations but had no influence on weight loss [17]. used along with statins, fenofibrate and ezetimibe with LDL-C levels showing more reduction than any of them alone [17].

The study question involved the implications of Rosuvastatin and Rosuvastatin and Orlistat on the patients of hypertension, diabetes mellitus and IHD. The results showed that there was a significant decrease in the level of triglycerides and low-density lipoproteins among others and even better, a decrease in LDL level [13]. According to the study, rosuvastatin successfully lowers LDL cholesterol in diabetics to the desired levels, has a low increment of the HDL cholesterol, and a reduction of triglycerides [8, 13, 14]. Further, the Orlistat has shown to lower the blood level of LDL-C and total cholesterol but not weight loss [17]. In combination, orlistat with statins, fenofibrate and ezetimibe have proved to reduce LDL-C levels more than any of the above used separately [4, 17].

Conclusion

Lastly, based on the current study, rosuvastatin as well as the association of rosuvastatin and orlistat have significant effects on triglyceride and LDL levels of hypertensive patients with diabetes mellitus and/or IHD. Such results suggest the potential efficiency of these medications of reducing cardiovascular risk factors and controlling lipids levels among such categories of patients. These results should be verified and elaborated in further studies.

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