The Professional Medical Journal
www.theprofesional.com

ORIGINAL PROF-2322

HYPERCHOLESTEROLEMIA;

COMPARISON OF THE EFFICACY OF SIMVASTATIN 20MG WITH ATORVASTATIN 20MG IN LOWERING LOW DENSITY LIPOPROTEIN IN PATIENTS WITH HYPERCHOLESTEROLEMIA

Dr. Zahidullah Khan[1], Dr. Inamullah Khan[2], Dr. Fazle Subhan[3]

1. MBBS, MCPS, FCPS, District Medical Specialist, Govt: City Hospital Lakki Marwat, KPK
2. MBBS, MRCP, Senior Registrar Medical "B" Unit, Khyber Teaching Hospital Peshawar, KPK
3. MBBS, FCPS, Registrar Medical "C" Unit, Khyber Teaching Hospital Peshawar, KPK

Correspondence Address:
Dr Zahidullah Khan
District Medical Specialist
Government City Hospital,
Lakki Marwat, KPK, Pakistan
zahidullahmarwat@gmail.com

ABSTRACT… Objective: To compare the efficacy of Simvastatin with Atorvastatin in lowering Low Density Lipoprotein Cholesterol (LDL-C) in patients with Hypercholesterolemia in a tertiary care hospital. **Design:** Prospective, observational, single center study. **Setting:** Department of Medicine, Khyber Teaching Hospital, Peshawar. **Period:** December 2011 to December 2012. **Subjects and Methods:** A total of 200 cases having base line fasting LDL-C level of ≥ 130 mg/dl and meeting the inclusion criteria were included in the study through both outpatient department (OPD) and admitted patient. After detailed history and clinical examination, all patients were divided randomly into two groups, A and B. Patients in Group A were given Simvastatin 20mg/day and Group B received Atorvastatin 20mg/day. Fasting blood samples were taken from the selected patients in the start of study and after 12 weeks. **Results:** A total of 200 subjects with a serum LDL-C level ≥ 130 mg/dL were included in the study. They were divided into 2 groups randomly, 100 in each group. Each group comprised of 75 male and 25 female. The mean age in group A was 52 years and in group B it was 54 years. The age ranges between 40 years and 73 years. Mean base LDL-C level was 165 mg/dl in group A and 170mg/dl in group B. Simvastatin 20 mg/dl reduced LDL-C level by 26% and Atorvastatin 20mg/dl reduced LDL-C level by 33% after 12 weeks of treatment. **Conclusions:** Atorvastatin is a more effective drug to reduce serum LDL-cholesterol than Simvastatin in the same doses.

Key words: Hypercholesterolemia, Low Density Lipoprotein Cholesterol, Simvastatin, Atorvastatin.

Article received on:
03/08/2013
Accepted for Publication:
12/10/2013
Received after proof reading:
03/02/2014

Article Citation: Khan Z, Khan I, Subhan F. Hypercholesterolemia; comparison of the efficacy of simvastatin 20mg with atorvastatin 20mg in lowering low density lipoprotein in patients with hypercholesterolemia. Professional Med J 2014;21(1): 111-115.

INTRODUCTION

Coronary artery disease (CAD) is the leading cause of morbidity and mortality worldwide and accounted for 27% of deaths in 2005 in United States[1,2]. An established body of evidence points to reducing low-density lipoprotein (LDL) cholesterol as one of the most effective ways to prevent and treat Coronary heart disease (CHD), regardless of a patients risk[3,4]. On average, every 1% reduction in LDL cholesterol is matched by a 1% reduction in the likelihood of a major cardiac event[5]. Thus, small reductions in population LDL cholesterol could prevent many CHD-related deaths.

Remarkable progress has been made in recent years regarding lipid-lowering therapy, particularly with the development of potent statins. Although intensive lipid-lowering therapy has contributed significantly to the primary and secondary prevention of cardiovascular disease (CVD), the large residual risk for CVD is a major limitation[6].

Statins are the diverse class of drugs that lower cholesterol levels in patients with and without at risk of CAD by inhibiting the enzyme 3-hydroxy-3-methylglutaryl-CoA (HMG-CoA reductase) which is a rate limiting enzyme of cholesterol synthesis. Results of various trials have shown that Statins are the most efficacious drugs in primary and secondary prevention of CAD by reducing LDL-C levels but residual morbidity and mortality is still on

the higher side[3,7]. The commonly prescribed statins are Simvastatin, Atorvastatin and Rosuvastatin in our setup.

The Scandinavian Simvastatin Survival Study (4S) was a land mark trial and demonstrated clearly that statins therapy could reduce total mortality in secondary prevention trial. It reduced LDL level by 32% during study duration[8]. The most significant impact on mortality was due to the reduction in cardiovascular events. A number of substudies were also performed and demonstrated that Simvastatin therapy was beneficial in women and older patients (age > 60 years)[9]. Cerebrovascular events and new carotid bruits were also significantly reduced by Simvastatin therapy[10].

In Atorvastatin Versus Revascularization Treatment Trial (AVERT), Atorvastatin significantly reduced LDL-C by 46% during study duration and the composite end point of ischemic event was reduced by Atorvastatin therapy[11].

Statins are generally considered to be safe drugs. The common side effects are myalgias, headaches, bone pain, nausea, diarrhea, malaise, fever, muscle cramps and skin and subcutaneous disorders[12].

The rationale of current study is aimed to compare the efficacy of Simvastatin with Atorvastatin because they have different molecular structures and pharmacokinetics and may have different efficacy.

MATERIAL AND METHOD

This prospective, observational, single center study was conducted in Department of Medicine, Khyber Teaching Hospital, Peshawar from December 2011 to December 2012. A total of 200 patients (both male and female) having base line fasting LDL-C level of ≥130 mg/dl were included in the study. Patients were enrolled from both medical OPD and medical wards. Patients with familial hypercholesterolemia, history of intake of lipid lowering agents in past 6 months, history of alcohol intake, chronic kidney disease, hypothyroidism and chronic liver disease were excluded from the study.

A thorough history and clinical examination along with relevant investigations like liver function tests, renal function tests, thyroid function tests were performed from the hospital laboratory to exclude other diagnosis mentioned in exclusion criteria.

All patients were randomized into two groups. Patients in Group A were given Simvastatin 20mg/day and Group B received Atorvastatin 20mg/day. Fasting blood samples were taken from the all patients in the start of study and after 12 weeks. All laboratory investigations were performed from Khyber Teaching Hospital laboratory under supervision of single expert biochemist.

The patient detailed history with physical findings and results of relevant investigations were recorded on questionnaires, devised in accordance with the objectives of the study. Informed, written consent was taken from all patients. SPSS version 16 computer software was used for data analysis.

RESULTS

A total of 200 subjects with a serum LDL-C level ≥ 130 mg/dL were included in the study. They were divided into 2 groups A and B randomly, 100 in each group. Each group comprised of 75 male and 25 female as shown in Fig 1. The mean age in group A was 52 years and in group B was 54 years. The minimum age of the patients was 40 years and maximum age 73 years.

The mean base-line LDL-C level for group A was 165 mg/dl and group B was 170 as shown in Table-I.

Simvastatin in a dose of 20 mg was given to group A. It resulted in a fall of 26% (-42.9 mg/dl) in low density lipoprotein-cholesterol level in 100 patients during 12 weeks of treatment.

Atorvastatin in a dose of 20mg was given to group B. It showed a fall of 33% (-56.1 mg/dl) in low density lipoprotein-cholesterol level in 100 patients during 12 weeks of treatment.

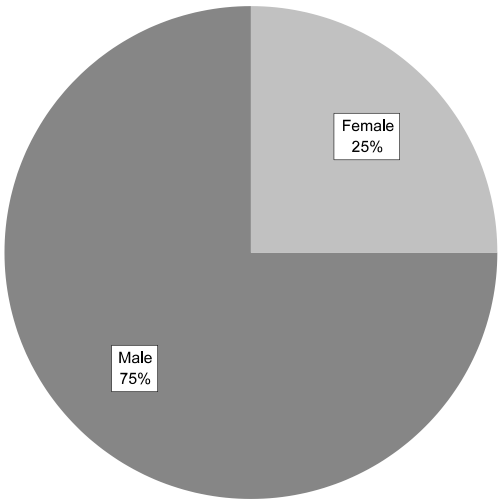

Fig-1. Sex distribution of patients

	Mean Base-Line	Simvastatin	Atorvastatin
LDL-C	165 mg/dl (Group A) 170 mg/dl (Group B)	122.1 mg/dl (26% or -42.9 mg/dl)	113.9 mg/dl (33% or -56.1 mg/dl)

Table-I. LDL-C levels and percentage reduction after 12 weeks of treatment with statins

DISCUSSION

Hyperlipidemia is a major risk factor for the development of CAD. Hypercholesterolemia provides an important modifiable risk factor for coronary heart disease and stroke. Risk increases progressively with higher levels of low-density lipoprotein (LDL) cholesterol and declines with higher levels of high-density lipoprotein (HDL) cholesterol[13]. Statins, especially in combination with a good diet and exercise have been proven to decrease the risk of heart attack and stroke, lessen the need for heart surgery and angioplasty and reduce the risk of death significantly[14-16].

The Third Report of National Cholesterol Education Program Adult Treatment Panel & the most recent guidelines of the Third Joint Task force of European and other societies on prevention of cardiovascular disease in clinical practice have recommended an LDL cholesterol level of less than 100mg/dl as the goal of therapy for patients at high risk for CHD[17,21].

Simvastatin 20mg/day reduced LDL-C by 26% after 12 weeks of treatment in our study. The results of our study correlate with results of Kontopoulos AG, et al in which Simvastatin reduced LDL-C level by 22%[24]. In a study conducted by Chaudhry A, et al, Simvastatin reduced LDL-C level by 26% which is equal to our study[18]. Another study conducted by Harley CR, et al in United States showed that Simvastatin reduced LDL-C levels by 35.5%. The results of this study are higher than our study but this study was carried out only in diabetic hypercholesterolemic patients[25].

In our study, LDL-C was reduced by 33% with 20mg dose of Atorvastatin given for 12 weeks from the start of study. A local study conducted by Chaudhry A, et al showed that Atorvastatin 10mg/dl reduced LDL-C by 35%[18]. This result is in accordance with our study. In another local study conducted by Shah M, et al Atorvastatin reduced LDL-C level by 35% which is comparable to our study[26]. Another study conducted by Recto CS, et al in Philippine Heart City, Philippines showed that Atorvastatin 20mg/day decreased LDL-C level by 35 which is also comparable to our study. This study also illustrated that both Atorvastatin and Simvastatin are equally effective in reducing LDL-C levels and are well tolerated[19]. Another study conducted in United States, Atorvastatin reduced LDL-C by 26% which is slightly lower than our study[20]. Atorvastatin reduced LDL-C by 28% in a study conducted by Ohsfeldt RL, et al in United States[23]. The results of this study are similar to our study.

CARE study demonstrates a relationship of lowering LDL-C and decreasing coronary events[21]. The value of lowering low density lipoprotein (LDL) cholesterol level in preventing major cardiovascular events & stroke has been well documented[22].

CONCLUSIONS

Both Simvastatin and Atorvastatin are effective statins in lowering LDL-C levels in

hypercholesterolemic patients but Atorvastatin is more effective than Simvastatin of the same doses as shown in the above study. However, larger studies are required to prove this in our set up.

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