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ANALYZING THE THERAPEUTIC EFFICACY OF ROSUVASTATIN IN MANAGING HYPERCHOLESTEROLEMIA AND DYSLIPIDEMIA

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Abstract: This research aimed to assess both the clinical effectiveness and safety of rosuvastatin therapy in patients diagnosed with hypercholesterolemia and dyslipidemia. The study involved 60 participants treated at the therapeutic unit of Bukhara City Clinical Hospital between 2024 and 2025. Subjects were randomly assigned to two groups: the first group (n=30) received daily doses of rosuvastatin (10–20 mg), while the second group (n=30) underwent lifestyle and dietary interventions without medication. The key parameters analyzed included changes in lipid profiles — specifically total cholesterol, LDL-C, and HDL-C — along with liver enzyme levels to ensure drug safety.

At baseline, lipid indicators were similar between both groups. After 12 weeks, those treated with rosuvastatin demonstrated marked improvements: total cholesterol levels dropped by 28%, LDL-C was reduced by 44%, and HDL-C rose by 27%, all with statistically significant differences ($p < 0.05$). The lifestyle-only group did not show meaningful changes in these metrics. The medication was well tolerated overall, with only mild adverse reactions observed in two individuals, none of which required stopping the therapy.

These results reinforce the established lipid-lowering potential of rosuvastatin and affirm its safety in everyday clinical settings. The study highlights that rosuvastatin therapy yields significantly better improvements in lipid profiles than non-pharmacological measures alone. Therefore, it should be regarded as a key element in the prevention of atherosclerosis and cardiovascular complications, especially for patients at heightened risk. Further extensive, long-term trials are recommended to validate the durability of these benefits and track long-term safety outcomes.

Keywords: rosuvastatin, hypercholesterolemia, dyslipidemia, atherosclerosis, lipid profile, prevention.

Introduction. Atherosclerosis and its associated cardiovascular diseases (CVD) remain among the primary causes of illness and premature death worldwide, contributing significantly to disability and early mortality. The development of atherosclerosis is driven by a complex set of factors, including lipid metabolism disorders, endothelial dysfunction, chronic inflammation, and genetic predisposition. Among the modifiable risk factors, dyslipidemia plays a central role. It is typically characterized by elevated levels of total cholesterol, low-density lipoprotein cholesterol (LDL-C), and triglycerides, along with reduced levels of high-density lipoprotein cholesterol (HDL-C). This lipid imbalance contributes to the formation and progression of atherosclerotic plaques in the arteries, leading to vascular narrowing and ischemic events such as myocardial infarction and stroke.

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Pharmacological management of dyslipidemia has become a cornerstone of cardiovascular disease prevention. Statins, or HMG-CoA reductase inhibitors, are the first-line agents due to their proven ability to reduce LDL-C, stabilize atherosclerotic plaques, and exert additional effects such as anti-inflammatory action and improved endothelial function. Among these, rosuvastatin stands out for its high potency, favorable pharmacokinetic properties, and strong lipid-lowering efficacy even at low doses. It works by inhibiting the rate-limiting step in cholesterol biosynthesis, resulting in marked reductions in LDL-C and total cholesterol, as well as beneficial effects on HDL-C and triglyceride levels.

Although the effectiveness and safety of rosuvastatin have been confirmed in large-scale clinical trials, continued evaluation in various clinical contexts and patient populations remains important. Factors such as genetic variability, comorbid conditions, and concurrent medications can influence treatment response and tolerability. Therefore, this study is dedicated to assessing the clinical and laboratory efficacy and safety of rosuvastatin in patients with dyslipidemia undergoing treatment in a city clinical hospital. The results are intended to support the optimization of lipid management strategies tailored to the specific needs of the local patient population.

Materials and Methods

This prospective, controlled study was conducted at the Therapeutic Department of Bukhara City Clinical Hospital during the period from 2024 to 2025. A total of 60 patients diagnosed with primary dyslipidemia or hypercholesterolemia were enrolled based on the diagnostic criteria established by the European Society of Cardiology (ESC) and the European Atherosclerosis Society (EAS) in 2016. The inclusion and exclusion criteria were rigorously applied to ensure a homogeneous study population and minimize confounding factors.

Inclusion criteria were as follows: patients aged between 35 and 70 years; total cholesterol levels exceeding 5.2 mmol/L; LDL cholesterol levels above 3.0 mmol/L; and no prior history of statin therapy, allowing for an unbiased assessment of rosuvastatin's efficacy and safety as an initial treatment.

Exclusion criteria encompassed patients with active hepatic or renal pathology, including elevated liver enzymes or impaired kidney function, as these conditions could influence drug metabolism and safety profiles. Additionally, individuals with secondary causes of hyperlipidemia, such as hypothyroidism, nephrotic syndrome, or other endocrine disorders, were excluded to isolate the effect of primary dyslipidemia. Patients with documented intolerance or contraindications to statin therapy were also excluded to ensure patient safety.

Following screening, participants were randomized in a 1:1 ratio into two groups. The **main group** (n=30) received rosuvastatin therapy at doses ranging from 10 to 20 mg once daily, adjusted according to clinical response and tolerability. The **control group** (n=30) was managed with lifestyle modifications, including adherence to a low-cholesterol diet emphasizing reduced intake of animal fats, alongside recommendations for regular physical activity consistent with current clinical guidelines.

Clinical and laboratory evaluations were conducted at baseline and after 12 weeks of intervention. Laboratory parameters measured included serum total cholesterol, LDL

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cholesterol, high-density lipoprotein (HDL) cholesterol, triglycerides, and hepatic transaminases (alanine aminotransferase [ALT], aspartate aminotransferase [AST]) to monitor both efficacy and safety. Clinical data encompassing blood pressure, body mass index, and symptomatology were recorded. Furthermore, patient-reported tolerability and adverse events related to rosuvastatin were systematically documented throughout the study period.

This methodological approach aimed to provide comprehensive insight into the lipid-lowering efficacy, safety profile, and overall clinical impact of rosuvastatin in a real-world hospital setting.

Results

After 12 weeks of rosuvastatin therapy, significant improvements in the lipid profile were observed in the main group:

Parameter	Before Treatment	After Treatment	Change (%)
Total Cholesterol	6.8 ± 0.4 mmol/L	4.9 ± 0.3 mmol/L	−28%
LDL Cholesterol	4.5 ± 0.3 mmol/L	2.5 ± 0.2 mmol/L	−44%
HDL Cholesterol	1.0 ± 0.2 mmol/L	1.27 ± 0.2 mmol/L	+27%
Triglycerides	2.1 ± 0.3 mmol/L	1.6 ± 0.2 mmol/L	−24%

No statistically significant changes were observed in the control group ($p>0.05$). Regarding safety, two patients in the main group reported mild adverse effects (headache, nausea), which did not require discontinuation of therapy. Liver enzyme levels (ALT, AST) remained within normal ranges.

Discussion

The results obtained in this study unequivocally confirm the high efficacy of rosuvastatin in the correction of lipid metabolism disorders in patients with primary dyslipidemia. Treatment with rosuvastatin led to a pronounced reduction in low-density lipoprotein cholesterol (LDL-C) levels by more than 40%, accompanied by a notable increase in high-density lipoprotein cholesterol (HDL-C) by approximately 27%. These changes are of critical clinical importance, reflecting a substantial atheroprotective effect, which is well recognized as a key factor in reducing the progression of atherosclerosis and consequent cardiovascular events. Our findings are consistent with data reported in large-scale international clinical trials, particularly the JUPITER study, which demonstrated that rosuvastatin significantly reduces the incidence of major cardiovascular events in patients presenting with elevated levels of C-reactive protein and moderately increased cholesterol, despite otherwise low or average LDL-C concentrations. The JUPITER trial also highlighted the pleiotropic effects of rosuvastatin, including anti-inflammatory properties and endothelial function improvement, which may contribute to its cardiovascular benefits beyond lipid lowering. In addition to efficacy, rosuvastatin exhibited a favorable safety and tolerability profile in the studied cohort. No serious adverse events or significant elevations in hepatic enzymes were observed, supporting the drug's suitability for long-term use in

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clinical practice. This is particularly important given the concerns often raised regarding statin-associated side effects, which can limit patient adherence and treatment success. The comparison with the control group, which received only dietary and lifestyle recommendations, underscores the limitations of non-pharmacological interventions alone in achieving optimal lipid profile improvement among patients at high cardiovascular risk. Although lifestyle modifications are fundamental and should be continuously encouraged, they often fail to provide adequate reductions in LDL-C or significant increases in HDL-C in a relatively short time frame. Thus, our data reinforce the necessity of early initiation of statin therapy in appropriate patient populations to effectively mitigate cardiovascular risk.

Overall, the study supports the growing body of evidence advocating for rosuvastatin as a first-line agent in the management of dyslipidemia, particularly in settings similar to our clinical environment. Further longitudinal studies with larger sample sizes and extended follow-up periods are warranted to confirm these benefits and assess long-term outcomes.

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