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STUDY OF STATIN EFFICACY IN DIFFERENT AGE GROUPS

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Abstract

The role of statins is to block an enzyme from the body that promotes the formation of bad cholesterol, reducing the risk of heart disease. Bad cholesterol, LDL, is responsible for heart disease and vascular-cerebral accidents, it is deposited over time on arteries and triggers cardiovascular disease.

Statin treatment has become routine in hypercholesterolemia, hence the concern to mitigate the adverse effects of their administration. The most common side effects are: muscle tension, headache, insomnia, fatigue, nausea, abdominal pain, diarrhea, constipation, itching.

The brain needs cholesterol to release vital chemical compounds, neurotransmitters that provide messages between neurons, and statins inhibit this vital process. No cholesterol decreases intellectual performance and memory, which can lead to depression.

Key words: statins,enzyme, LDL, cholesterol, heart disease, risk.

INTRODUCTION

Lipids are defined as water-insoluble biomolecules and soluble in organic solvents: chloroform, acetone, methanol, benzene. (A.N. Cristea, 2016, 2006) et al. Cell membranes contain in their structure a protein layer and a double lipid layer. Triglycerides or triacylglycerols are a source of important chemical energy for the body and an important component of lipids. (Kivisto K.T et al.,2008)

In the United States, daily intake of lipids is approximately 81 grams, triglycerides or triglycerides representing more than 90 per cent, cholesterol, cholesterol esters, phospholipids or phosphoglycerides, and non-esterified fatty acids are the food lipid residue. (Kivisto K.T. et al.,2004)

Lipid digestion is catalysed by an acid-resistant lipase, begins in the stomach and is secreted by the glands at the base of the tongue, lingual lipase. Triacylglycerol molecules represent the primary target of these enzymes, especially those containing short or medium chain fatty acids.

Gastric lipase, secreted by the gastric mucosa, degrades the same molecules of triacylglycerols. (Mureșan M. et al., 2016) Both enzymes are active at a pH of between 4 and 6, being resistant to gastric acidity.

Lipids are released into the lime as chylomicrons after intestinal epithelial cells are taken up by fatty acids, monoglycerides and diglycerides, and after triglyceride resistance at this level. After intestinal absorption, fatty acids with long and medium chain fat come to the liver via the portal blood, brought in small amounts by food intake. (Mega J. L. et al.,2009)

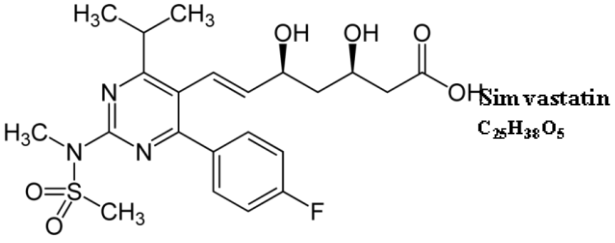
Statins are normal substances produced by fungi or synthetic analogues of these, being indicated in hyperlipoproteinemias with hypercholesterolemia, causing a decrease in cholesterol levels. The effect is mainly due to the inhibition of hydroxymethylglutaryl coenzyme A reductase, with the consequent diminishing of cholesterol synthesis. (Padmanabhan S. et al., 2010).

Statins play an important role in cardiovascular prevention, especially in high-risk individuals, with a favorable effect on total mortality, morbidity and coronary mortality, in secondary prevention for people without lipid disorders (Champe P.C et al., 2001)

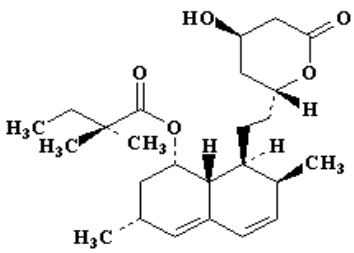
The enzyme involved in cholesterol synthesis in the liver is HMG-CoA reductase inhibitors of 3-hydroxy-3-methyl-glutaryl coenzyme A reductase. LDL-cholesterol decreases by 25-60%, increasing the number of hepatic receptors to LDL. Triglycerides and HDL-cholesterol are less influenced. (Dobrescu D. et al., 2018)

Recent studies have shown that intensive lipid-lowering therapy with statins has improved clinical outcomes and reduced the progression of atherosclerosis. (Bencini A. et al., 1983) Greater statin-intensive therapy benefits have been attributed, compared to statin therapy, a greater reduction in atherogenic lipoprotein levels, especially LDL cholesterol. (Coakley J.H . et al., 1998) Statins decrease the C-reactive protein (CRP) level; after the studies performed, CRP levels were 30-40% lower after statin-intensive therapy than after moderate treatment. (David W. et al., 1998)

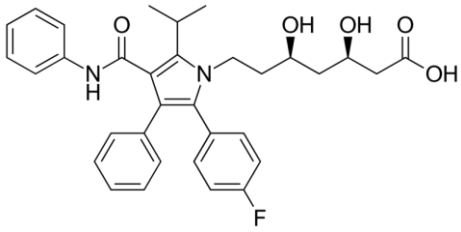
The drugs that are associated are hypo-cholesterol-lowering statins, for example: atorvastatin, lovastatin and simvastatin with hypo-cholesterol-lowering fibrates, eg gemfibrozil, give myopathic myositis, myalgia, rhabdomyolysis as a side effect association is an increased risk of fatal rhabdomyolysis, and their association is contraindicated. (Boyd A.H. et al.,1998)



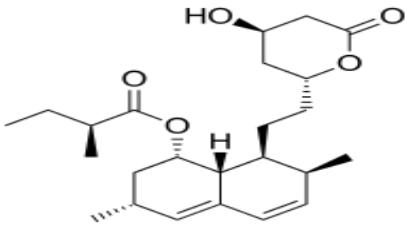
a) rosuvastatin



b)simvastatin



c) atorvastatin



d) lovastatin

Fig.1 The chemical structure of the most common pharmaceutical products on the market

MATERIAL AND METHOD

The study was performed on a group of patients admitted to Deta City Hospital in the internal medicine department who had atorvastatin, rosuvastatin and simvastatin treatment regimens following treatment for both admission and 30 days after discharge.

The Deta County City Hospital, 45 patients who received a 10 mg simvastatin treatment were selected from the internal medicine department, both during and after discharge for 30 days.

Since cholesterol synthesis is maximal at night, statins are administered orally in the evening in a single dose. Start treatment at a lower dose and then increase after 3 weeks.

RESULTS AND DISCUSSION

The gender distribution of the evaluated patients was 34 men and 11 women, 67% men and 33% women, aged 41 to 69 years.

Statin administration in children below 18 years is not recommended because the safety and efficacy of statins in this age group has not been demonstrated, nor is it recommended for pregnant women and nursing women.

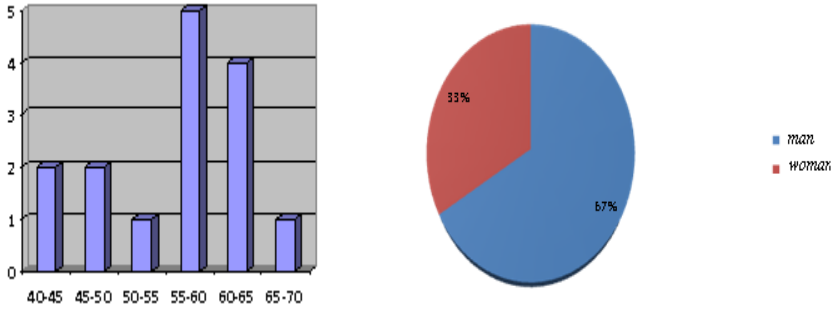


Fig. 2. Patient evaluation by age and sex

Patient data on admission was evaluated after statin treatment for 5 days of admission, patient evaluation was again performed, and after 30 days of treatment, patient values were re-evaluated to see if treatment was suitable.

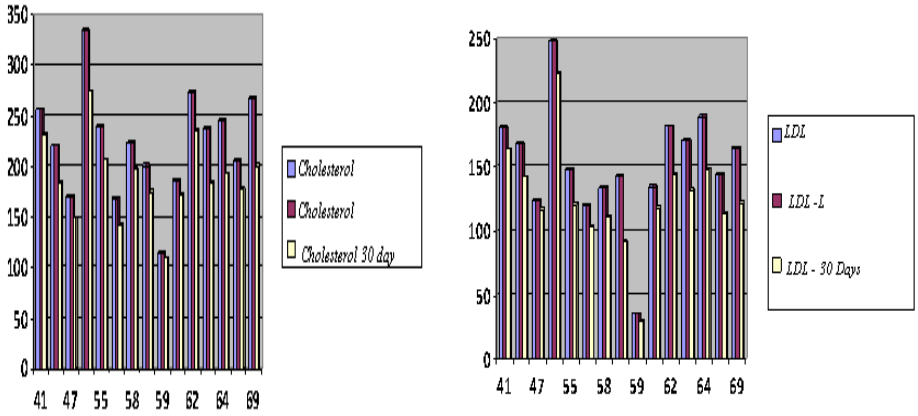


Fig. 3. Graphical representation of serum cholesterol

It can be seen that four patients, aged 47 years, having a cholesterol level of 171 mg/dl, 57 years having a cholesterol level of 169 mg/dl, 59 years having a cholesterol level of 115 mg/dl, 61 years having a cholesterol value of 187 mg / dl, are in the normal range (109-202 m /dl), and in the rest of the patients the cholesterol levels are increased.

After statin treatment in the 5-day hospitalization period, cholesterol levels do not change, but the period is very low, but after 30 days of treatment, it can be seen from the table and chart above that cholesterol levels have dropped considerably in all patients. In the four patients who

had values in the normal range, the values decreased but remained within the normal range.

CONCLUSIONS

In 24 patients of different age and gender, after 30-day statin treatment, values remained elevated beyond the normal range: the 41-year-old patient with an initial value of 256 mg/dl after 30 days decreased to 232 mg/dl; the 48-year patient with an initial value of 334 mg/dl after 30 days decreased to 274 mg/dl; the 55-year patient with baseline 240 mg/dl after 30 days decreased to 207 mg/dl; the 62-year-old patient with an initial value of 273 mg/dl after 30 days decreased to 236 mg/dl. These patients will continue with statin therapy. Adverse reactions during hospitalization were not recorded following statin treatment evaluation, after 30 days there was a decrease in total serum cholesterol, statins decrease the risk of death by cardiovascular disease by about 25%, we can say that the treatment was suitable. It can be noticed that statin administration, in our case 10 mg simvacard, does not influence the biochemical parameters analyzed during the 5 days of admission, but for a longer treatment period of 30 days, the biochemical parameters are influenced, it can be said that treatment is long-lasting and, as a result of our results, we can say that treatment with simvacard 10 mg in long-term patients was adequate.

REFERENCES

1. Aurelia N.C., Cornel C., Ioana L.T., Cristina D.M., Cristina Z., Diana S.N., 2006, Farmacie Clinică în farmacia de comunitate, vol I, pp. 78-80.
2. Bencini A., 1983, Clinical pharmacokinetics of vecuronium bromide. In: Agoston S (ed) Clinical experiences with norcuron. Excerpta Medica, Amsterdam (Excerpta Medica Current Clinical Practice Series, vol 6), pp. 22-24.
3. Boyd AH, Eastwood NB, Parker CJ, et al., 1996, Comparison of the pharmacodynamics and pharmacokinetics of an infusion of cisatracurium (51W89) or atracurium in critically ill patients undergoing mechanical ventilation in an intensive therapy unit. Br J Anaesth, pp. 76-78.
4. Cristea Aurelia Nicoleta, 2016 Tratat de farmacologie, ed.1, editura medicală București, pp.56-63.

5 Coakley JH, Nagendran K, Yarwood GD, et al., 1998, Patterns of neurophysiological abnormality in prolonged critical illness. Intensive Care Med., pp. 17-18.

6 Constantinescu, Cristina Russ, 2010, Farmacologie, ed.9 Bic All,

7 David W, Roehr C, Leatherman J., 1998, EMG findings in acute myopathy with status asthmaticus, steroids and paralytics: clinical and electrophysiologic correlation. Electromyogr Clin Neurophysiol, pp. 45-47.

8 Duvaldestin P, Demetriou P, D Hollander A., 1982, Pharmacokinetics of pancuronium in man: A linear system.
9 Dumitru Dobrescu, Simona Negreș, 2018, Memorator de farmacologie alopata, ed.24, editura universitară București, pp. 54-56.
10 Ioan C., Ramona G., Luminita P., 2011, Biochimie medicală, Arad: Vasile Goldiș University Press,.
11 Kivisto K.T., Niemi M., SChaeffeler E., et al. 2004– Lipid- lowering response to statins is affected by CYP3A5 polymorphism. Pharmacogenetics,pp 45-47.
12 Link E., Parish S.,Armitage J.,et al 2008, (Search Colaborative Group)- SLCO1B1 variants and statin - induced myopathy – A genomewide study. N Engl J Med.
13 Mega J. L., Morrow D.A., Brown A., Cannon C.p., sabatine M.S. 2009 – Identification of genetic variants associated whith response to statine therapy, Arterioscler Thromb Vasc Biol. pp. 67-71.
14 Mraz C E; Muresan M; Micle O, Vicas L, Pallag A,, Coltau M, Puscas I, 2012, Effect of vitamin D on carbonic anhydrase activity experimental reasearch in vitro and in vivo, Farmacia,; **60**(2): 264-271.
15 Mureșan M, Dobjanschi L, 2016, 'Biochimie medicală, Ghid de lucrări practice' Ed.Oradea, pp. 34-41.
16 Padmanabhan S., Paul L., Dominczak A.F 2010– The Pharmacogenomics of Anti-Hypertensive Therapy. Pharmaceuticals, pp. 67-68.
17 Pamela C. Champe, Richard A. Harvei, Denise R. Ferrier, Lippincott. Biochimie ilustrată, ed.IV, edit medicală Callisto, pp.34-39.
18 Pallag A, Jurca T, Sirbu V, Honiges A, Jurca C, Analysis of the Amount of Polyphenols, Flavonoids and Assessment of the Antioxidant Capacity of Frozen Fruits, 2018. REV CHIM. (Bucharest),; **69**(2): 445-448.
19 Pallag A, Jurca T., Pasca B., Sirbu V., Honiges A., Costuleanu M., 2016Analysis of Phenolic Compounds Composition by HPLC and Assessment of Antioxidant Capacity in Equisetum arvense L. Extracts REV CHIM .(Bucharest), **67**(8): 1623-1627
20 Pallag A., Paşca B., Jurca T., Suciu R., Nemeth S., Vicaş L., 2016, Comparative histo-anatomical researches on the vegetative organs and assessment of antioxidant capacity of two species from Equisetum Genus. *Farmacia*, **64**(3): 372-377.
21 Pedro-Botet J., Schaefer E.J., Bakker-Arkema R.G., et al. 2001– Apolipoprotein E genotype affects plasma lipid response to atorvastatin in a gender specific manner. Atherosclerosis.
22 Steven E. Nissen, M.D., E. Murat Tuzcu, M.D., Paul Schoenhagen, M.D., Tim Crowe, B.S., William J. Sasiela, Ph.D., John Tsai, M.D., John Orazem, Ph.D., Raymond D. Magorien, M.D., Charles O'Shaughnessy, M.D., and Peter Ganz, M.D. for the Reversal of Atherosclerosis with Aggressive Lipid Lowering (REVERSAL) Investigators.
23 Valentin Stroescu, Iosefina C. Constantinescu, Ion Fulga, Oana A. Coman, Maria c.Agoston S, Vermeer GA, Kersten UW, Meijer DKF (1973), The fate of pancuronium bromide in man.