Evaluation of body mass index and lipid fractions levels in patients with retinal artery occlusion

Evaluacija indeksa telesne uhranjenosti i lipidnih frakcija kod bolesnika sa okluzijom retinalne arterije

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Abstract

Background/Aim. There are studies stressing out that atherosclerosis is most common associated systemic condition in patients with retinal artery occlusion. The aim of this study was to analyze values of body mass index and lipid fractions in healthy individuals and patients with retinal artery occlusion. Methods. This study included 90 participants during a 6-year period. The population was divided into 2 groups: the group with the diagnosed retinal artery occlusion and the group without retinal artery occlusion. The observed parameters were as follows: body mass index, low and high density lipoproteins and triglycerides. Results. The study revealed no significant difference regarding body mass index and triglycerides values between the two evaluated groups, while low and high density lipoproteins values were significantly higher in the group of patients with retinal artery occlusion. Conclusions. The study demonstrated that body mass index and triglycerides have less important role in atherogenic pathogenesis of retinal artery occlusion, while low density lipoprotein is the fraction that is shown to be most potent in such etiological processes.

Key words: arteriosclerosis; lipids; body mass index; retinal artery; arterial occlusive diseases.

Introduction

Retinal vascular occlusions (RVO) are the second frequent retinal vascular disease seen in clinical practice in ophthalmology. Its frequency is estimated to approximately 1/10,000 outpatient visits. Retinal artery occlusions (RAO) are important acute retinal vascular occlusive disorders and ophthalmic emergencies, associated with sudden and massive visual loss in middle-aged and elderly people and are highly associated with hypercholesterolemia, atherosclerosis, and hypertension.

There are studies stressing out that atherosclerosis is most common associated systemic condition in patients with RAO. It is also observed that risk factors for development of RVO are associated with high concentrations of lipids and triglycerides.
of atherosclerotic lesions including hyperlipidemia, diabetes mellitus and arterial hypertension are associated with RAO. The role and impact of low density lipoprotein (LDL) cholesterol in atherosclerosis processes was described by numerous epidemiological studies. Protective effects of plasma high density lipoprotein (HDL) cholesterol by promoting reverse cholesterol transport and slowing vascular disease by blocking inflammation have been studied.

Also, it is stressed out that overweight and obesity are strongly associated with development of atherosclerotic plaques.

However, recent studies suggest that even though overweight and obesity are cardiovascular risk factors, they are not independently associated with carotid atherosclerosis.

The aim of this study was to analyze values of body mass index (BMI) and lipid fractions in healthy individuals and patients with RAO.

Methods

The study evaluated 90 participants during a 6-year period. The population was divided into 2 groups: the group with diagnosed RAO (group I) and the group that did not have RAO, or any other ophthalmological disease (group II). The group I included 50 participants treated at the Ophthalmology Clinic, Clinical Center of Serbia, Belgrade, while the second group included 40 adults with no RAO. Central retinal artery occlusion (CRAO) or branch retinal artery occlusion (BRAO) was diagnosed based on abrupt visual loss accompanied by one or more of the following signs as observed by slit-lamp biomicroscopy: 90 diopter or 78 diopter lens: sluggish, thinned retinal artery flow, fragmentation of the blood column in retinal arterioles, retinal opacification combined with sluggish retinal blood flow, and the presence of a cherry-red spot. Visual acuity tests by a Snellen chart under the same standard illumination, relative afferent pupillary defect, applanation tonometry, slitlamp biomicroscopy and funduscopy were performed. Two general parameters were analyzed: BMI and lipid fractions.

As one of the important risk factors for development of atherosclerosis and therefore occlusion of retinal artery, we analyzed separately each lipid fraction: LDL cholesterol, HDL cholesterol and triglycerides. Lipid fractions were analyzed separately in both groups of participants. Blood samples were taken in the morning before meal and with last meal not less than 12 hours from taking blood samples.

The study group was presented in terms of whole numbers and percents. To compare distribution of participants between the two groups we used the chi squared test.

The values for BMI, LDL cholesterol, HDL cholesterol and triglycerides were presented as mean with standard deviation (SD), and minimal and maximal values as well. To compare values of BMI, LDL cholesterol, HDL cholesterol and triglycerides between the evaluated groups we used the Student’s t-test. A range interval between minimal and maximal values was presented in terms of whole numbers, while difference in values between the two evaluated groups was described as percents for each parameter. Statistical significance was defined as p < 0.05. Analyses were assessed in part using SPSS 16.0 for Windows.

Results

The study included 50 (55.56%) patients with the diagnosed RAO and 40 (44.44%) adults without RAO. There was no significant difference between the two groups regarding number of participants (X² = 2.78; p > 0.05). Table 1 shows the values of BMI and lipid fractions for both evaluated groups of participants. The obtained results pointed out that there was no statistically significant difference (p > 0.05) for BMI between the two evaluated groups.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Group with RAO</th>
<th>Group without RAO</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI (kg/m²)</td>
<td>26.16 ± 3.77</td>
<td>24.87 ± 2.85</td>
<td>n. s.</td>
</tr>
<tr>
<td>LDL-C (mmol/L)</td>
<td>3.92 ± 1.32</td>
<td>2.87 ± 0.91</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>HDL-C (mmol/L)</td>
<td>1.43 ± 0.29</td>
<td>1.29 ± 0.27</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td>Triglycerides (mmol/L)</td>
<td>2.02 ± 0.96</td>
<td>1.83 ± 0.82</td>
<td>n. s.</td>
</tr>
</tbody>
</table>

Table 1

Discussion

Retinal artery occlusion if not diagnosed timely, could lead to loss of vision. Beside numerous factors that have studied regarding RAO, atherosclerotic plaques are one of them that could cause vasobliteration. Therefore, evaluation and role of risk factors responsible for atherosclerotic lesion formation are important in determining their significance in RAO etiology.

Several studies that were conducted more than 3 decades ago noticed that the majority of patients with atherosclerotic changes of retinal blood vessels had atherosclerotic changes on other arteries as well. It should be pointed out that in these studies serum lipids were not analyzed.

Recent epidemiological studies demonstrated that the diameter of retinal arteriolar caliber is associated with elevated blood pressure and obesity and can be valuable in predicting incidence of diabetes and coronary heart disease. Therefore, beside evaluation of risk factors for RAO, such entity is a valuable parameter of other risk factors that are responsible for cardiovascular diseases.

This study suggests that the group of patients with RAO had no significantly higher values of BMI and triglycerides as compared to those without occlusion. However, the range interval between minimal and maximal values was wider in patients with RAO, stressing out that such state can be diagnosed both in people that are categorized as overweight with BMI lower than 17 kg/m², as well in those that are obese with BMI over 40 kg/m². A wider range of values interval, that is more than 50%, in the group I of participants implicates heterogeneity of this population and with other findings stresses out that occlusion of retinal artery is not closely influenced by BMI and triglycerides.

Further, the group I of participants had significantly higher values of LDL cholesterol and HDL cholesterol than those without occlusive condition. For patients from the group I minimal values as well as maximal values regarding LDL cholesterol were higher than for the participants from the group II, while for HDL cholesterol only maximal values were higher. These findings clearly indicate that LDL cholesterol fraction is associated with occlusive disease of retinal artery. Such observations are in accordance with other studies. This fact is demonstrated in our study also by a lower widening of range interval between minimal and maximal values (below 50%), pointing out less heterogeneity contrary to BMI, and even, HDL cholesterol findings. It is important to notice that even there is higher protective role of HDL cholesterol, speaking in terms of its higher values in the group I of participants, it is LDL cholesterol that is more atherogenic in the processes of occlusion.

Conclusion

This study demonstrated that certain factors such as BMI and triglycerides have less important role in atherogenic pathogenesis of retinal artery occlusion, while LDL cholesterol is the lipid fraction that is shown to be most potent in such etiological processes.

REFERENCES


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