EXPERIMENTAL DATA REGARDING THE ROLE OF LIPOPROTEIN (a) IN ATHEROGENESIS

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Abstract: The present study has tried to establish certain correlations between the role of lipoprotein (a) in artherogenesis and the changes occurred in the lipidic metabolism. The results achieved show that lipoprotein (a) is found especially on persons with cardiovascular disorders with changes of the lipidic metabolism, and represents one of the main atherogenous factors which initiates and develops the cardiovascular disorders.

INTRODUCTION

According to prior research (3) the role of lipoprotein (a) [Lp (a)] in the artherogenesis process has become more and more prominent and the further purpose was to establish a correlation between this lipoparticle and the changes of the lipidic metabolism. A new pathology was mentioned, the so called pathology of civilization, characterized by a great frequency of chronic degenerative diseases but more than half of the death causes is due to cardiovascular diseases (50-55%) in most word countries. In our country the cardiovascular diseases are the origin of 46% of the death rate.

Together with the risk factors which lead to these high frequencies – food and stress - and acting in close connection to these factors, are the metabolic diseases such as saccharate diabetes, obesity, dislipidimy, gout, etc (5).

Nowadays, it is believed that secondary cardiovascular prevention can only be achieved by the discovering and treating all risk factors without underestimating any of them or by supervising only some of these factors which frequently determine cardiovascular events (2).

Having a structure to a large extent similar to plasminogen, apoprotein (a) [apo(a)] and respectively lipoprotein (a) show great affinity for fibrine, fibronectine, proteoglycans, considering that Lp (a) can be atherogenous through the interference of trombolisis (4). From a structural point of view Lp (a) is similar to LDL, that is, it contains cholesterol esters in the core of the particle and an apo B100 molecule on the periphery on which disulphide bridges 1-2 molecules of apoprotein (a) are attached. Apo (a) is a glycoprotein highly glycolised (38% of glucidical part compared to 5-10% on apo B100) and has 5 or 6 times more acid N- acetilneuraminic than apo B100 (8)

In order to prevent the growth, crack, the break the thrombolysis and the embolization of the atheroma plaque a long term cardiovascular prevention is needed, staggered from the a healthy condition to illness, having as main purpose the change of life style and the treatment of the cardiovascular risk factors, which represents the modern concept of **continuum cardiovascular** (5).

On the grounds of the endothelial dysfunction, determined by the risk factors' action, dyslipidemias and especially hypercholesterolemia represents the cause of atherosclerosis and its consequences persists even after the values of the total cholesterol, the LDL of the cholesterol or even the low values of both lipidical components become normal (6) (7).

In purpose of the present work is to observe the incidence of the changes occurred with the lipidic metabolism among human subjects investigated in order to prevent as much as possible, the cardiovascular disorders which derive from them.

MATERIAL AND METHOD

The investigation was carried out on a group of 230 subjects who were observed within the clinic laboratory of the M.A.I. Medical Centre of Iasi County. In the blood drawn from these subjects, total cholesterol, tryacylglycolemia, HDL-cholesterol, LDL-cholesterol, VLDL-cholesterol, lipoprotein (a),were discovered through the methods frequently employed in the laboratories of clinical biochemistry (1). The separation of seric lipoproteins was carried out by means of electrophoresis in agarosis gel. The experimental data gathered were statistically processed through the Student test. (10).

RESULTS AND DISCUSSIONS

Of the 230 human subjects observed, only on 32 of them the lipoprotein (a) was traced, Which represents an incidence of 13,9 % of the investigated population. Of the 32 subjects monitored, 19 are dispensarised for cardiovascular disorder, which represents an incidence of 59,3% of cardiovascular disorders on persons with atherogenous risk factors.

In table 1 the lipoprotein (a) incidence is shown according to age criteria and a high frequency is seen between the ages of 50 and 59 which represent the age range with major atherogenous risk for the present study.

Table 1. The incidence of lipoprotein (a) on the investigated subject by age range

AGE	SUBJECT HUMAN OF LIPO (a)	PROCENT (%)
30-39	**3**	**6,25**
40-49	**4**	**12,5**
50-59	***12***	***37,5***
60-69	**7**	**21,8**
70-80	**7**	**21,8**

On the subjects included in this study on the grounds of lipoprotein (a) presence, the following values were found for the biochemical parameters (fig. 1, 2 and 3).

The average value of the total cholesterol quantity is 11, 16 % higher than the reference value (200mg %) which shows that in the cardiovascular disorders even the growth of the parameters of the lipidic profile represents a risk factor which favors and maintain the atherogenous process. Figure 1 shows a rise of the total seric cholesterol quantity, especially between the ages of 50 and 59, followed by the 60-69 age range. As to the tryacylglycerols, there were no changes of concentration on the investigated group; the values continued to range within the normal limits of this biochemical parameter.

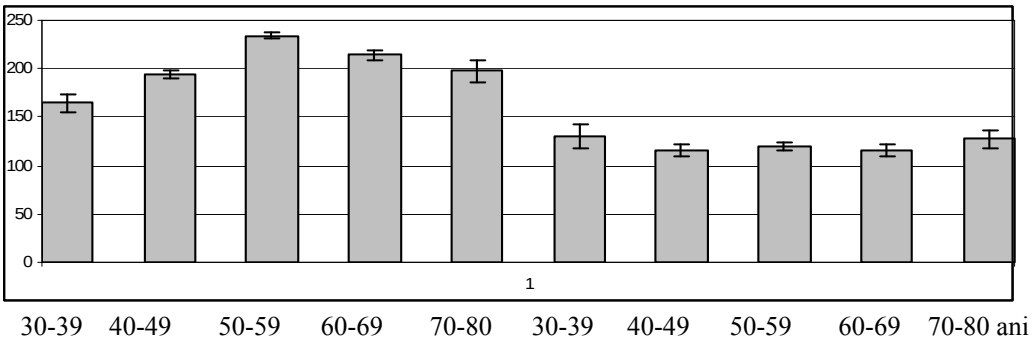

Fig. 1. The average value for the total seric cholesterol (mg%) and tryacylglycerols (mg%) by age range.

For the HDL, the average value is found towards the inferior limit, which proves the decrease of the anti-atherogenous factor compared to the presence and/or the rise of the level of atherosclerotic factors. In figure 2, it can be seen that the average value of HDL-cholesterol is very close to the inferior limit of the normal value range (22-46%), a fact that shows a low anti-atherogenous protection, a decrease that is evident especially on subjects between the ages of 40

and 49 and the ages of 50 and 59 where we can also mention a high risk for the appearance or development of atherosclerotic injuries triggered by the decrease of the concentration of protection cholesterol.

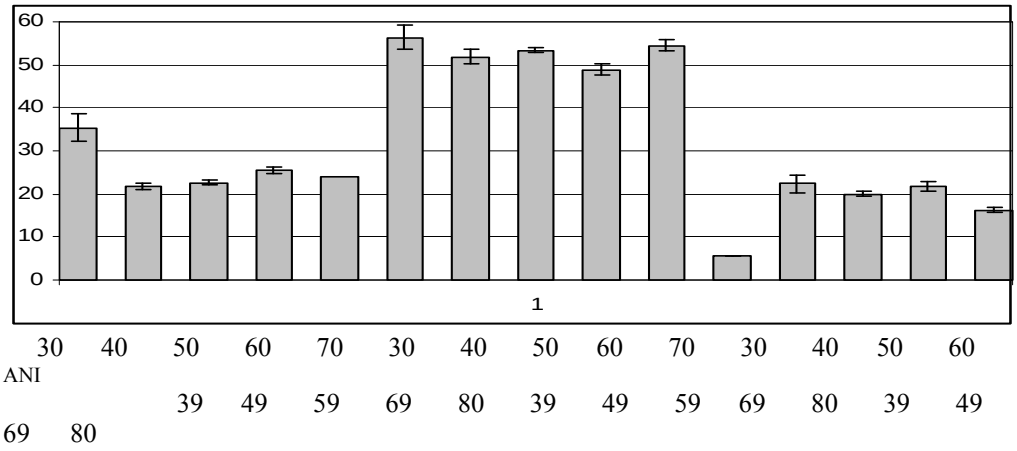

Fig. 2. Average values of fractionated cholesterol (mg%) by age range

The LDL-cholesterol has an average value oscillating towards the inferior limit of the normal values range (47-71%) proving the presence atherogenous factor represented by the high concentration of LDL cholesterol which can be corroborated with the presence of lipoprotein (a); the value of this cholesterol fraction is approximately equal for the age ranges of 30-39, 40-49 and 50-59. It can be seen that, between the concentration of HDL cholesterol and that of the LDL cholesterol, there is an inverse proportional relation, that is, the decrease of the HDL cholesterol, that has an anti-atherogenous role, is followed by the rise of the LDL cholesterol with an atherogenous role.

In the case of VLDL, a significantly change of concentration can be seen only on the subjects within the 70-80 age range, in the other groups, this parameter can be compared with the average value of tryacylglycerols with which has a close interdependence and in the present study it cannot be defined as a major atherogenous risk factor.

For lipoprotein (a), the average value (fig.3) shows a 4,02% rise compared to reference limit (absent). Considering this rise, we can take into consideration that the presence of lipoprotein (a) represents a major atherogenous risk factor and we can even state that this could trigger the atherogenos process, with many possibilities described: the inhibition of fibronolysis, the stimulation of proliferation and migration of the muscular cells of the vascular wall, the stimulation of the phagocytation of Lp(a)-glycosaminoglycans complex which will precipitate in the presence of calcium. These data are emphasized in fig.2, where it can be seen a significant rise in the 70-80 age range, followed by the 50-59 and 60-69 age range, respectively. This means that the atherogenesis is a process that appears insidiously, with time and is favored by the presence of risk factors, of which lipoprotein (a) has a special role in the appearance of

atherogenesis. In the study that we have carried out, the high frequency of lipoprotein (a) was observed on the subjects from the 50-59 age range, representing a 37,5 % percentage, followed by the 60-69 and 70-79 age range respectively.

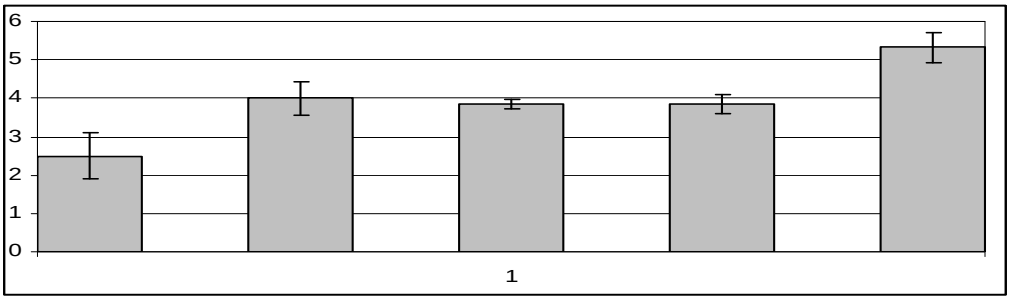

Fig. 3. The average value of lipoprotein (a) (mg%) by age range

After comparing the data in these graphics, we can establish interdependence relations regarding the concentration of total seric cholesterol and of lipoprotein (a), which have high values especially on the subjects in the same age groups: 30-39 and 70-80.

CONCLUSIONS

The subjects over 50 years old are sensitive to the atherogenous process and, implicitly to the cardiovascular disorders resulted from the morpho-pathological changes of atherogenesis.

The presence of lipoprotein (a) is not conditioned by the change of the lipidic profile. The results obtained for cholesterol indicate a 11,6 % rise of the average value compared to the reference value while for trycylglycerols, the change of their concentration shows no pathologic significance.

The decrease of the concentration of HDL-cholesterol is related to the rise of the lipoprotein (a) concentration since, between their concentrations there is an inverse proportional ratio. The decrease of HDL-cholesterol with anti-atherogenous, protective role is related to the rise of the concentration of LDL-cholesterol and lipoprotein (a), with atherogenous role, representing thus the initiating factor of the changes specific for atherogenesis.

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