The role of Leptin and and soluble Leptin Receptor Levels in pathogenesis of ovarian dysfunction in adolescent girls with obesity

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The issue of selective leptin resistance, which is caused by a violation of the feedback mechanism in the leptin-receptor system, is under active discussion now.

Objective. The study of the role of leptin and its receptors in pathogenesis of ovarian dysfunction in adolescent girls with obesity.

Materials and methods. The levels of gonadotropins, sex steroids, leptin and soluble Leptin receptor (sL-R) in 2 groups of overweight adolescent girls were determined by the ELISA. Group 1 (basic) had 47 patients with oligomenorrhea, group 2 (comparison) - 33 patients with obesity and regular menstrual cycle. The control group - 25 healthy girls with normal BMI and regular menstrual cycle. The groups were totally comparable in terms of age.

Results. The leptin levels in group 1 exceeded the values of group 2 twice ($p<0.001$) and the control values– by 5 times ($p<0.001$). The leptin level in group 2 was 3 times higher than the control values ($p<0.001$). These results indicated hyperleptinemia of adolescents with obesity, both with oligomenorrhea and with a normal menstrual cycle.

The serum content of sL-R in group 1 was lower than in control and comparison groups ($p<0.001$). At the same time the comparison group sL-R level did not differ from the control. This indicated that sL-R plays the most significant role in the formation of ovarian dysfunction. Taking into consideration the large interval of leptin reference values, as well as gender and age dependence, an index of free leptin (FLI), which is the percentage ratio of leptin and sL-R, for an objective evaluation of leptin resistance was proposed in a number of works. FLI is independent of gender, age, degree of obesity and other metabolic parameters. There are no guidelines in the scientific literature for FLI in adolescent girls, since almost no published data is available on examination of sL-R concentration and FLI in adolescent girls population.

The highest FLI was found in the group 1, exceeding the FLI of the control and group 2 ($p<0.001$). FLI for the 2 and the control groups did not differ. Therefore, according to the values of FLI, it is possible to evaluate not only the metabolic status, but also to predict its effect on the functional status of the ovaries.

Conclusion. FLI can be better marker of leptin resistance evaluation than leptin or sL-R, and it most accurately reflects the involvement of the leptin-receptor system in the pathogenesis of ovarian dysfunction.

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