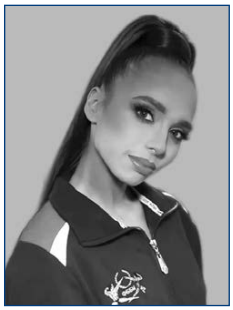
Unbalanced nutrition as a factor causing disruptions in the menstrual cycle and ovarian function in young women involved in bodybuilding

UDC 796.03



M.Y. Safronova[1]
Dr. Biol., Professor **R.V. Tambovtseva**[1]
[1]The Russian University of Sport «GTSOLIFK», Moscow

Corresponding author: ritta7@mail.ru

Received by the editorial office on 20.05.2025

Abstract

Objective of the study is to identify the relationship between nutritional deficiencies in female athletes specializing in bodybuilding and disorders of their ovarian-menstrual cycle (OMC).

Methods and structure of the study. A rational method for reducing caloric intake by reducing fat intake was developed and a survey of girls specializing in bodybuilding was conducted.

Results and conclusions. It was found that disorders (absence) of the OMC mainly occur due to a decrease in carbohydrates and fats to a critical level. The worst effect on the ovarian-menstrual cycle is a decrease in the percentage of fat in the diet to 10-15%. Those girls who maintained their OMC followed a diet containing 30-35% fat.

Keywords: *hormones, bodybuilding, menstrual cycle, proteins, fats, carbohydrates, competitions, rational method for reducing caloric intake.*

Introduction. Currently, there is a trend towards the development of women's sports. To achieve high levels of physical fitness, a female athlete needs to do a greater total amount of work than a male athlete. Often, such loads are disproportionate to the capabilities of the female body [1, 2, 3]. This phenomenon is explained by the anatomical and physiological characteristics of the female body, the main function of which is bearing and giving birth to a child. Professional sports place high demands on a woman's condition.

One of the components of training female athletes is a special diet. In some sports, such as wrestling, gymnastics, acrobatics, bodybuilding, etc., it is necessary to bring the body's condition to certain parameters [1, 2, 3]. The competition is considered an event on the day of which the athlete must show her "peak" form. At the same time, the preparatory period cannot be greatly extended in time, especially if the interval between starts is less than a week. Time constraints require the use of the most effective methods that give a guaranteed result. The above factors give grounds to say that the diets tried in the pre-competition period are not always gentle. The body regards any deficiencies as stress. Often, exhausting physical activity in combination with a caloric deficit in the diet that does not cover the energy expenditure of the athlete leads to ovarian-menstrual cycle disorders [3-6].

Objective of the study is to identify the dependence of deficiencies in the nutrition of female athletes specializing in the bodybuilding category on ovarian-menstrual cycle disorders.

Methods and structure of the study. This scientific observation was carried out at the Department of Biochemistry and Bioenergetics of Sports named after N.I. Volkov RUS "GCOLIFK", as well as in fitness clubs. The scientific experiment involved female athletes specializing in bodybuilding, aged 21-35 years (n = 30), from whom informed consent was taken to participate in the experiment. A method for reducing the caloric content of food by reducing the fat consumed was developed and a survey of those involved was conducted. The results obtained were processed using Microsoft Excel 2019.

Results and conclusions. The diet of an athlete in the pre-competition period can almost completely exclude fats of both plant and animal origin, while the total caloric content of the diet can either greatly decrease or be maintained by increasing the amount of protein food consumed. It is worth noting that the amount of carbohydrates is often also greatly limited.

For example, in one case in our experiment, to maintain body weight (55 kg), the athlete consumed 2500 kcal, of which 660 kcal came from proteins (165 g (2.5 g / kg)); 594 kcal – fats (66 g (1.2 g / kg)); 1246 kcal – carbohydrates (311 g (5.6 g / kg)). To reduce body weight, the diet could consist of 297 kcal – fats (33 g (0.6 g / kg)); 623 kcal – carbohydrates (155 g (2.8 g / kg)); the amount of proteins is maintained: 660 kcal (165 g (2.5 g / kg)). Thus, 297 + 623 + 660 = 1580 kcal. Here you need to calculate the percentage of calorie deficit: 2500 - 1580 = 920 kcal (38.6% of the calorie content needed to maintain weight).

In the second case, the calorie content of the diet was maintained due to protein: the amount of carbohydrates and fats is reduced in the same way as in the first case, and proteins are added in such a way that the daily calorie intake is maintained, as for weight maintenance: 297 kcal – fats (33 g (0.6 g / kg)); 623 kcal – carbohydrates (155 g (2.8 g / kg)); The amount of proteins can be calculated as follows: 2500 kcal – (297 + 623) kcal = 1580 kcal. Then 1580 kcal / 4.3 kcal = 367 g (6.6 g / kg). Such nutritional deficiencies put the body into a state of stress. Stressful situations provoke excessive production of cortisol and prolactin. Prolactin activity leads to a slowdown in the functioning of the thyroid gland, while the connection with the pituitary gland is also disrupted. As a result, the level of thyroid-stimulating hormone produced by the brain structure increases. This phenomenon leads to menstrual cycle disorders.

Another situation that requires attention is a decrease in the percentage of subcutaneous fat to a minimum. In this case, there is a decrease in the level of female sex hormones – estradiol. The level of sex hormones in the blood determines the nature of the distribution of adipose tissue, since accumulation, intense aromatization of sex hormones and their secretion also occur in it. Low estradiol in women causes a long absence of menstruation, dry skin and mucous membranes, brittle bones. The longer the period of an athlete's stay in this condition, the greater the risk of infertility. Today, the problem of maintaining the reproductive health of female athletes is very relevant. Girls participating in bodybuilding competitions are especially susceptible to reproductive health disorders. The fact is that the categories of this sport require maintaining large muscle volumes with a low percentage of subcutaneous fat (≈5-7%).

To confirm this assumption, a survey was conducted among girls participating in bodybuilding competitions n=30.

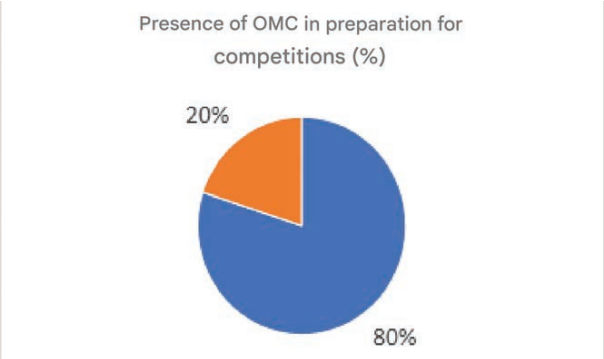


Fig. 1. The presence of the ovarian-menstrual cycle during preparation for competitions in girls specializing in bodybuilding

According to the survey, only 20% of the girls surveyed did not encounter the problem of menstrual cycle disorders during the competitive period (Fig. 1).

The described results can indeed indicate a direct dependence of the presence and functioning of the OMC on the nutrition of athletes.

As described above, the ovarian-menstrual cycle ceases to function normally due to low caloric content. However, it is worth noting that the caloric content of the diet of girls who did not experience OMC disorders was not significantly higher than that of the rest. Then, it was decided to conduct a survey aimed at identifying the ratio of proteins, fats and carbohydrates in the diet of athletes (Fig. 2).

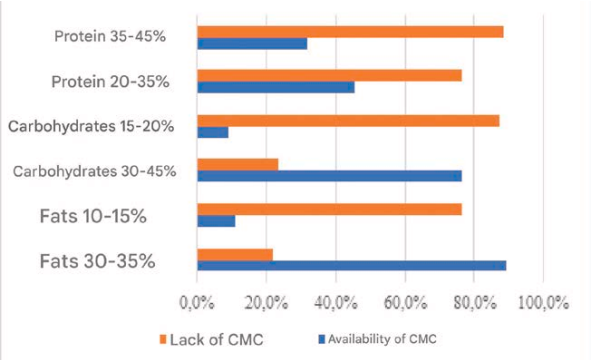


Fig. 2. Content of nutritional components in the diet of female athletes

It has been shown that the most detrimental factor to the ovarian-menstrual cycle is the reduction of the percentage of fat in the diet to 10-15%; girls who managed to maintain the OMC followed a diet containing 30-35% fat.

Conclusions. Analyzing the results of the questionnaire, we can draw the following conclusions:

1. The caloric content of the diet is not a determining factor in the presence or absence of the ovarian-menstrual cycle.

2. The most detrimental factor to the ovarian-menstrual cycle is the reduction of the percentage of fat in the diet to 10-15%; girls who managed to maintain the OMC followed a diet containing 30-35% fat.

3. Disturbances (absence) of the OMC largely occur due to a reduction in carbohydrates and fats to a critical level.

4. Athletes who managed to maintain normal ovarian-menstrual cycle functioning followed a diet containing an adequate amount of fat (to a greater extent) and carbohydrates (%).

References

1. Bezuglov E.N., Lazarev A.M., Khaitin V.Yu., Barskova E.M., Koloda Yu.A. Vliyanie zanyatiy professionalnym sportom na menstrualnuyu funkciyu. Problemy reprodukcii. 2020. No. 26(4). Pp. 37-47.
2. Gorulev P.S., Rumyantsev E.R. Zhenskaya tyazhelaya atletika: Problemy i perspektivy: ucheb. posobie dlya studentov vuzov, obuchayushhihsya po spec. 032101 (022300): dop. Gos. kom. RF po fiz. kulture i sportu. M.: Sovetskiy sport, 2006. P. 162: tab.
3. Saksonov N.N. Energeticheskie traty tyazheloatleta: lekciya dlya studentov-zaoch. in-tov fiz. kultury, slushateley kursov usovershenstvovaniya, trenerov i prepodavateley tyazh. atletiki. GTSOLIFK. M., 1980. 22 p.
4. Bouchard, C. In Physical activity, fitness and health: International proceedings and consensus statement. C. Bouchard, R.J. Shephard, T. Stephens. Champaign, IL: Human Kinetics Publishers, 1994. 1055 p.
5. Energy expenditure of swimmers during high volume training. T.A. Trappe et al. Medicine and Science in Sports and Exercise. 1997. Vol. 29, No. 7. Pp. 950–954.
6. Nelson, D.L. Cox M.M. Lehninger Principles of Biochemistry: [англ.]. 5th ed. W.H. Freeman[англ.], 2008.