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Research Article

Studying A Number of Reproductive Values in Sexual Somatotypes in Women Athletics Doing Weightlifting and Powerlifting

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Abstract

The article presents materials concerning the issue of studying a number of reproductive values (using the example of the menstrual cycle) in female athletes involved in weightlifting and powerlifting. The purpose of the article is to present the results obtained, with identified changes in a number of morphological and medical-biological reproductive health of female athletes. Data on indicators of sexual dimorphism in each of the somatotypes in the studied groups are presented. The identified variants of menstrual cycle disorders in female athletes and the identified manifestations of hyperandrogenism in a number of female athletes in both groups are described in detail. The established relationship between intense physical and psycho-emotional stress and identified disorders in a number of reproductive health indicators in female athletes of both groups is indicated.

Keywords: female athletes; menstrual cycle; menarche age; reproductive health; somatotype; weightlifting; powerlifting

Introduction

Questions concerning various aspects of the influence of physical and psycho-emotional stress on the female body, as well as its adaptive reactions in this case, are always relevant when conducting medical and biological studies of female athletes [1,7,9]. This also applies to the study of adaptation processes in female athletes involved in historically male sports, such as weightlifting and powerlifting [12,13,16,17]. Weight lifting, intensity of power loads, features of the construction of the training-competitive period in micro, meso and macrocycles, its compatibility with the cyclic changes of the female body, processes of adaptation to these loads - this is a far from complete list of issues that determine the problem of studying this problem [1,5]. Our analysis of the latest domestic and foreign research and publications on the issue of changes in the female reproductive system and the level of reproductive health among young athletes involved in weightlifting and powerlifting shows that in recent years the interest of researchers in this problem has increased [2-4, 8,14,15,18]. However, the number of studies conducted and the volume of material presented is clearly insufficient and not systematized.

The data obtained by researchers requires refinement, classification and deeper understanding for further practical application. Among the domestic authors, I would like to note the works of P. S. Gorulev (2006); A. A. Orlova, E. P. Zinovieva-Orlova (2009, 2019); Yu. I. Grishina (2011); E. R. Rumyantseva, T. Sokhi (2012); S. I. Laktoguz (2013); E. A. Yakimova, V. N. Krestov (2015); S. G. Vasina (2016); T. P. Zamchiy, E. S. Korneeva, M. Kh. Spataeva (2016); E. V. Filgina (2016); K. G. Terzi (2016). Among foreign authors, the works of such foreign authors as M. Jurczyk, A. Borawska (2010) and V. Charniga, O. Solonenko (2014) should be noted.

Among the issues related to changes in the body of women involved in weightlifting and powerlifting, in our opinion, the issue of changes in such basic indicators of reproductive health as the ovarian-menstrual cycle and manifestations of hyperandrogenism is not fully addressed. These issues are particularly relevant to research among female athletes of adolescence and first reproductive age involved in powerlifting. This was the reason for conducting our study, with an attempt to connect the identified disorders in the reproductive system of female athletes (primarily

menstrual cycle disorders) with intense physical and psychological stress present during weightlifting and powerlifting.

Aim of study

The purpose of the article is to present the results of the study, with identified changes in a number of morphological and medical-biological reproductive health of female athletes.

Material and methods

The study was conducted in 2022 at the Garth sports center and weightlifting and powerlifting sections in Zaporozhye and Novaya Kakhovka. The study involved 11 female weightlifting athletes and 12 female powerlifting athletes. In the group of weightlifters, the average age was 21±1.32 years, in the group of female powerlifting athletes – 20.14±0.87 years. All athletes were classified as adolescent (n=16) and first reproductive age (n=7). The period of practice in this sport is from 3 to 5 years – 7 (30.44%), from 5 to 8 years – 12 (52.17%), more than 8 years – 4 (17.39%). 18 (78.26%) girls were students, 5 (21.74%) were working. 8 (34.78%) began practicing these sports at the age of 11-15 years, 11 (47.83%0) at the age of 15-18 years, 4 (17.39%) of the studied athletes started after 18 years. Sports qualification – I category 9 (39.13%), candidates for master of sports (CMS) - 10 (43.48%), masters of sports (MS) - 4 (17.39%). When conducting this study, we used methods such as analysis of available sources of information on the issue under study, anthropometry, index method, somatotyping, questionnaires on the characteristics of the menstrual cycle in female athletes (author's questionnaire by K.A. Bugaevsky, 2009©), examination, use of the Ferriman scale -Gallwey, interviewing, method of mathematical statistics.

All athletes who voluntarily took part in the study gave their voluntary consent in writing.

Results and discussion

When dividing female weightlifters (n=11) into somatotypes based on sexual dimorphism (J. Tanner's classification), we obtained the following indicators: the average value of the sexual dimorphism index (SDI) in the group was 81.64±1.07 ($p< 0.05$). This corresponds to the values of the mesomorphic somatotype (73.1–82.1) [1; 4; 10]. In the group of female athletes involved in powerlifting (n=12), the SDI value was 81.17±0.06 ($p<0.05$), which also corresponds to the values of the mesomorphic somatotype [1; 4; 10]. The distribution of sexual somatotypes according to J. Tanner in the studied groups of female athletes is shown in Table 1:

Показатели значений индекса полового диморфизма в группах (%)

№	Name of indicator	Andromorphic sexual somatotype	Mesomorphic sexual somatotype	Gynecomorphic sexual somatotype
1.	Female athletes (weightlifting) (n=11)	4 female sportsmens 36,36%	6 female sportsmens 54,55%	1 female sportsmens 9,09%
2.	Female athletes (powerlifting) (n=12)	5 female sportsmens 41,67%	6 female sportsmens 50,00%	1 female sportsmens 8,33%

Table 1: Indicators of sexual dimorphism index values in groups (%)

When analyzing the results of somatotyping, attention is drawn to the fact that both groups are dominated by athletes with "non-female" sexual somatotypes – andromorphic (male) and mesomorphic (transitional to male somatotype) [1, p. 20-28; 4, p. 14-23; 10, p. 504-508]. Thus, in the group of female weightlifters, the total number of athletes with "non-female" sexual somatotypes was 10 (90.91%), with only one athlete with a gynecomorphic sexual somatotype. The picture is similar in the group of female athletes involved in powerlifting - the total number of girls with anromorphic and mesomorphic sexual somatotypes is 11 (91.67%), while there is also only one athlete with a gynecomorphic somatotype.

During the interviews, we found that both of these girls have 3 and 3.5 years of experience in these sports and the intensity of their physical activity is still moderate. Considering the data regarding the characteristics of the menstrual cycle (hereinafter referred to as OMC) and variants of its disorders, based on the data obtained as a result of questionnaires and anamnesis collection, we were able to obtain the following information: in the group of weightlifters (n = 11), the time for the onset of menarche was 12.26 ± 0 ,63 years old. This is slightly lower than the average rate of menarche in girls in Ukraine, which is 12.52±0.52 years ($p<0.05$) [2; 3; 8; 12; 14].

At the same time, 3 (27.27%) athletes experienced menarche at the age of 11, 4 (36.36%) - from 11 to 12 years, and 4 (36.36%) - from 13 to 14 years, which also fits into indicators that, on the one hand, are greater than the normative average, and on the other hand correspond to the normative physiological values for menarche [2; 3; 17; 18]. The duration of menstrual bleeding (MB) in the entire group was 18.14±0.53 days ($p<0.05$), which does not correspond to the generally accepted international norm of 21-35 days ($p<0.05$) [2; 3; 17; 18]. At the same time, 5 (45.46%) female athletes do not have menstruation for periods from 60 to 120 or more days, which is regarded as secondary amenorrhea [2; 3; 8; 12; 14], and 6 (54.55%) had a "floating" number of days of menstrual bleeding (hereinafter referred to as MB) from 1 to 2, extremely rarely 3 days, with scanty, spotting discharge, which is typical for oligo-opsomenorea [2; 3; 8; 12; 14].

The duration of MB in the group was 2.21±0.24 days, which also does not correspond to the physiological norm of 3 to 7 days [2, p. 13-15; 3, p. 114-116; 17, p. 20-22; 18, p. 28-29]. Also, all athletes have pain in the abdomen and lumbar region, headaches, discomfort and autonomic disorders during menstrual bleeding. This gives reason to believe that in this group of female weightlifters there are manifestations of hypomenstrual syndrome and algomenorrhea [2; 3,; 8; 12; 14].

As for the group of female athletes involved in powerlifting (n=16), in this group the time for girls to reach menarche was 12.13±0.17 years. This is also lower than the average rate of menarche in girls in Ukraine, which is 12.52±0.52 years ($p<0.05$) [2; 3; 17; 18]. At the same time, 4 (25.00%) athletes experienced menarche at the age of 11, 10 (62.50%) from 11 to 12 years, and 2 (12.50%) from 13 to 14 years, which is also fits into indicators that, on the one hand, are less than the normative average, and on the other hand correspond to the normative physiological values for menarche [2; 3; 8; 12; 14].

The duration of OMC in the entire group was 18.14±0.32 days ($p<0.05$), which also does not correspond to the generally accepted international norm of 21-35 days ($p<0.05$) [2; 3; 17; 18]. Moreover, in this group, 11 (68.75%) athletes have unstable BC, from 1 to 3 days, scanty, and 5 (31.25%) have no menstrual bleeding from 60 to 120 days or more. In this group, 13 (81.25%) had premenstrual syndrome (PMS). The duration of MC in the group was 2.23±0.14 days ($p<0.05$), which also does not correspond to the physiological norm of 3 to 7 days [2; 3; 8; 12; 14]. In this group of female athletes, as well as in female weightlifters, the phenomena of hypomenstrual syndrome, with the phenomena of oligo-opsomenorrhea and algomenorrhea, were reliably recorded [2; 3; 8; 12; 14].

All athletes in both groups, although they associate changes in their menstrual cycle and deterioration in reproductive health with intense

physical activity, nevertheless consider the frequency of training (up to 5-6 times a week), the total volume and intensity of physical activity acceptable for them and not want to reduce the level of intensity of the training process, considering participation in these sports and participation in competitions as a higher priority than disturbances in their menstrual cycle.

When determining the manifestations of hyperandrogenism in both study groups, using the Fahrimann-Gallwey index (scale) in 11 zones, we found that in the group 6 (54.55%) athletes had Ferryman-Gallwey index values (hair growth borderline between normal and excessive) ranged from 8 to 12 points, symptoms of acne, seborrhea [2; 8; 13]. A pronounced degree of manifestations of hyperandrogenism, with the phenomenon of male-pattern hair growth on the face and body, with Ferryman-Galwey index values in the range of 12-18 points, was identified in 5 (45.45%), which clearly indicates moderate and severe symptoms of hyperandrogenism [2; 8; 13].

In a group of female athletes involved in powerlifting, manifestations of hyperandrogenism were also identified. In 9 (56.25%) the values of the Ferryman-Gallwey index (hairiness borderline between normal and excessive) were determined by visual examination to range from 8 to 12 points [2; 8; 13]. In 5 (31.25%) female athletes, a pronounced degree of manifestations of hyperandrogenism was revealed, with the phenomenon of male-type hair growth on the face and body, with Ferriman-Gallwey index values in the range of 12-18 points. In 1 (6.25%) athlete, no symptoms of hyperandrogenism were detected.

The prospect of further research lies in the dynamics of observations of these groups of female athletes, with an ultrasound of their reproductive organs and a biochemical study to determine the main male and female sex steroids, pituitary and thyroid hormones in their blood serum.

Conclusions

1. In both study groups, 6 (54.55%) weightlifters and 11 (68.75%) female athletes engaged in powerlifting, various, often combined, menstrual cycle disorders such as hypomenstrual syndrome were identified, in 5 (45.46%) female weightlifters and 5 (31.25%) female athletes involved in powerlifting had secondary amenorrhea.

2. Data on the determination of the phenomena of hypoandrogenism with its definition according to the values of the Fehrimann-Gallwey index (scale) indicate the presence of moderate and severe degrees of its manifestations in all female weightlifters, and in the group of female athletes engaged in powerlifting in 15 (93.75%) also Manifestations of moderate and severe hyperandrogenism were identified.

3. Numerous combined disorders of a number of reproductive indicators revealed as a result of the study give grounds to assert that they are directly related to the intense physical and psycho-emotional stress characteristic of these sports.

4. All athletes who took part in the study need to be registered with a gynecologist and endocrinologist and constantly be under the supervision of a sports doctor and coach, with a review of the intensity of their training and competitive load - microcycles to an annual macrocycle.

Abbreviations

- **WP** - width of the pelvis;
- WS - width of the shoulders;
- **OMC** – ovarian-menstrual cycle;
- **MB** - menstrual bleeding;
- **PMS** - premenstrual syndrome;
- **SDI** - sexual dimorphism index, according to J. Tanner;
- **BMI** - body mass index;
- **MI** - the masculinization index;
- **AI** - andromorphic index;
- **CMS** - Candidate for Master of Sports;
- **MS** - Master of Sports.

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