

Optimization of the Training Process in order to Maintain Good Health and to Enhance Sporting Performance of Women Athletes

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Abstract

Training of women-athletes is a very complex issue subject to the influence of many factors. One of such factors is the menstrual function(MF). Therefore any attempts at optimization of the training process in women's sport have to be carried out with regard to this female phenomenon.

Difficulties rising in connection with this problem are considerable. For one thing it is impossible to have a rigid set once and for all system of training. Because the cyclic nature of the MF affects female organism, its working potential, its rehabilitating ability etc.

In our research we analyzed gonad functions in the process of muscular activity. We used such methods as the questioning of women - athletes, we analyzed their "self-control" diaries we carried out a bio-chemical analysis of estrogen and pregnanediol excretions in the urine, basal temperature, the so called 'fern-leaf' phenomenon, vaginal smear cytology, with the total number of the people tested - 567 (all top-ranking women-athletes).

As a result of our long and thorough research we managed to work out some general rules which if correctly applied may considerably improve the sporting performance of female athletes. It should be stressed though, that these basic principles ought to be observed in the training process by all coaches regardless of their personal views on these matters or whatever other problems they may encounter in their work. Otherwise the training process will go along the male lines and therefore will not be 100% efficient.

Key words: menstrual cycle, training, hormones

Growth of achievements in sports is determined by objective analysis of the coaching methods, clear determination of the ways of its further improvement and correct approach to their elaboration and realization. This inevitably gives rise to several general and local problems, one of which is "Optimization of coaching process of sports-women". Difficulties raising when solving this problems are significant. They are caused by the reason that it is impossible to fix definitely rigid structure of many years coaching for women, because it is a dynamic creative process, influenced by many factors. Physiology of a female organism has one biological peculiarity - complicated in its neurohumoral regulation menstrual function (MF), cyclicity of which significantly effects the whole organism, its working ability and possibility to rehabilitation.

For 25 years we have been studying problems of women's coaching from pedagogical and medical-biological points of view. Scientific data, results of our own investigations allowed to obtain in full measure impression of the women coaching character.

The gathered facts allowed four conclusions:

- 1) Great physical and psychological loads alter the character of different functional systems reactions, including MF;
- 2) Great and intensive loads are the effective means of general and special working ability development, and give positive result, only in case they are applied in accordance with the state of a sportswoman in the concrete moment and take turns in definite succession with the account of her biological rhythms;
- 3) Changes in the organism of women slowly reach optimal value, they become more protracted at wrong methodology of coaching microcycles and mesocycles with the different dynamics and primary directions of her coaching loads;
- 4) Working ability of sportswomen is different in phases of menstrual cycle (MC).

Investigations allow to state that ovulatory, premenstrual and menstrual cyclic phases are characterized by decreased working ability and deterioration of the general feeding comparatively with postmenstrual and postovulatory MC phases. Negative effect of premenstrual and menstrual cyclic phases on the physical, technical training is found, resulting in decrease of control over one's emotions, deterioration of understanding with partners, trainers. In menstrual phase of the cycle precision of sports modes realization changes greatly, indications of the volume and stability of attention are decreased. In premenstrual and menstrual days in the highest degree the qualities depending upon precise space orientation, precise muscle feelings and emotional state of sportswomen deteriorate, which is connected with growth of frontmotive correlations, breaks in intercommunications in cortex, some desautomation and deterioration of emotional habits.

When the studying gonad functions in the process of muscle activity we applied method of active questioning, analysis of the self-control diaries, biochemical determination of estrogen and pregnanediol excretion with the urine, basal temperature measurement, phenomenon of the "fern leaf", vaginal smear cytology. A group of sportswomen engaged in a cyclic sports was examined, the total number of persons - 567 (table tennis - 102 persons, volleyball - 324 persons, gymnastics - 141 persons). The sport qualification of the examined group: USSR honored masters of sports - 10 persons, international category masters of sports - 72 persons, USSR masters of sports - 281. The average age of women-players - 22 ± 2.12 years, representatives of the gymnastics - 15 ± 1.37 years. The average age at starting sports activity is correspondently 9.28 ± 0.12 and 7 ± 0.41 years. Menarche starts at 13.76 ± 0.64 and 15.69 ± 1.28 years. Statistical accounts give evidence about stability inside the group changes, indicate homogeneity and uniformity of group used for examination. The comparative analysis of the personal particulars pays attention to the character of menstrual process of players and gymnasts being engaged in sports. In the both groups of sports women clear pathology in the gonads functions expressed in bleeding, amenorrhea and irregular menstruations was found, except the group of players where amenorrhea was not observed. Breaks of MC expressed in dysfunctional uterine bleedings (DUB) are met more often in groups of gymnasts and have such percentage share: 6.66 at the shortened cycle, 4.16 at 28-days cycle and 26.66 at prolonged cycle. This kind of pathology in the players' groups does not exceed 5.62% at 28 and 21-days cycles, the lowest value is 3.3 at prolonged cycles. Amenorrhea is found only in the group of gymnasts and only in cases of the shortened MC, where it makes up 16.66%. Irregular MC are met more often in the group of gymnasts - 66.66% of cases at 21-days cycle; 57.29% at 28-days and 80% of cases at prolonged MC. The players have irregular menstruations in 21.05% - at 21-days cycle, 31.56% - at 28-days and 33.33% at prolonged MC. The most expressed changes are observed at prolonged MC. Hypomenorrhea more often is met in the players groups and makes up 56.59% of cases at the shortened MC; 51.23% - at 28-days MC; 46.66% - at prolonged MC.

Premenstrual syndrome (PS) in the group of women-players is met rather often. Headaches are observed in the group of women with the 28-days MC and make up

41.87%, tiredness in cases of shortened and prolonged cycles – 60.52% and 80% correspondently. Irritableness does not depend upon MC duration and is placed within the range 44.73...50.93% of cases. Pains in the small pelvis are observed in all the groups of sportswomen and are within the range of 43.33...60.41%. Pains in the small of one's back are met very seldom comparatively with the all symptoms of the PS said above. In the group of players they are within the range 10.00...15.78%; in the group of gymnasts – 19.79...60.00% and depend upon the MC duration.

In the menstrual phase the tiredness and irritableness of players is 86.66% at prolonged cycles, 80.23% – at shortened MC and 53.75% at 28-days cycle. Irritableness is met in all the groups not depending upon the cycle duration and makes up 55.26% at 21-days MC, 48.12% – at 28-days MC, 43.33% – at prolonged MC. So, the mostly expressed PS is met in case of shortened and prolonged MC. Personal questionnaire analysis allowed to find out that majority of players and gymnasts keeps up training during menstrual cycle phase, but its effectiveness is low in all the groups not dependable upon the MC duration. Low-effective coaching is observed in the group of gymnasts in 83.33% having 21-days MC, 85.41% : 28-days MC and in 100% of cases – prolonged MC, when in the group of players it is correspondently 85.50%, 95.63%, 93.33%. Almost all the sportswomen take part in competitions not taking into account low effectiveness of results, only 4.34% of players and 10.80% of gymnasts has demonstrated their best result. The conclusion can be made that the full-scale coaching and participation in competitions during the MC menstrual phase are low effective because of the working ability decrease.

Comparing data, obtained from examination of the sport gymnastics and sports plays representatives it was found out that the menstrual character during sports has its peculiarities. The biggest percentage of inclinations is noticed in the group of gymnasts with the shortened MC. This appropriateness is true for players also, but the percentage of inclination is much smaller, which can result from the earlier start of sport activity by the representatives of sport gymnasts, the earlier coming over all the stages of the many years coaching and entering the period of the highest sport mastership, when the requirements rendered to the organism are much more severe, and this organism is not yet through with the complicated neuro-humoral reconstruction. Mainly in the beginning of this period the female gland starts functioning, the process of its formation in physiological conditions requires several years. Questionnaire data analysis determined significant changes of MP in the examined groups of sportswomen and emphasized the statement that sports significantly effect the MP formation and its change: the kind of sport with peculiarities of coaching planning, early sport specialization, MC duration. The shortened and prolonged MC are the most sensitive to all types of physical and psychological loads. Analysis of the gonads function by the way of psychological tests: basal temperature, the "fern leaf" phenomenon showed that the majority of sportswomen with the detected MP inclinations have defective MC: either insufficient lutein phase or unovulatory. For the deeper gonad function study examination of the estrogen excretion and pregnanediol in the whole day urine into follicular, ovulatory and lutein MC phases was carried out. Two groups of women were examined: the control group of 10 young women with the stable MP and the group of sportswomen with MC inclinations, 20 persons. All the women underwent gynecological tests with the air of detection female disorders and MP characteristics. The sportswomen with weekend lutein phase of the cycle, the latter was shortened to 6–7 days, the estrogen excretion with the urine was decreased in some extent, but did not loose cyclicity of secretion, pregnanediol excretion was significantly lower than the ordinary values. Sportswomen with unovulatory cycles had the monotonous estrogen character, and the absence of the yellow body resulted in low values of pregnanediol of the adrenal origin. The most interesting and the less studied is the question of the estrogen influence on the adrenal cortex. Being its stimulators, increasing synthesis of the adrenal glucocorticoids, they increase the bonding ability of transcortin, these reducing physiological activity of corticosteroids circulating in blood. So, the gonads in the female organism are inalienable link in the chain

of the organism reactions of adaptation. Breaks in their functions significantly decrease these possibilities resulting in durative recovery period that was proved by experiments of animals. Great muscular loads applied in different phases of estral cycle of female white rats have different effect on duration of recovery period. So, the load in the phases metestrus, diestrus and proestrus result in recovery of the organism of animals after 24 and 48 hours and do not produce inclinations in the estrus cycle of an animal. The same loads in the estrus phase make recovery process more durative and result in inclinations in their estrus cycle, prolonging the estrus phase to 25 days. So, correct functioning of ovaries is conducive to higher adaptational abilities of the female organism and its higher working ability. Their normal functioning preserves hormones' reserves with anabolic effect that is so important for muscular activity.

The mentioned properties of the female organism present specific requirement to organization of educational-coaching process and must be paid attention at evaluation of the said criteria of the sportswomen training condition, their working ability and rehabilitation. Great intensive loads, being effective means of the general and special working ability development, give positive effect only in the case if they are applied in accordance with the state of sportswomen and alternate in definite succession with the account of her biological rhythms.

These works are completed with elaboration of the coaching process on rational planning. Theoretical understanding of optimization process will put the trainer closer to correct solving of problems of coaching and his programmes organization in female sports, will change nonphysiological directive on the coaching of men and women of the same type. We have elaborated our programme with the account of difficulties in rational planning of educational-coaching process, health and working ability control of sportswomen. The programme is written in BASIC and is intended for use on personal computers. For successful planning of educational-coaching process and preparation to important season competitions it is important to clear out:

- a) MC duration (it varies for the team members);
- b) MC regularity;
- c) the phase in which the woman is in the given date;
- d) genetic MC predisposition;
- e) menstruation duration;
- f) presence of PS;
- g) determination of ovulation.

All the data are put into the programme. On the base of the outcoming tables on months and days we obtain initial information about location of each woman and the team, as a whole, in different phases of biological rhythms. Particularly this location is not accounted in team coaching methods, which results in extreme competition conditions to unjustified technical flaws. Through information analysis obtained in the process of complex control over postponement of the planned loads, coaching directions, realization of technical-tactical actions, participation in competitions can serve as a fundament for making up coaching plans and programmes, with the help of which strategic training will be optimally ensured and realized. With this approach the possibility arises to detect and to remove in some extent factors limiting for achievement of excellent results. It should be stressed that general principles being the basis of the suggested approach, should be preserved not depending upon the trainer's views on problems of coaching methods. If this approach is neglected, then coaching will go on according to the male type.