

STUDY REGARDING THE USE OF ALTERNATIVE AEROBIC ENDURANCE DEVELOPMENT MEANS IN HIGH-SCHOOL STUDENTS

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Abstract: This paper approaches the content of physical and sportive education for extracurricular activities, aiming to find new means to develop the general endurance, a priority goal for this age. The education of endurance at this level has certain differentiations regarding the means that are used, but especially the methods used to apply those means. Out of the forms of endurance, it is required for the adolescents to develop especially their aerobic endurance, which well tolerated by the high-school students. It is a well-known fact that generally, this motor skill is approached only during the physical education lessons, in the last thematic part, through running in a uniform tempo. This study advances the idea that aerobic endurance can develop under good conditions also outside these school classes, using both running of various duration (on flat or varied land), but also other means, more varied and more attractive for the students at this sensitive age. These alternative means, identified as being: hiking, cyclotourism, swimming, and playing games, together with jogging, are concretized in extracurricular athletic activities that can be used effectively in developing the aerobic endurance in adolescents, given that certain methodical-organizational indications are respected.

Key words: aerobic endurance, alternative means, high-school students

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INTRODUCTION

It is a well-known fact that generally, endurance can develop at any age, and during school years it can be developed very well, especially in regards to long-term, aerobic endurance, without maximal or sub-maximal intensities.

Usually, this motor skill is educated only during physical education classes, using almost exclusively the flat land running. We believe that this can be achieved also outside these classes, both by using running of various durations, and by using other development means that are more attractive for the students, and which, in our opinion, can be used, even in combination, to develop endurance in a more pleasant and varied way.

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ALTERNATIVE MEANS OF DEVELOPING THE ENDURANCE

Jogging

This represents the most common means of developing the aerobic endurance outside the school curricula, and which can be practiced almost anywhere: in the park, on the street, in the forest, on a country road, on the beach, etc.

It is important to choose your own rhythm, for your own comfort, trying to eliminate discomfort as much as possible. During the first hours, a certain time after starting to run, a certain respiratory discomfort can appear. If this happens, you must not interrupt your movement, but diminish your rhythm to walking, to recover, and then keep on running. Gradually, you will see that the distance covered during walking will become smaller, meaning that the aerobic endurance has increased. The distance covered during running will gradually increase, but you must not cover always the same maximum distance, but adapt it to the moment.

When this is used in the physical education lessons, or in some other form of organization of practice of physical exercises, it is done during the last theme of the lesson, lasting 10-15 minutes, framed within lesson cycles formed of 10-12 unități (Tudor, 1999).

We believe to be necessary to emphasize certain methodical-organizational aspects for the use of jogging to develop aerobic endurance (Drăgoi, 2008):

- ✓ it must be practiced at least three times a week (it can be done also every day);
- ✓ one must alternate running on different surfaces (earth, stone, sand, etc.), avoiding hard surfaces as much as possible (bitumen);
- ✓ one must use a gear that is appropriate to the season, especially shoes with an effective sole in attenuating the shocks (Sorbotan);
- ✓ in the beginning, one should run for 7-10 minutes, alternating running with fast walking, so that later one should be able to run gradually more, arriving at 20-30 minutes and even more;
- ✓ the effort intensity should have low to average values, the heart rate varying between 120-150 beats/minute;
- ✓ the breaks will be short, if they are really necessary, but active (fast walking, ample respirations, accentuating the expirations).

Even if most physical education teachers consider running as the only means of developing endurance, we believe that this ability can be developed very well through other means, which we present below.

Hiking

It is the most well-known and most practiced form of tourism, consisting in covering certain touristic roads of different lengths, heights, and difficulties. It can be, for the Romanian physical education system, an important means of developing the adolescents' motor skills, thus, implicitly, also their aerobic endurance. The hiking can be practiced from childhood up to an old age, taking into account the particularities of age, physical training, and general health, in choosing the right roads, in regards to their lengths, height, and maximum reached altitude.

The hiking tours take, generally, about 4-6 hours, with 10-15 minutes breaks for one hour of walking, but also with shorter breaks, of 1-3 minutes, for shorter intervals (15 minutes), when the difficulty of the terrain impose it.

The effort characterizing hiking is an aerobic one, "steady-state", with small intervals of mix (aerobe-anaerobe) toward the aerobic area, emphasized when the ascension is performed on a high angle slope.

For developing the aerobic endurance through this means, the following are recommended (Drăgoi, 2008):

- ✓ practicing hiking at least twice a week (for those living near a mountain area), or at least twice a month;
- ✓ covering accessible roads, with a difficulty adapted to the group components, easy-medium at the beginning.
- ✓ the duration should not be, at the beginning, more than 3 hours, increasing then gradually the volume of the effort, up to a maximum of 5-6 hours/day.

- ✓ The effort intensity, verified through the heart rate values, should be small, with some inherent variation toward medium (120-150 beats/minute).
- ✓ The breaks are recommended to be of 10 minutes for one hour of walking, in which there is a recovery of the heart rate to normal, rest values; in the situations when certain more steep sections are covered, short, 1-2 minutes breaks are taken, allowing a partial recovery, up to values over 90 beats per minute.

Hiking can be performed very well in any season, existing however certain conditions (temperature, snow, ice, duration of the light during the day, danger of avalanches, etc.) that impose concrete measures of adaptation: corresponding gear, choosing short or medium roads, avoiding the avalanche-prone areas, covering known roads that are usually covered during the seasons without snow.

Cyclotourism

Cycling is a sportive-utilitarian activity, a very good way to relax, being a sports branch at the same time, comprising many events. The effort demanded by this sport is within the category of cyclic efforts, with an increased demand on the cardio-respiratory system, with important energy expenditures, where the determining role is played by the general cardio-respiratory endurance and the local muscle endurance.

The basic motor skill demanded by cyclotourism is long term endurance, type 2 and 3 (over 1 hour). Being a long endurance effort, it will lead to the accomplishment of multiple adaptations (Drăgan, et al., 2002):

- resting and effort mobilization bradycardia with increases up to 200-220 beats/minute;
- 60-90 ml during rest, increased to 200-230 ml during effort;
- heart rate: 5-6 l/min. during rest, increased to 40-42 l/minute during effort;
- cardiac volume: 700-800 ml in the beginner cyclists, it can increase up to 1400 ml to a top performer.

For the high school students, cyclotourism is a very good means of developing the aerobic endurance. It can be practiced individually, or better yet, in physically homogeneous groups, taking into account the emulation state that can appear. For reaching the set goals, we suggest a few methodical-organizational indications:

- ✓ cyclotourism should be practiced at least twice a week;
- ✓ one should alternate street routes with forest roads, where bicycles are allowed;
- ✓ one session should be of minimum 30 minute, but, usually, not over 3-4 hours (recommendable up to 2 hours, according to the individuals' training);
- ✓ the effort intensity should be low to average, the heart rate being 125-140 beats/minute;
- ✓ the breaks can be taken every 20-30 minutes, a few minutes long (3-5) needed for recovery, and hydration; in the case of courses of over 2 hours, one needs a longer break, of 15-20 minutes (or even more, if one considers also some touristic objectives).

Swimming

The large popularity of this sport in all age categories is due to the favorable effect exerted by the water effort on one's body, this being considered one of the most important means of strengthening one's body (Demeter, 1972).

After a regular and prolonged practice of swimming, one can observe an increase in the thoracic perimeter and diameter, in the vital capacity, in the maximum respiratory flow, and in the VO₂ max. values, which clearly indicates the favorable influences of this means on the development of aerobic endurance.

Next, we suggest several methodical-organizational indications for developing the aerobic endurance in adolescents (Drăgoi, 2008):

- ✓ swimming should be practiced at least twice a week;

- ✓ the duration of a session should be of 30-45 min. for the beginners, and 1h for the advanced;
- ✓ in order to avoid the premature appearance of fatigue, an alternation of the following styles is recommended: freestyle, breaststroke, and backstroke, which will lead to an increase in the covered distances, without needing to interrupt your swimming;
- ✓ the effort intensity will be regulated in such a way so that it would not put an excessive demand on the body, and the heart beat values should remain between 130-150 beats/minute; the breaks are necessary and are more frequent than for other sports, determined by fatigue, or for avoiding passing to another type of effort; they can be of 1 min 30''- 2 min., so that the aerobic process of producing energy is not interrupted.

Playing games

Playing games (soccer, handball, volleyball, basketball, tennis) represent some of the most beloved means of developing the students' motor skills, and not only, constituting an attractive segment of physical education and sports.

The demand on the body is different from one game to another, depending on the duration, the continuity or discontinuity of the effort, the dimensions of the court, and the number of players comprised by the team. Even in the same game, the demand on the body presents higher or lower oscillations, depending on the microclimate, the game tempo, the performance level, and not in the least, on the position the player has within the team.

In playing games, the effort intensity is variable, starting from small and moderate to sub-maximal, or even maximal.

Usually, playing games have a long duration, requiring the intensification of the autonomous functions (circulation, respiration, internal secretion, thermal regulation), conferring them the characteristics of cardio-respiratory efforts. Short and intense efforts are combined with mix efforts (anaerobe-aerobe) and with aerobe efforts. The rapport of these types of effort differs, both during one game, and (especially) during various games (Demeter, 1972).

Out of the playing games practiced on a large scale by teenagers, soccer, handball, and basketball offer the best possibilities for developing the endurance, under its various forms, including aerobic endurance. Certain methodical clarifications are needed (Drăgoi, 2008):

- ✓ the playing games should be practiced twice a week;
- ✓ the maximal and sub-maximal efforts should be avoided, and when they produce, enough time should be given for the recovery and for the oxygen intake;
- ✓ a heart rate between 120-150 beats/minute should be kept for as long as possible;
- ✓ the duration of a "training" session is variable, recommending it to be over 40 minutes, up to 90 minutes;
- ✓ the breaks are usually between half-games, with a variable duration (5-15 minutes), but supplementary (short) breaks can be added of 1-2 minutes, depending on various situations
- ✓ the playing games should be alternated between them, but also with other endurance development means for this level.

CONCLUSIONS

The education of endurance represents a priority goal during adolescence, with certain differentiation notes regarding the means that are used, but especially regarding their application methods.

At this age, it is required for the adolescents to develop especially their aerobic endurance, which well tolerated by the high-school students.

Running still remains the main mean of developing the endurance, being the most accessible.

There are other, alternative means through which the endurance can be developed, such as extracurricular, more attractive activities, which are less used.

Hiking, cyclotourism, swimming, playing games, can be successfully used in developing the endurance, especially the aerobic endurance, in high-school students, respecting certain given methodical-organizational indications.

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