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ADOLESCENT'S AEROBIC ENDURANCE TRAINING

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Abstract

Statement problem**.** The years of adolescence are a difficult time in everybody's life. A general belief is that the years of adolescence are the unhappiest years of life. The teenagers are concerned about the new feelings that appear in this period of time. Adolescence is a period of transition from childhood to the age of young. Biological development influences the motor evolution of the teenager. It is necessary to help body to support the new requirements of the life.

Cardiopulmonary system is an important respiratory system of the adolescent body. The heart is the largest muscle responding to endurance training. Physical activities are efficient means to improve the endurance, and so the cardiopulmonary function. Physical activities like jogging, cycling, rowing, walking, dancing, low impact aerobic improve body endurance. Specialists recommend around 30 minutes of cardio exercises every day, thus keeping the body healthy. 30 minutes of moving continuously is the time for carbohydrate metabolism that means weight control. Training improves the oxygen transport system: more vascularization will occur in muscles, with greater quantities of oxygenated blood and nutrients that reach muscles. The effect is that muscles have more ability to produce aerobic energy. The muscles which are able to work in long time activities are slow-twitch muscle.

The methods used for the study are: speciality literature through books, articles, studies. Personal observation and experiences contributed to the study as well. Biological, psychological, social and training information are also on the basis of the study. It is important to use the right methods for improving endurance and cardiopulmonary capacity in teenagers.

Results and conclusions. There are some interesting means that improve endurance and provide good health in teenagers.

In spite of the fact that not all the young people are found of sports, there are many others who love to do it. Teenagers have to be encouraged to practice physical activities, as part of their life style.

Key words: teenager, health, endurance, training.

Introduction

The years of adolescence are a difficult time in everybody's life. A general belief is that the years of adolescence are the unhappiest years of life. The teenagers are concerned about the new feelings that appear in this period of time. Adolescence is a period of transition from childhood to the age of young.

Biological development influences the motor evolution of the teenager. It is necessary to help body to support the new requirements of the life.

The period begins with important gains in height and weight, body shape changes, sexual aspects, voice tone.

Skeletal and sexual maturation get rapid and occurs mainly in early adolescence. Sexual hormones have great important influence in boys and girls evolution. Individual maturation change is extensive.

Youngers gain about 1-2 cm height, and 4-5 kg weight per years. The girl's body become more feminine, and the boy's body stronger. The bones become more resistant with a composition nearly the adult. The bones grow up more in thickness. Bone maturation finishes at age 17-18, for females and 21-23 years old for males.

Spine becomes stronger in spite of less evolution for thorax. Skeletal muscles develop by thickening, but no enough strong. However, at the end of the

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period, female's strength reaches maturity, before what happened o males.

The most important **muscle groups** involved in endurance effort are gluteus, hamstrings, and calves muscles provide forward propulsion. Quadriceps stabilizes the knee during the movement. Back and shoulder muscles are involved in resting and movement body's posture. Abdominal muscles stabilize the trunk allowing efficient driving movements.

The heart weight doubles up 19. Systolic volume reaches close to adult values at age 18. Heart rate and blood pressure are close to adults, especially for those who practice physical activities.

Boys usually have slightly higher blood pressure than girls. Taller children usually have higher blood pressure than shorter children. Lungs are anatomically well developed.

The main functions as: respiratory frequency, vital capacity, breathing amplitude work, but not at adult level.

Cardiopulmonary system is an important respiratory system of the adolescent body. Blood transports the oxygen continuously to muscles to keep them active and to recover them after effort.

The hormonal balance is fragile, at this age, so that the adolescent appetite is not constant. Moderate effort increases the body's resistance and blocks the white blood cells.

Adolescence is a period of intense **mental evolution**, with a lot of inner conflicts. Teenagers show some agitation, impulsiveness, restlessness and difficulty on concentration (Schiopu et al. 1995).

Psychologists consider that formal operational thought appears between 11-15years old. So, formal operational thought is more idealistic than concrete operational thought. Brain controls all movement. Endurance practice has effects in improving the power of the mind.

Cognitive, adolescence is a special period of transitions, about critical thinking. Youngers gain an increased speed and capacity of information processing, an important ability to form new combinations of knowledge. For teenagers, the most important activity is formal study. In the same time there is a difference of interest about subjects study. Girls are more interested on philology and psychology. Males are interested on sciences. Both of them evaluate the adult's attitudes and behaviour.

Study and memory are going through important transformations. The memory functions are going to be reorganized. Learning becomes more efficient. Teenagers study by doing their own system for a better memory of unit content.

Same important changes happened in adolescence **social cognition**. Youngers have a special type of egocentrism and a special image about themselves, as being unique. Later they become more competent in decision making.

Adolescents need more experiences and practice in order to learn to make correct decisions. Selves training needs get an important place.

Teenagers are getting closer to cultural values, and try to have an original evaluation. Vocational skills orientate the teenagers toward the professional activities. Emotional life is more active, and professional interests become more certain.

Moral conscience grows up, due to their selves control, convictions, judgments, moral fillings. At this age, there is a special dynamism about teenager personality transformation that is going to have attitude on social confrontations.

The teenager has an interesting affective life, with many kinds of emotions. They accumulate an important complex emotionality.

The methods used for the study are: speciality literature through books, articles, studies. Personal observation and experiences contributed to the study as well. Biological, psychological, social and training information are also on the basis of the study. It is important to use the right methods for improving endurance and cardiopulmonary capacity in teenagers.

Results

Teenagers are young people aged 13 up to 19 years old. They are studying in middle and high school. The school requirements are important and they rich to have more and more less time for themselves. There are some final exams that are waiting for them and that means a lot of time for studies. In the same time they begin to be less interested about physical efforts. The adults and the teachers are aware about the impact of their sedentariness and the negative effects. So, it is

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important to educate them in order to be more active. Physical activities with low effort, that improve aerobic endurance and health, of course, can be a way of stimulate teenagers to be more active.

Factors as individual differences in physical and psychosocial development, may contribute to the way in which adolescents experience sports activities. According to Cordun, M. (2011) endurance term, can be extends to any form of effort that is prolonged. Pradet, M, quoted by Cordun, M (2011) underlines that all the energetic processes able to sustain muscular contraction have a special level of endurance.

Endurance is an ability related to time. Endurance means the maximum amount of time that a group of muscles can perform a certain action. Endurance is focused toward more time regardless the capacity at which a muscle is performing.

Training improves the oxygen transport system: more vascularization will occur in muscles, with greater quantities of oxygenated blood and nutrients that reach muscles. The effect is that muscles have more ability to produce aerobic energy. The muscles which are able to work in long time activities are slow-twitch muscle. The athletes who practice sport endurance have more slow-twitch muscle fibres trained.

Endurance training has significant cardiovascular health benefits. Endurance training leads to decreases in resting heart rate and in systolic and diastolic blood pressure. During endurance effort the heart rate increases to pump blood to the working muscles.

Endurance – guidelines in order to improve:

- stroke volume and heart rate;
- vascular system and the oxygen processing capability of muscles;
- use of carbohydrate and fat sources;
- mental abilities.

The muscles are able to store amount of energy as glycogen, which is the most accessible source of fuel. "*More glycogen is stored in liver, around 2,000 calories enough energy for 32 km or three hour running*" (Hufton, E. 2015).

An efficient plan of endurance program it is necessary to know the adolescent heart rate maximum (Max HR). There are some formulas used for maximum heart rate. Astrand formula: 220-age. The American researchers suggest formula: 206.9-[0.67 x age] (Cordun, M. 2009). Hufton, E. (2015) indicates formula: 214-[0.8 x age] for males and 209-[0.9 x age] for females.

The oxygen utilization efficiency is measured by VO_2 Max – it means the amount of oxygen that body can process at peak output and it is measured in ml/kg of body weight per minute. The parameter is strong determined by genetic factors. The cyclists have VO_2 max around 80 ml/kg/min, comparative to untrained people (less 40 ml/kg/min). There is a relation between HRM and VO_2 max (Table 1).

Table 01. Heart Rate Max versus VO_2 max

Max HR (%)	**VO_2 max (ml/kg/min)**
50	28
60	42
70	56
80	70
90	83
100	100

Endurance effort increases lung capacity. The oxygen taken is very important for endurance effort, because it reacts with the others source of energy, like glucose, fats. It is important the amount of carbon dioxide that is expulsed in endurance effort. Hawley, J. (2001) underlines that "*compared with the body's limited carbohydrate (CHO) stores, the reserves of fat in humans are plentiful: if fat was the sole source of energy, it could sustain skeletal muscle contraction for approximately 120 hours of continuous, moderate intensity (65% of maximal oxygen uptake [VO_2 max]) exercise. On the other hand, if CHO was the only fuel oxidised, it could provide energy for approximately 90 minutes of intense (85% of VO_2 max) activity*".

Endurance effort is sustains by carbohydrate and fat sources. At exercise intensities above fat max 2 g of fat are lost for every gram of fat and that could be used at lower effort (table 02)

Starting an endurance effort too quickly or too hard during the race, it is possible to impair endurance performance by depleting CHO stores too soon. Fat can significantly offset CHO use and extend the endurance effort. Regular training around 80% HRMax can improve the teenager's ability to use fat a fuel.

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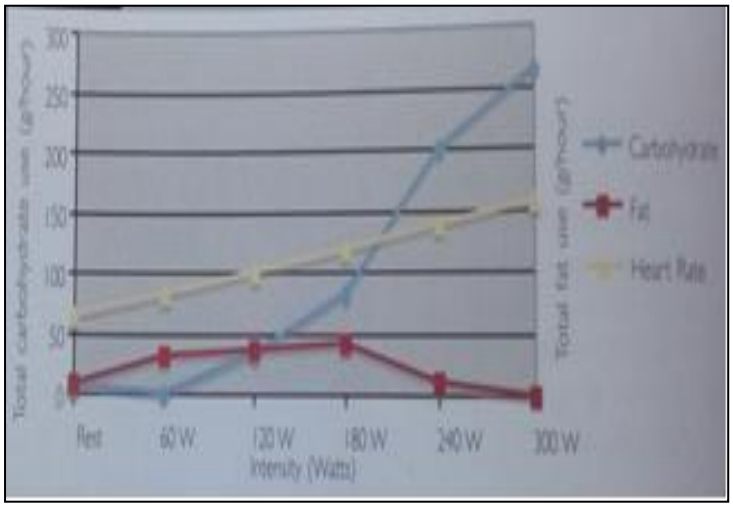

Table 02. Metabolic fuel use with increasing exercise intensity
(Shepherd, J. 2007)

Endurance – training methods (Shepherd, J. 2007)

1. Duration or long slow distance training. Effort about 60 minutes steady-paced effort; intensity 70-80% of HRMax; the body will become more adept at using fat as fuel source. Effort is sustained in aerobic zone. This is a very good way to improve teenagers' endurance.
2. Varying pace efforts, develop aerobic base condition. The method is good for advance trained young people. Pace of 60 minutes split as:
   - part 1 / 15 min at 70% HRMax;
   - part 2 / 1 min at 85% HRMax and 4 min 70% HRMax, repeated 6 times;
   - part 3 / 15 min at 70% HRMax.
3. Endurance specific duration, develop aerobic or anaerobic training. Effort as hill run 10x3min, with 10 min easy running between each repetition. The method develops greater aerobic capacity, speed endurance, lactate tolerance and increased muscle capillary growth.

Aerobic endurance activities that can be interesting for teenagers practice. We are thinking about some in different kind of nature, outdoor as following: onshore sports, in water, on ice, mechanized.

Walking is involved in early stages of aerobic endurance. It is a good way to improve muscles strength and joins. In the same time is a way of preparing the body to avoid the injuries. Walking outside is more healthy than indoor.

Running as walking is natural activity and as soon as the children walk they try to run.

Cycling is a great way for outdoors workout that increases aerobic endurance and legs strength without the impact of running.

Swimming is the pleasant way which improves aerobic endurance, breath, joins' mobility.

Skating improves aerobic endurance, legs strength, keeping the balance of the body.

Rowing is an activity that pushing in water is creating a force the move the bout. The effort involved is referring to aerobic endurance and limbs strength.

Discussions and conclusions

Duration or long slow distance training induces more permanent positive changes in teenagers' body.

The most common recommendations suggest moderate effort about 20-30 minutes, 3-4 times a week.

- Increase the muscles ability to repeated contractions.

The effect of training means better endurance capacity, as following:

- Improve heart and lung capacity to mobilize oxygen supply;
- Increase the oxygen processing capability of slow-switch fibres;
- Create a greater ability to use fat as fuel;

Regarding the health effects of regular aerobic endurance activities, the teenagers have the following benefits:

- Healthy heart and lungs: the heart becomes more efficient and the body's ability to transport oxygen improves muscles activities.
- Stronger bones and joints: dynamic activities improve bone density and this is the age for stimulate the bones' architecture. Dynamic activities develop the joint mobility, too.
- Develop muscles as mass and tone: the back, stomach, and legs muscles gain in volume and strength. In the same time the posture is improved, due to spine muscles. Breath becomes better, due to the respiratory muscles and lungs functions improved.
- Reduced body fat: the teenagers get an optimal weight, have less risk of obesity, and become more dynamic;
- Compensates the daily stress induced by school requirements that means static positions and activities for many hours.
- Sports become healthy activities for teenagers, instead of many other dangerous options.

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