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THE ROLE OF AEROBIC EXERCISES IN THE TRAINING FOR MUSCLE DEFINITION IN BODYBUILDING

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ABSTRACT. Physical activities daily become more important for everybody's life, so the bodybuilding can't be different. It provide a pleasure spent of the free time together with the maintaining of a healthy life, but it also give us the personal dignity and respect for ourselves. It is nice to see muscle, but is nicer to have muscle. The article is trying to prove the role aerobic exercises have in the training for muscle definition in bodybuilding and to demonstrate the benefits of it: the athlete will be healthier, more in shape and one of the most important things that a bodybuilder wants, to look even more muscular.

Keywords: bodybuilding; muscle definition; aerobic exercises; muscularity.

REZUMAT. Rolul exercițiilor aerobe în antrenamentul de definire musculară în culturism. Activitățile fizice devin pe zi ce trece din ce în ce mai importante în viaţa fiecărui individ, iar în mod special, culturistul nu poate fi altfel. Alături de menţinerea unui stil de viaţă sănătos, ne oferă atât un mod plăcut de petrecere a timpului liber, cât şi respectul şi demnitatea personală faţă de noi înşine. Este plăcut să vezi muşchi, dar este şi mai plăcut să îi ai. Articolul încearcă să arate rolul pe care îl joacă utilizarea exerciţiilor aerobe în antrenamentul de definire musculară în culturism şi să demonstreze beneficiile acestora: sportivul va fi mai sănătos, într-o formă fizică mai bună şi, unul din cele mai importante lucruri pe care un culturist le doreşte, să arate mult mai musculos.

Cuvinte cheie: culturism; definire musculară; exerciţii aerobe; muscularitate.

Introduction

In the early '80s, the attention of the bodybuilding community was drawn to the aerobic exercises, due to their benefits in terms of fat burning. Initially, this activity was used by those involved in competitions, considered as an additional

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means to gain the fat tissue while being trained for the competition. Nowadays, it has spread at such level that most part of the bodybuilders are introducing this aerobic element in their training program.

The studies carried out underline the benefits of this type of training (Mănescu, D.C. 2008):

- It is good for heart and muscle systems, as they become more efficient.
- A trained body can better extract the fatty acids, glucose and oxygen, for improving the energy input both to the brain and the muscles.
- Theoretically, the aerobic exercises can expand the capillary bed and increase the high density lipoproteins (HDL) in the blood, balance or even decrease the blood pressure, decrease the resting heart rate, increase the maximum oxygen used volume (max VO_2) and decrease the level of body fat.
- The improved cardiovascular function improves the resistance, which means that the training can be carried out with maximum intensity from the beginning to the end. Moreover, is shortens the resting time between sets, as another way to increase the strength.

The main goals of muscles definition period are shown below (Table 1):

Table 1. – The main goals of muscles definition period

The main goals of muscles definition period	1. burning the hypodermic fat and increasing the visibility of the displayed muscle striations; 2. increasing the protein content of the muscles by using the long and multiple repetitive sets; 3. increasing the capillary density inside the muscles, by boosting the aerobic training volume;

By adding an aerobic component, the training program involves burning more calories. This can compensate the high deficit by using a diet that contains more calories, but maintaining in the same time the anabolic status, together with developing and striating the muscle mass.

As per the above, is it clear that practicing quality bodybuilding, which is to combine a large muscle mass with a special muscle display, is impossible without the right combination of weight-lifting training (mostly anaerobic) and aerobic-impact exercises – for burning the fat.

Theoretical basis

To clearly define the boundaries between the two types of exercises, the terms aerobic and anaerobic should be analyzed properly.

Anaerobic – translated as „no oxygen", means that the exercise intensity is so high, that the body cannot release oxygen to the worked muscles. The breathing is racing, and the lack of oxygen causes a break between the sets for compensating

the due oxygen and returning to the normal breathing. For supporting an anaerobic activity, the body needs to burn glycogen, the sugar in the body to be found in the muscles, liver and blood (Bota, C. 2000). The short duration and explosive-type of this activity (due to the fact that the involved fibers are white-type) do not allow the body to access its fat reserves to burn it and to convert it into energy.

Aerobic – meaning „with oxygen" refers to the average or low intensity efforts (especially due to the involvement of the slow and red type fibers), while the body has the opportunity to provide enough oxygen to the system during the physical activities. During this type of activity (for example, running, cycling, swimming), that can be sustained for a longer time, at the beginning, the body burns the glycogen deposits, and after draining them, it uses the fat reserves as energy source (Bota, C. 2000). The burning leads to obtaining the adipose layer and „cleaning" the toxins in the body, with a direct impact on development (synonym with separation or shaping) and quality of the muscle groups.

The aerobic system means the oxidation of the main nutritive principles inside the mitochondria for producing energy. In this way, the glucose, fatty acids and the amino acids from the food – after certain intermediary processes – are combined with the oxygen for releasing very large quantity of energy, used for transforming AMP and ADP into ATP.

Comparing this aerobic energy providing mechanism with the glycogen-lactic acid system and with the phosphates system, the maximum relative rates for generating the strength, as the equivalent of the ATP obtained in time, are the following (Demeter, A. 1979):

Table 2. – Maximum relative rates for generating the strength
mols ATP/min

Aerobic system	1
Glycogen-lactic acid system	2.5
Phosphates system	4

On the other hand, if we compare the systems from the point of view of their resistance, these relative values will be the following:

Table 3. – Energy systems from the point of view of their resistance
Time

Phosphates system	8 – 10 sec
Glycogen-lactic acid system	1.3 – 1.6 sec
Aerobic system	unlimited time

It is noticed that the phosphates system is the most used by the muscles for the power peaks of few seconds, and that the aerobic system is necessary for a prolonged sport activity. In the middle we can find the glycogen-lactic acid system, which is important especially to offer an additional strength during intermediary races, i.e. 200 m to 800 m running (Bompa, T.O. 2003).

The intensity – the element that differentiates the aerobic exercise and the anaerobic one is the intensity during the training. The same physical activity can be done both in aerobic and anaerobic modes. The difference between them is given by the applied intensity.

For example, running can be also done in both ways, aerobic and anaerobic, according to the used intensity. Let's consider the different levels of the intensity generated by a 100 m sprinter and a marathon runner. The sprinter is doing an anaerobic activity. He springs for the race and gives everything in just 10 seconds, almost not breathing during it. His effort is so intense that a strong lack of oxygen occurs and, after crossing the finish line, he spends the next minute breathing very fast.

On the other hand, the marathon runner does an aerobic activity. He races at such low speed – based on his physical abilities – that the oxygen continues to be supplied to the body while running, allowing him to sustain the rhythm for few hours. If he doesn't exceed his physical strength, he will finish the race with a low tiredness and without the sprinter's „drama".

The differences between the two types of runners are to be noticed in the athletes' body-built appearance. The sprinters, as anaerobic experts, tend to have more muscles, while the marathon runners, as doing an aerobic effort, are slim and with a minimum body weight.

Why then a body builder wishes to practice aerobic exercises that can contribute to create a slim figure? The key to this question is related to the aerobic training as an additional step to the weight lifting training and not as a replacement of it. The right combination of the two is an essential step for reaching the maximum potential.

The goal of any body builder is to become „great". A full training program includes the involvement of both types of fibers, fast and slow muscle fibers (Mănescu, D.C. 2011).

The occurrence of the fat is associated to those training periods for gaining muscle mass, when using large weights for lifting and involving the fast muscle fibers are crucial.

The issue raised is that the aerobic trainings of high intensity suppose also the involvement of rapid fibers, worked out during the weight lifting sessions. This combination will rapidly lead to exhaustion, finishing the glycogen reserves from the liver and muscles, resulting in muscle tissue losses, as the easiest material to use for energy generation at this level.

For avoiding these unpleasant issues, there is only one conclusion: the aerobic training must be carried out with an average intensity during the days between weight lifting trainings, even from the beginning of the bodybuilding program. In this way, the body structure will become definite and massive.

For obtaining the aerobic effects – to reach the necessary aerobic results (i.e. fat burning), the sessions should last around 30 minutes. As for the rhythm, the exercises must be done with a certain rhythm allowing the athlete to speak and to avoid letting him without air (Foran, B. 2001). Each aerobic session should include few warming-up minutes (5-10) and few resting minutes. Also, the rhythm must be sustained for maximum 25-30 minutes.

The aerobic exercise intensity must be enough to sustain the heart rate to 65 % of the maximum value, on the entire duration of the training (excluding the warming-up and resting times). For calculating the maximum pulse, you simply deduct the age from 220. For calculating the work-out pulse, you need to multiply the maximum rate with 0.65. The result is the heart rate that should be reached and sustained during the aerobic session.

For example, the work-out rhythm for a person of 25 is calculated as below:

$$220 - 25 = 195 \text{ (the maximum heart rate)}$$
$$195 \times 0.65 = 126 \text{ (work-out rhythm)}$$

When should the aerobic exercises be done? – the most efficient period of the day for the aerobic training is in the morning, right after waking up, before eating. At this time, after an 8-10 hours' sleep, when the body had not received food, the glycogen reserves are at their minimum, causing the body to faster use the energy gained by burning the fat.

Regarding the training sessions, they must be split during the week time, in the non-consecutive days. If weights lifting trainings are scheduled for three times a week, normally on Mondays, Wednesdays and Fridays, then it is recommended to have the aerobic exercises in the other days, on Tuesdays, Thursdays and Saturdays (Dumitrescu, R. 2008).

The aerobic and anaerobic trainings with weight-lifting are two different activities: the aerobics are of a low intensity, while the weight training has a high intensity. These should not be overlapped during the same training session.

If some program aspects force the athlete to have an aerobic session during the weight-lifting training day, he should try to let long periods between them – the best should be to have the aerobics in the morning and the weight-lifting training in the evening (Şerban, D. 2006).

Combining the two within the same session is non-productive for the bodybuilder goals. If combined, the two will finish up the energy reserves, physically and mentally, causing a weak body for the next weight-lifting training.

Doing an aerobic after a weight-lifting training is a trap. Immediately after a strong weight-lifting training, the body priority is the recovery. At this time, the muscle fibers start to deteriorate and the body „screams" for protein and carbohydrates infusions, for stimulating and rushing the recovery processes. Having an aerobic training after the weight-lifting one will delay the recovery – will postpone the entire recovery process, impacting the gains. In the worst case scenario, the body – already exhausted and aching for food to stimulate the repairing of the muscle fibers, with the finished glycogen reserves – it will burn the muscle tissue for energy.

Selecting the aerobic exercise type – the aerobic activities types are:

- Exercises that can be carried out in the gym or at home – fixed bike, running or walking on the treadmill, the stepper, jumping on the elastic net, inline skaters;

- Exercises carried out outdoors – walking, jogging, cycling, swimming, canoeing (rowing), roller skating.

The most important is to reach the level which allows completing three sessions per week, of 30-40 minutes each. As long as the aerobic results are reached (i.e. working-out 65% of the maximum pulse, for about 25 minutes), the way they are obtained is a secondary issue.

The human body is a very efficient system, responding to environment changes and continuously adapting to them. For example, when running (as aerobic activity), the body becomes very efficient in executing the necessary moves in this process. The more efficient the athlete becomes, bio-mechanically speaking, the more calories he will consume, and the less fat he will burnt. Therefore, it is recommended to have more types of cardio exercises (Drăgan, I. 2002).

Weight-lifting training in cardio mode is the best alternative for the muscle separation and striating period, due to the fact that the fat burning effort can be directed to those muscle groups involved in this very activity.

It is important that, for burning as much fat as possible, the muscle contraction period to be increased. In the same time, to accomplish this, the loads should be reduced to 30-50 % of 1RM. At the beginning of one set with multiple repetitions and a low load, only a limited number of muscle fibers are activated. The rest of the fibers will be activated while the first are getting tired, allowing the athlete to carrying on the effort for a longer period of time. This training, if carried out on long time sequence, exhausts the ATP/CP and glycogen reserves, leaving the fatty acids as the only one energy source available for continuing the activity. Using this type of resource leads to body fat burning, especially of the hypodermic one. This is actually the mechanism used for obtaining the development of the muscles and the increase of the muscles striating level (Sandler, D. 2005).

Training for muscle definition

The training routine content during the definition period

Main goals:

1. Burning the hypodermic fat and increasing the display of the muscle striations;
2. Increasing the muscle protein content by using long sets with multiple repetitions;
3. Increasing the muscle capillary density by raising the work-out volume in the aerobic mode.

Work-out parameters

1. The entire duration of the definition phase: 6 weeks
2. The number of trainings during a week: 3
3. The number of muscle groups trained per session: 2-3
4. The resting time between trained muscle groups: 3 minutes
5. The number of exercises for each muscle group: 4-5
6. The resting time between exercises: 2 minutes
7. The total number of sets per exercise: 3-4
8. The resting time between sets: 1 minute
9. The total time of repetitions per set: 12-15 or maximum
10. The load used in the program: 30-50 % of 1RM
11. The training method: repetition till no more – method

Table 4 - Loading variation model

Continuous increase and decrease					
70 %	75 %	80 %	80 %	75 %	70 %
week 1	**week 2**	**week 3**	**week 4**	**week 5**	**week 6**

At the end of this phase, the subject:

- Should reach the top of his shape after the first training session.

Table 5 - Training routine during the definition period

	Phase duration 6 weeks	No. of trainings/ week 3	No. of groups/ session 2-3 IO 3 min	No. of exercises/ group 4 IO 2 min	No. of sets/ exercise 3-4 IO 1 min	No. of repetitions/ set 12-15	Weight % of 1RM 30-50
Gr. m.	Exercise	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
Pectorals	Push-up from prone position	A1/ 3 x max	A1/ 3 x 15R	A1/ 3 x 12R	A1/ 3 x max	A1/ 3 x 15R	A1/ 3 x 12R
	Incline push-up	A1/ 3 x max	A1/ 3 x 15R	-	-	A1/ 3 x 15R	A1/ 3 x 12R
	Decline push-up	A1/ 3 x max	-	A1/ 3 x 12R	A1/ 3 x max	-	A1/ 3 x 12R
	Lateral raises with dumbbells	-	A1/ 3 x 15R	A1/ 3 x 12R	A1/ 3 x max	A1/ 3 x 15R	-
Back	Pull-ups at helcometer	A2/ 3 x max	A2/ 3 x 15R	A2/ 3 x 12R	A2/ 3 x max	A2/ 3 x 15R	A2/ 3 x 12R
	Dead lifts with dumbbells	A2/ 3 x max	A2/ 3 x 15R	-	-	A2/ 3 x 15R	A2/ 3 x 12R
	Rowing	A2/ 3 x max	-	A2/ 3 x 12R	A2/ 3 x max	-	A2/ 3 x 12R
	Pull-over	-	A2/ 3 x 15R	A2/ 3 x 12R	A2/ 3 x max	A2/ 3 x 15R	-
Deltoid	Overhead push-ups	A3/ 3 x max	A3/ 3 x 15R	A3/ 3 x 12R	A3/ 3 x max	A3/ 3 x 15R	A3/ 3 x 12R
	Flat chest flies with dumbbell	A3/ 3 x max	A3/ 3 x 15R	-	-	A3/ 3 x 15R	A3/ 3 x 12R
	Crossing on pulleys	A3/ 3 x max	-	A3/ 3 x 12R	A3/ 3 x max	-	A3/ 3 x 12R
	Flexion with exercise bar	-	A3/ 3 x 15R	A3/ 3 x 12R	A3/ 3 x max	A3/ 3 x 15R	-
Biceps	Flexion with exercise bar	A1/ 3 x max	A1/ 3 x 15R	A1/ 3 x 12R	A1/ 3 x max	A1/ 3 x 15R	A1/ 3 x 12R
	Half squats with dumbbells	A1/ 3 x max	A1/ 3 x 15R	-	-	A1/ 3 x 15R	A1/ 3 x 12R
	Flexion with EZ bar	A1/ 3 x max	-	A1/ 3 x 12R	A1/ 3 x max	-	A1/ 3 x 12R
	Pull-ups at a fixed exercise bar	-	A1/ 3 x 15R	A1/ 3 x 12R	A1/ 3 x max	A1/ 3 x 15R	-
Triceps	Close grip pull-ups	A2/ 3 x max	A2/ 3 x 15R	A2/ 3 x 12R	A2/ 3 x max	A2/ 3 x 15R	A2/ 3 x 12R
	Parallel bars push-ups	A2/ 3 x max	A2/ 3 x 15R	-	-	A2/ 3 x 15R	A2/ 3 x 12R
	Bar extensions exercises	A2/ 3 x max	-	A2/ 3 x 12R	A2/ 3 x max	-	A2/ 3 x 12R
	Extensions at helcometer	-	A2/ 3 x 15R	A2/ 3 x 12R	A2/ 3 x max	A2/ 3 x 15R	-
Thighs	Squats	A1/ 3 x max	A1/ 3 x 15R	A1/ 3 x 12R	A1/ 3 x max	A1/ 3 x 15R	A1/ 3 x 12R
	Flexion over a bench	A1/ 3 x max	A1/ 3 x 15R	-	-	A1/ 3 x 15R	A1/ 3 x 12R
	Extension at the chair	A1/ 3 x max	-	A1/ 3 x 12R	A1/ 3 x max	-	A1/ 3 x 12R

	Phase duration 6 weeks	No. of trainings/ week 3	No. of groups/ session 2-3 IO 3 min	No. of exercises/ group 4 IO 2 min	No. of sets/ exercise 3-4 IO 1 min	No. of repetitions/ set 12-15	Weight % of 1RM 30-50
Gr. m.	Exercise	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
	Seated leg press machine exercises	-	A1/ 3 x 15R	A1/ 3 x 12R	A1/ 3 x max	A1/ 3 x 15R	-
Calf	Push on toes	A3/ 3 x max	A3/ 3 x 15R	A3/ 3 x 12R	A3/ 3 x max	A3/ 3 x 15R	A3/ 3 x 12R
	Donkey	A3/ 3 x max	A3/ 3 x 15R	-	-	A3/ 3 x 15R	A3/ 3 x 12R
	Extensions on the press machine	A3/ 3 x max	-	A3/ 3 x 12R	A3/ 3 x max	-	A3/ 3 x 12R
	Pushing up on the press machine	-	A3/ 3 x 15R	A3/ 3 x 12R	A3/ 3 x max	A3/ 3 x 15R	-
Abdomen	Flexion over the bench	A2/ 3 x max	A2/ 3 x 15R	A2/ 3 x 12R	A2/ 3 x max	A2/ 3 x 15R	A2/ 3 x 12R
	Flexion at the machine	A2/ 3 x max	A2/ 3 x 15R	-	-	A2/ 3 x 15R	A2/ 3 x 12R
	Hanging flexion	A2/ 3 x max	-	A2/ 3 x 12R	A2/ 3 x max	-	A2/ 3 x 12R
	Crunch flexion	-	A2/ 3 x 15R	A2/ 3 x 12R	A2/ 3 x max	A2/ 3 x 15R	-

A1/ 4 x 10 R means the training 1 from week… / no. of sets x no. of repetitions Gr. m. means muscle group 1RM – one repetition maximum – is the amount of weight one can lift in a single repetition

Besides including aerobic exercise on muscle definition training, a bodybuilder should also take into account the following key pieces of advice (Castle, M.A. 2012):

- build bigger muscle – it is not possible to have muscle definition if there is no muscle development;
- perform a specific workout routine for muscle definition with those exercises to work harder the specific points of muscle insertion with the right number of sets and repeats to get ripped;
- do not use the same workout routine for more than three month because muscles adapt to exercise type and fail to develop properly;
- follow a calorie based diet – effective muscle definition diets are those based on your weight, height, sex and current activity level or lifestyle in order to give you the amount of carbohydrates, fat and proteins that your body really needs;
- even this is not essential for muscle definition, using a fat-burner product can really help; real fat-burning products are those which promote the use of body fat as an energy source;

Conclusions

When the body adapts to the aerobic exercises, it will be more accommodated to use the fat as energy source. The metabolism will be more efficient calorie and the heart and lungs will be healthier. It will also allow more calories to be ingested without the fattening risk. The body strength will be increased and harder trainings will be more bearable. In short, the athlete will be more in shape and healthier. For the bodybuilder, the most important is that, by adhering to a constant aerobic program, his body will look even muscular.

The researches proved that the aerobic exercises noticeably influence the entire cardio-vascular system. Special information that interests the bodybuilders is related to the capillarity. Therefore, the consistent cardio work-out increases the existing capillary dimensions and generate new others.

For the bodybuilders, this benefit is obvious. The improvement of the existent capillarity, together with the expanding of the capillary system, allow a better supply with nutritive substances of the muscle tissue, which positively impacts the development and recovery, as well as the faster removal of the residual products, i.e. lactic acid, as a result of an intensive training.

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