

GENERAL STRENGTH OPTIMIZATION BY AEROBIC GYMNASTICS SPECIFIC MEANS IN ADULTS

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Summary: In this article, we aim to find the most effective means specific to aerobic gymnastics that contribute visibly to optimize the general strength in adults. To this effect, exercise programs were chosen, corresponding to the morpho-functional peculiarities of these persons, taking into account the previous medical condition and motor experience. We chose aerobic gymnastics because it is a dynamic activity that contributes effectively to the optimization of the general strength by modeling the human body, to the increase the motor development indices and hence of the quality of life.

Introduction

General strength (according to Badiu Toma, 2001) is defined as the possibility of the human body to overcome resistance through the participation of the major muscle groups. Aerobics, being a dynamic activity, contributes effectively to the optimization of the general strength, by modeling the human body, to the increase of the motor development indices, and hence of the quality of life.

Aerobics is characterized by several forms, depending on the impact that the exercises have on the musculoskeletal system, without making reference to the intensity of the effort during the session. Thus, there are *high impact aerobics* (H.I.A.) - high-impact exercises: jumping, balancing, hopping, etc, *low impact aerobics* (L.I.A.)-low-impact exercises and *moderate impact aerobics* (M.I.A.), containing exercises with moderate impact on the musculoskeletal system.

During an aerobics session, the oxygenated blood supply needed by the muscles increases, the carbon dioxide together with other unnecessary products are eliminated, and the heart beats faster in order to nourish the musculature and to flush toxins. Prior to starting an aerobics program, it is best to seek medical advice, especially if chronic diseases,

smoking, overweight issues are involved, or if the person in question has led a sedentary life.

This activity has many benefits for the human body, regarding the health condition, weight loss, feeling good and others. To this end, we have chosen the most effective means, specific to the aerobic gymnastics, that contribute constructively to the optimization of the general strength of the 10 adult females, included in our experiment.

Material-method:

(Analysis hypothesis)

This article aims to find the most effective means to optimize the general strength in adults, through aerobic gymnastics specific means.

For the effectiveness of practicing physical exercises, that in their intensity reaches the target heart rate, specific to each person's age (in an adult, the heart rate is $220-50=170$, the target rate ranging between 102-136 beats per minute). To strengthen the heart during exercise, the pulse should reach 60-80 % out of the maximum heart rate (220). The frequency with which the exercises are performed is just as important, requiring an average of 3 sessions per week. The duration of each session will be of minimum 20 minutes, in order for it to be effective.

Exercises structures performed on a musical background (measure 3/4, 4/4), used in the experiment:

Teaching materials:



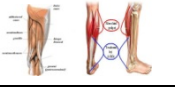






- Gym equipped with mirrors;
- Equipment, ropes, mats, dumbbells and sand weights, Bobarth balls, audio-video equipment, CDs, DVDs, equipment suitable for the performed activity.





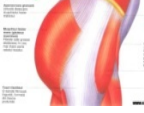



Organization of the group:

- working groups, under organization and self-organization: in line, on 4-5 rows;
- in pairs, in columns of 3, etc.;

Table no.1 Program model proposed for the optimization of the general strength in adults (H.I.A):

Class times, duration	Content	Muscular action	Dosage	Methodical indications
Warm-	- basic gymnastics exercises for the analytical influence of the musculoskeletal system; -exercises for preventing the settling of poor postures (free, with or without objects etc.);	Major muscle groups	5 min	- The thorough warm-up of all body segments shall be tracked;

<p>up (warm-up) 10min.</p>	<p>- aerobic gymnastics exercises: basic steps - Step-touch (lateral step, returning the other leg to the starting position), moving the arms, or step-touch by shifting the weight from one leg to the other and by lifting the heel of the free leg; - stretching exercises;</p>		<p>5 min</p>	<p>- the exercises shall be performed in accordance with the rhythm dictated by the music;</p>
<p>Aerobic stage (workout) 35min.</p>	<p>March combined with arms: Standing with one arm stretched out sideways, and the other on the shoulder, holding in each hand 1 kilo dumbbell: Back-forth movement 4 steps, by march step or by reversing the position of the arms.</p>	<p>Upper limb muscles</p> 	<p>3-4 repetitions, 8 musical bars each</p>	<p>- shall be performed left to right, to the rhythm of the music;</p>
	<p>Step-touch front combined with kick-back (or high leg kick-back): Standing with the arms bent at the elbow joint: step-touch front, followed by kick-back with the right/left leg.</p>	<p>Muscles of the thigh, of the calf</p> 	<p>3-4 repetitions, 8 musical bars each</p>	<p>- the kick-back step shall be performed simultaneously with the bending forward of the body;</p>
	<p>Exercise for the lower limb muscles: Standing with hands by the body, with the arms bent at the elbow joint: flexion of the knees, slightly bending the body forwards, followed by moving successively a leg backward and returning it to the start position.</p>	<p>Lower limb muscles</p> 	<p>Two series -32 repetitions on the right leg and 32 repetitions on the left leg/series, 5-6 sec break.</p>	<p>- work fast-paced; - the arms shall be moved along the body together with the leg you work with (opposite arm-leg);</p>
	<p>Skip-side with pressure on the thigh: Standing on one leg with the other as lateral support, hands on hips: successive skip-side movements with the right/left leg, with the body slightly bending sideways towards the raised leg.</p>	<p>Thigh muscles, abdominal muscles</p> 	<p>Two series -24 repetitions/series, 6-8 sec break</p>	<p>- during the execution the leg you work with shall not touch the floor;</p>
	<p>Semi-squats combined with skip-front: Standing with hands by the body: semi-squat with raising your arms to the front, followed by skip-front with lowering the arms back down.</p>	<p>Abdominal muscles, lower limb muscles</p> 	<p>2-3 series - 24 repetitions/series, 6-8 sec break</p>	<p>-keep the back straight;</p>
	<p>Jogg knee-up: Standing with the hands by the body, elbows bent: jogg knee-up standing in place.</p>	<p>Major muscle groups</p> 	<p>1-2 min, break with step-touch step and breathing movements</p>	<p>- the upper body is slightly bent forwards, the arms at your sides</p>
	<p>Lunge side: Standing with hands on hips: side lunge (lunge side) on the right leg, coming back to standing position, then the left leg, followed by coming back to standing position (alternatively)</p>	<p>Thigh and calf muscles</p> 	<p>4 repetitions, 8 musical bars each</p>	<p>- keep the back straight, eyes forward;</p>
	<p>Lunge front on the same leg, with arms movement and 16 seconds pressure: Standing with the arms stretched forward: side lunge on the right/left leg, simultaneously with raising the arms to the front sideways and returning to the start position.</p>	<p>Thigh muscles, femora</p> 	<p>2 repetitions, 8 musical bars each, then pressure on the lunged leg 16 sec</p>	<p>- keep the back straight, eyes forward; - before applying the pressure on the lunged leg, keep the position for 8 sec;</p>

	Semi-squats combined with kick-front: Standing with hands by the body: semi-squat with raising the arms forward, followed by front kick with lowering the arms back down.	Abdominal muscles, lower limb muscles 	2-3 series - 24 repetitions /series, 6-8 sec break	- keep the back straight;
	Mat exercise for arms and upper body: Lying face down with hands on the floor aligned with the shoulders, legs stretched out: pushing successively into your arms, and raising the body from the floor (push-ups)	Arm muscles, pectoral muscles 	Two series -16 repetitions/ series, 5-6 sec break	- throughout the entire exercise, the breathing shall be carried out normally (do not hold your breath during the performance);
	Mat exercise: Lying on your back with hands behind your head: raising your body at 90°, alternatively twisting it left-right.	Abdominal muscles, back muscles 	Two series -16 repetitions /series, 5-6 sec break	- keep the back straight throughout the performance;
	Mat exercise: Lying on your back, hands under your backside: lifting your legs at 45° - shearings.	Abdominal muscles, lower limb muscles 	Two series -32 repetitions/ series, 6-8 sec break	- keep the body on the ground
	Mat exercise: Standing on knees: raising a knee to the side, then return.	Thigh muscles 	Two series -16 repetitions forward and 16 repetitions backward/ series, 5-6 sec break	- keep the back straight during the performance;
	Bobarth ball exercise for arms and upper body: Lying face down on the Bobarth ball, legs stretched out, apart, supported on the half-sole, arms stretched sideways, each with one dumbbell in hand, rotating the arms forward/backward, alternatively/simultaneously.	Arm muscles, back muscles 	1-2 min	- the center of gravity of the body on the ball shall be located in the abdominal area;
	Exercise for the abdominal muscles on the Bobarth ball: Lying on your back on the Bobarth ball, with legs apart, supported on the floor, hands behind your back: successive liftings of the body	Abdominal muscles 	Two series-24 repetitions/ series, 6-8 sec break	- the center of gravity of the body on the ball shall be located in the pelvic area; - keep the back straight during the performance;;
Cool down stage 5 min	- Stretching, relaxation exercises and breathing control after exercise; - Stretching exercises;	Major muscle groups 	5 min	- The exercises shall be performed slowly to control the breathing, to the rhythm of the music

Within training programs, both the effort as well as the intensity and the complexity of the exercises have been increased gradually, with the increasing number of sessions. The breaks were initially more frequent, and they gradually decreased depending on the particularities of the effort. During the sessions, great attention was paid to the way of presenting the new exercises, continuous supervision of the persons included in the experiment, as well as correcting or drawing attention to possible mistakes.

In making the programs, the physio-pathologic particularities were also taken into account to avoid worsening some issues (joint pains, hypertension, etc.) and persons who were not able to perform certain exercises were offered alternatives, which allow them to actively participate to class. For the exercises to be effective, they worked minimum 2-3 sessions per week, 45-40 minutes each, in each session, at least 20 complete movements were performed, at an intensity to reach the heart rate specific to the age of the practitioner.

The experiment was carried out at the fitness gym of the "Mihai Băcescu" Sports Association, on a group of 10 female individuals, aged between 30-40 years, over a period of 3 calendar months. The persons were tested before and after the conclusion of the test period. Upon performing the exercises, the use of the materials and equipment available in the gyms was encouraged (mats, Bobath balls, dumbbells and sand bags for weights of 1-3 kg), which has allowed the optimization of funds use and broke the monotony. The sessions have been structured in 3 parts: warm up, workout and cool down.

Results:

In order to assess the general strength we have used the following trials:

- Standing long jump (explosive strength): consists of the performance of a leap standing in place. Necessary materials: chalk, flat surface, centimeter;
- Manual dynamometry (static strength): Dynamometer – Measuring device of the upper limb strength;
- Lifting the body at 45° from lying on the back position (30 sec) (abdominal strength);
- Maintaining the hung position (static strength): consists of keeping the arms outstretched in hung position on a bar as long as possible. Necessary materials: bar, chair/bench (10-15 cm h), timer;

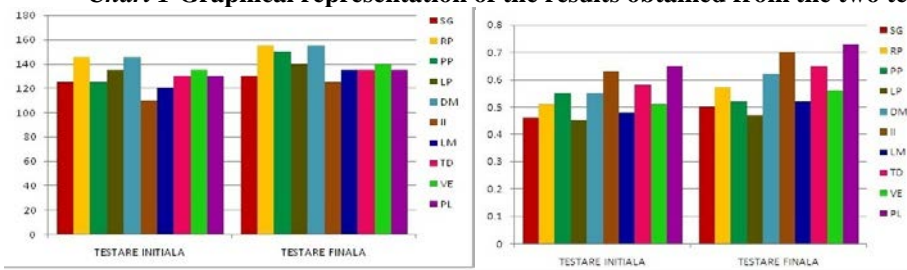
Table no. 2 Values dynamics regarding the general strength of the test group– INITIAL/FINAL TEST

Runni ng no.	Surna me, name	Trial no. 1 = Standing long jump (explosive strength) - cm		Trial no. 2 = Manual dynamometry (static strength) - bars		Trial no. 3 = Lifting the body at 45° from lying on the back position (30 sec) – repetitions no. – dynamic strength		Trial no. 4 = Maintaining the hung position (static strength) - minutes	
		I	F	I	F	I	F	I	F

1	RP	145	157	0.51	0.57	19	21	180	200
2	PL	130	135	0.65	0.73	17	22	180	220
3	PP	125	154	0.55	0.52	15	16	100	170
4	LP	135	143	0.45	0.47	17	20	160	190
5	DM	145	156	0.55	0.62	18	22	190	210
6	II	110	129	0.63	0.7	6	15	0	270
7	SG	125	135	0.46	0.5	9	13	160	170
8	LM	120	138	0.48	0.52	14	19	130	150
9	TD	130	136	0.58	0.65	13	17	120	210
10	VE	135	142	0.51	0.56	16	17	120	140
X		130	14.5	0.53	0.58	14.4	18.2	134	193
S		10.80	9.90	0.06	0.08	4.11	3.08	56.01	38.02
Cv		8.30	6.94	12.69	15.04	28.57	16.94	41.80	19.69
t		2.69		1.33		2.33		2.75	
p		p<0.05		p>0.05		p<0.05		p<0.05	

As shown in the table (table no. 1), the scores of the final tests have values higher than previously obtained. The research subjects showed progress at all four trials that targeted the optimization of the general strength. These differences demonstrate the fact that the specialized programs implemented by us yielded results, with progresses in terms of improving the general strength of the persons included in our research. The progress of each participant is highlighted in the charts below.

Chart 1 Graphical representation of the results obtained from the two tests



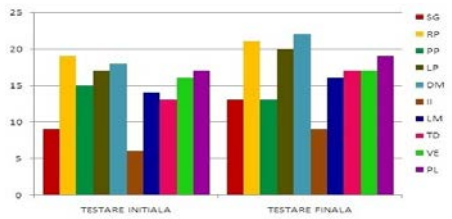


Diagram no. 3 Lifting the body at 45 from lying on the back position (trial 3)

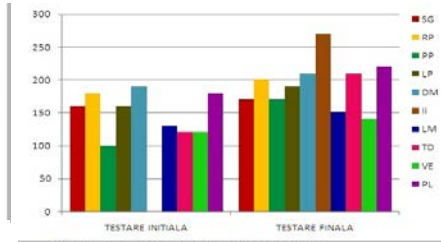


Diagram no.4 Maintaining the hung

Regarding the statistical-mathematical interpretation of the obtained results, it can be seen that between the arithmetic mean of the initial test and the arithmetic mean of the final test there is a considerable difference. In terms of the coefficient of variance it is observed that the degree of homogeneity of the test group is sufficiently representative, with evolution in all four trials.

The Student test calculated by us upon the 4 tests is 2.69 (Standing long jump), 1.33 (Manual dynamometry), 2.33 (Lifting the body at 45°), and 2.75 (Maintaining the hung position), which compared to the significance degree $p < 0.05$ from Fisher's table (in our case 2.26), shows that there are significant differences in 3 out of the 4 tests. On the Manual dynamometry test, for which the t test is insignificant, most subjects have made relatively good progress, but not at all negligible considering the results of initial testing.

Table 3 Value dynamics of the statistical-mathematical indicators of the 4 trials regarding the general strength – initial tests

Running no.	Arithmetic mean (X)	Standard deviation (S)	Coefficient of variation (Cv)
Trial 1	130	10.80	8.30
Trial 2	0.53	0.06	12.69
Trial 3	14.4	4.11	28.57
Trial 4	134	56.01	41.80

Table 4 Value dynamics of the statistical-mathematical indicators of the 4 trials regarding the general strength – final tests

Running no.	Arithmetic mean (X)	Standard deviation (S)	Coefficient of variation (Cv)

Trial 1	142.5	9.90	6.94
Trial 2	0.58	0.08	15.04
Trial 3	18.2	3.08	16.94
Trial 4	193	38.02	19.69

Table 5 Value dynamics of the statistical-mathematical indicators of the 4 trials regarding the general strength

Running no.	Student test(t)	T test (Fisher's table)	Significance threshold (p)
Trial 1	2.69	2.26	p<0.05
Trial 2	1.33	2.26	p>0.05
Trial 3	2.33	2.26	p<0.05
Trial 4	2.75	2.26	p<0.05

Chart 2 Graphical representation of the statistical-mathematical calculations regarding the general strength

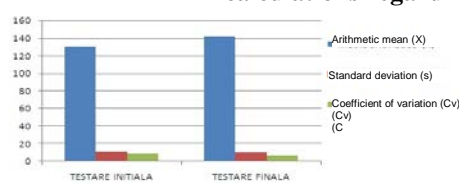


Diagram no. 5 Standing lung jump

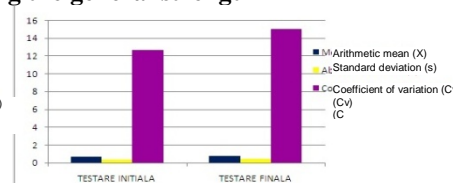


Diagram no.6 Manual dynamometry

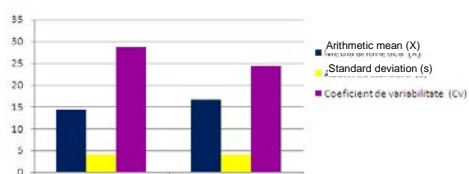


Diagram no. 7 Lifting the body at 45 from lying on the back position (30 sec) dynamic strength

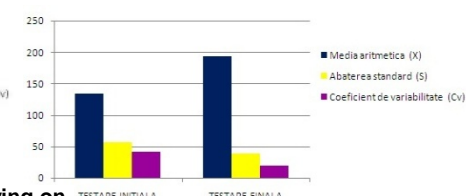


Diagram no.8 Maintaining the hung

Conclusions / Discussion:

- Practicing sports should become a way of living, it should be done with pleasure and not as chore, it should be understood that for a long life without diseases, it represents an ideal solution;
- The elements specific to aerobic gymnastics can successfully contribute to the optimization of the general strength in adults;

- The results obtained from the two tests confirm that by choosing the most effective means, specific to aerobic gymnastics, superior physical development indices can be obtained;

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