THE EFFECTS OF 6 MONTHS SPECIFIC AEROBIC GYMNASTIC TRAINING ON MOTOR ABILITIES IN 10 - 12 YEARS OLD BOYS

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Abstract

The purpose of this study was to investigate the effect of six months specific aerobic gymnastic training on motor abilities in 10-12 years old boys. Eighteen boys (aged 10-12 years old) volunteered to participate in the 6 months aerobic gymnastic training. Some motor ability parameters were measured weekly in addition to pre training. Data were analyzed using one-way ANOVA with repeated measures. The mean values of Chin-Up in 30 Seconds, Legs Lift in 30 sec, Horizontal Jump and Press Handstand test records were significantly changed after 6 months training ($p<0.05$).The Rope Climbing Using Legs/Feet records were significantly decreased (promoted) after 6 months specific training in aerobic gymnasts. Similarly, Tuck up Trunk and Leg Flexion records were significantly increased in the first, 3rd and last month evaluations ($p<0.05$).The records of Single Leg Squats test were significantly increased in both legs approximately similar to a higher value in pre training for right leg ($p<0.05$). Based on the results of this study it can be concluded that specific training in aerobic gymnastic, (independent of growth and maturation) causes positive changes in motor abilities in 10-12 years old boys.

Keywords: *Aerobic Gymnastic, Motor Abilities, Explosive Strength, Static Strength.*

INTRODUCTION

Gymnastics' subgroups are composed of a series of moves that included several movements in the form of simple, complex, static and dynamic techniques that are marked with a precise definition. The use of physical activity during the period of growth improves anaerobic strength and aerobic capacity in adolescent (Bouchard, Thibault, & Jobin, 1981, Payne & Morrow, 1993).

Aerobic gymnastic (AG) is a relatively new discipline in gymnastic family, with no more than thirty years of history. As its inclusion in the International Gymnastics Federation (FIG) and until now, it is a topic of ongoing regulamentary reviews with the aim to attain better functional, harmony and coherence structure among its judges (Gutiérrez & Vernetta, 2006). This sport has unparalleled structure and it's composed of movements that are categorized according to difficulty. Set of intricate movement forms as regular stepwise by combining music and steps.

Movement patterns of legs, which include seven original steps in march, jogging, skipping, knee lifting, kicking, jumping jacking and lunging, are putting on a show. Also, it is a way in which all actions must be performed continuously without any cut-off between them is therefore a part of aerobic disciplines. The average of total time of routine in competition is 1.5 minutes (FIG, 2008).

Motor ability can be imaged as a person's ability to carry out different acts, including coordination of both thin and large motor skills (Haga, et al., 2008; Gallahue, Ozmun, & Goodway, 2006). Some of the existing motor abilities tests concentrate on balance, flexibility, agility, speed, muscular strength and endurance (Fjørtoft, Pedersen, Sigmundsson, & Vereijken, 2011; Gallahue, Ozmun, & Goodway, 2006).

Strength, balance, coordination, speed, agility and flexibility are often described as a performance related fitness, reflecting the positive changes are expected, especially in the area of motor abilities Motor competence has important implications for different aspects of development in children (Haga et al., 2008; Malina & Bouchard, 1991; Piek, Baynam, & Barrett, 2006).

Most exercises in aerobic gymnastic include explosive power movements. The body's ability for movement in the air and muscle activity are based on the needs of movement, increase the range of motion that maintaining high levels can lead to the desired level of accuracy in the condition of organs that move is running. Thus to achieve the optimal quality and safety program performance, at first step should focus on physical condition and then training program (Marković, Čavar, & Sporiš, 2012).

In aerobic gymnastics athlete should have an extraordinary and high level of suitability of preparation and this importance obtains in exercise not in tournaments. The high level of the basic requirements of fitness is necessary for the success in learning of skills. Gymnasts in motor abilities that reflect onthe quality of performance, accuracy of techniques and movements are different. This achieved with adequate and appropriate training. These athletes have a very good relationship in neuromuscular characteristics, such as very high levels of power, strength, flexibility, muscular endurance, speed and coordination (Jemni, Sands, Friemel, Stone, & Cooke, 2006).

The success of any gymnast is directly dependent on the level of motor abilities, particularly on the special strength of the gymnast. Has strength in all three forms of; explosive, static and dynamic are very important for success gymnast. Gymnastics requires a great variety of movements example; the transition from dynamic to static elements and contrariwise, frequent changes in body position and various positions in the space (Bučar Pajek et al., 2010).

Investigations that have been done on champions gymnastics indicated that they have little muscle mass despite a high power (Sands, Caine, & Borms, 2003). As a member of the gymnastics' family, aerobic gymnastics is comparable in some aspects with other subtypes (Alexander et al., 1991; Behm & Kibele, 2007; Gionet, Babineau, & Bryant, 1986).

When we look at the child gymnasts, based on the definition of power we can only discuss about of power, especially explosive power, and there will be no discussion about strength (Marković, Čavar, & Sporiš, 2012). In our search, we find a study that analysis the motor skill of 100

female aerobic gymnasts in 19-21 years old. This study show the model of the motor skills necessary for the performance of aerobics gymnastics difficulty elements are: legs and hips flexibility, the strength of hip joint flexors, coordination, general strength and power. Based our search We didn't find any more research in background of this study.

One of the crucial period in the beginning stages of training on aerobic gymnastics training is at the age of 10 to 12 years. Because official aerobic gymnastic competition start at 12 years old (AG1) and previous age is 10 to 12 years old (national development) that is starter of age (FIG, 2008). So it is very important that we have given extraordinary attention to the training requirements. In any educational program as well as its various stages, to achieve the main purpose we should have a specific program, which it can introduction to performing gymnastic exercises in the right way. Based on the principles outlined above as well as the relationship between gymnastics phases we assumed that our training program increased motor abilities to extents that are important for aerobic gymnastics.

On the other hand, there is a lack of studies which investigate the effect of a long period training course of aerobic gymnastic on motor abilities in 10-12 years-old aerobic gymnastic boys. Therefore, the aim of this study was to assess the influence of programmed training on certain motor abilities of aerobic gymnasts aged 10 to 12 years, after 6 months participation in this training.

METHODS

The sample of subjects consisted of 18 boys (Age 11.7±0.5 years; Height, 142.2±1.7 cm; mass, 35.6±4.8 kg) that volunteered to participate in this study. All subjects had a minimum of two years' experience in gymnastic training and decided to start specific aerobic gymnastic training. They had a appropriate style and talent for aerobic gymnastic that selected by Iranian aerobic gymnastic national coach. Before conducting the study, subjects completed consent forms and questionnaires. Regarding medical information and physical exercise, none of them had any motor problems. Individuals who have a bone or joint problems in the year, before the study were barred from participating in this study.

The total period of training in current study six months (5 sessions per week for three hours per session because they have professional aerobic gymnastic training) lasted (Katić, Maleš, & Miletić, 2002). Training program generally were include: learning routine and difficulty element, artistic (specific of aerobic gymnastic and different of Artistic filde), chorography, full routine and general physical preparation. Also Warm up and cool down was constant in each session. Training period and measurements were performed under the national coach and training conditions for all subjects were the same. During the study period, subjects had not another additional non organized physical activity. All gymnasts were in the same school and have the same physical education class that we neglected it.

Measurements on seven sessions during the six-month training period held to calculate 9 functional standard tests of gymnasts. Tests were chosen so that the cover filed strength ability of hands and shoulders, and legs and trunk as well as hip flexibility. These tests include 2 tests to measure hands and shoulders, 3 tests to measure power of the trunk; 3 tests for lower body and one test for the total body (Table 1) (Marković, Čavar, & Sporiš, 2012). Before accomplishing the tests, each gymnast performed 5 minutes running and 10 minutes of dynamic stretching warm up to him.

Table 1
Motor tests, measurement unit and motor ability

Name of motor test	Unit	Motor ability
Legs Lift From Piked Position	number	Power (Low Abs And Gauds)
Chin-Up In 30 Seconds	number	Power (Arms And Shoulder Belt)
Legs Lift In L-site position	sec	Power (Low Abs And Quads)
Rope Climbing Using Legs/Feet	sec	Explosive Power (Arms And Shoulder Belt)
Tuck Up Trunk And Leg Flexion	sec	Power
Single Leg Squats (Right)	number	Power (Lower Limbs)
Single Leg Squats(Left)	number	Power(Lower Limbs)
Horizontal Jump	cm	Explosive Power
Press Handstand	number	Power Of The Entire Body

Data were analyzed using SPSS statistical software Version 16. Descriptive statistics (means and standard deviation) were calculated for all variables. The Kolmogorov-Smirnov test was applied to test for a normal distribution. Data were analyzed using one-way ANOVA with repeated measures. Significance levels for all statistical analyzes were considered as $p \leq 0.05$.

RESULTS

The mean values of Legs Lift from Picked Position test have no significant change during training period. But, the mean values of Chin-Up in 30 Seconds test records were significantly changed after 6 months training and this variable increased by 16.2% in compare to pre training values. Also, the records of Legs Lift in 30 sec test were significantly increased by 65.2% after 6 months specific training in compare to pre training values ($p<0.05$) (Figure 1).

The Rope Climbing Using Legs/Feet records were significantly decreased (promoted) by 15.9% after 6 months specific training in aerobic gymnasts. Interestingly, this variable was significantly changed in the first month as same as all later months. Similarly, Tuck Up Trunk and Leg Flexion records were significantly increased in the first, 3rd and last month evaluations. Mean changes of this variable were 23.9% after 6 months specific training ($p<0.05$) (Figure 2).

The mean values of Single Leg Squats test with left and right legs are presented in Fig 3. The records of this variable were significantly increased in both legs approximately similar to a higher value in pre training for right leg ($p<0.05$). Accordingly, this variable was increased after 6 months specific training by 190.5% in left leg and 106.8% in right leg in compare to pre training values (Figure 3).

DISCUSSION

The aim of physical education is to ensure comprehensive and harmonious development of children by developing their motor abilities and helping them to increase the skills and experience useful in different sports (Granacher, Muehlbauer, Doerflinger, Strohmeier, & Gollhofer, 2011; Piek, Baynam, & Barrett, 2006; Alpkaya, 2013). Any motor ability plays an important role in the process of physical education (Haga et al., 2008; Lucertini, Spazzafumo, De Lillo, Centonze, Valentini, & Federici, 2013). Physical activity in the great rang influence the growth and development of children

(Malina & Bouchard, 1991; Lopes, Rodrigues, Maia, & Malina, 2011). The motor development and sports skills of children have been considered important in the physical education program (Haga et al., 2008). The importance of different forms of sports has been verified for good lifelong physical activity and for the versatile development of fitness and motor abilities (Fujinaga, et al., 2008; Gallahue, Ozmun, & Goodway, 2006; Pehkonen et al., 2011). Some of the motor tests typically concentrate on balance, flexibility, agility, speed, muscular strength and endurance (Baláš & Bulc, 2007; Fjørtoft, Pedersen, Sigmundsson, & Vereijken, 2011; Haga et al., 2008). Some exercise like gymnastics are highly influenced on the development of these characteristics (Bučar Pajek, Čuk, Kovač, & Jakše 2010; Werner, Williams, & Hall, 2011). Horizontal Jump and Press Handstand records were significantly increased by 3.7% and 146.3%, respectively, after specific training period ($p<0.05$) (Figure 4).

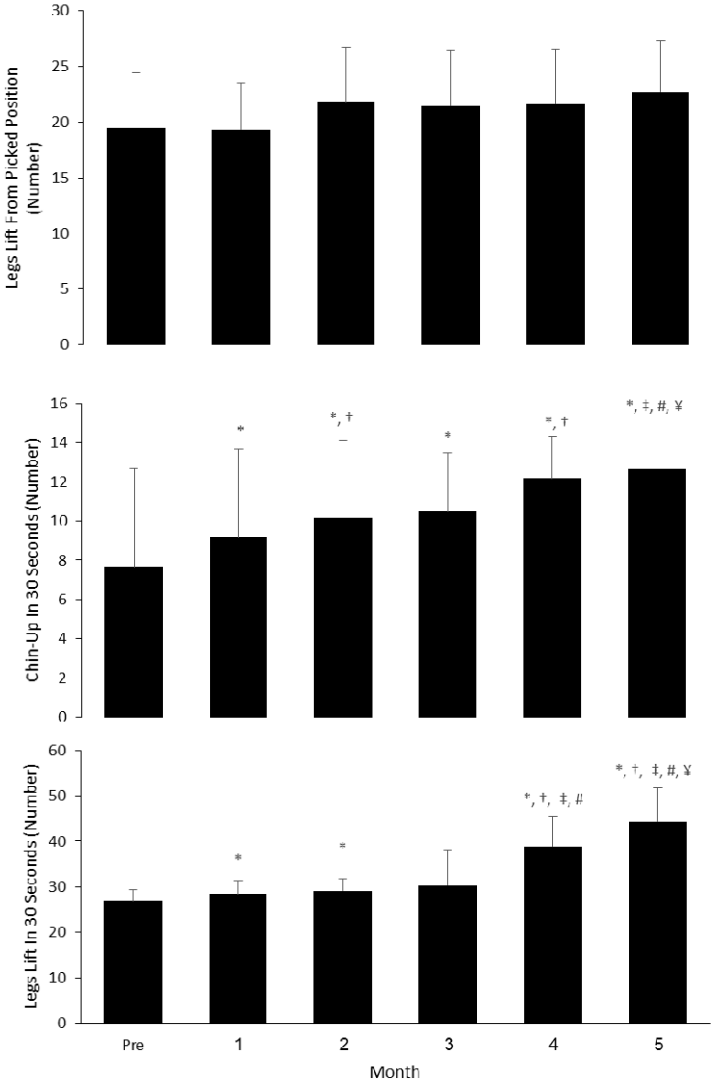

Figure 1. Means and standard deviations of Legs Lift from Picked Position (top graph), Chin-Up in 30 Seconds (middle graph), and Legs Lift in 30 sec (bottom graph) tests of aerobic gymnasts during 6 months specific training. *, Significant differences from pre-training values; †, Significant differences from 1 month ago values ‡, Significant differences from 2 months ago

values; #, Significant differences from 3 months ago values; ¥, Significant differences from 4 months ago values ($p<0.05$).

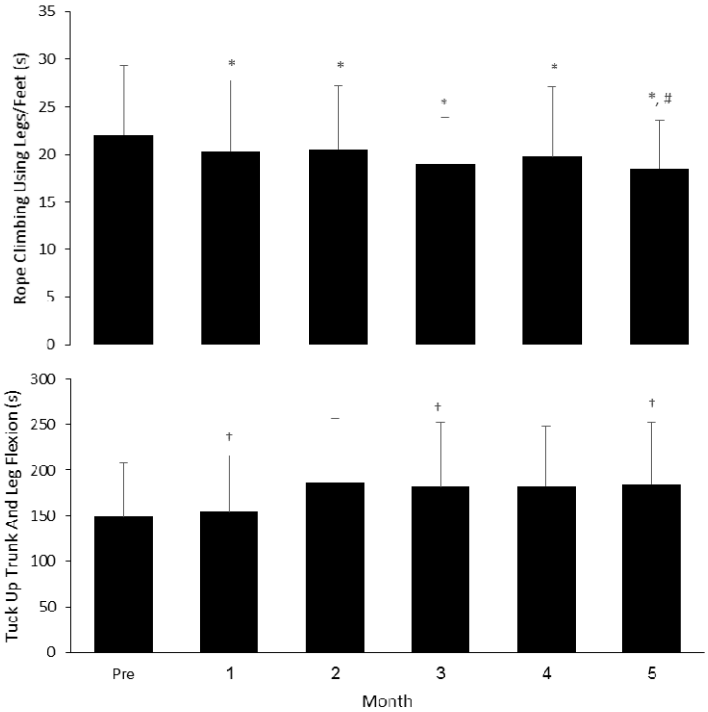

Figure 2. Means and standard deviations of Rope Climbing Using Legs/Feet (top graph), and Tuck up Trunk and Leg Flexion (bottom graph) tests of aerobic gymnasts during 6 months specific training. *, Significant differences from pre-training values; †, Significant differences from 1 month ago values ‡, Significant differences from 2 months ago values; #, Significant differences from 3 months ago values; ¥, Significant differences from 4 months ago values ($p<0.05$).

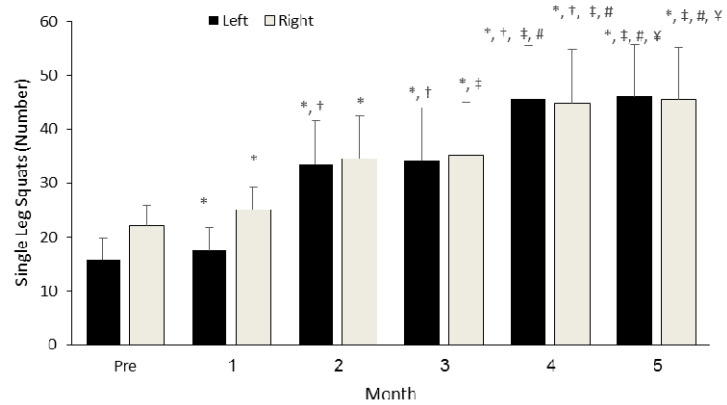

Figure 3. Means and standard deviations of Single Leg Squats (left and right) tests of aerobic gymnasts during 6 months specific training. *, Significant differences from pre-training values; †, Significant differences from 1 month ago values ‡, Significant differences from 2 months ago values; #, Significant differences from 3 months ago values; ¥, Significant differences from 4 months ago values ($p<0.05$).

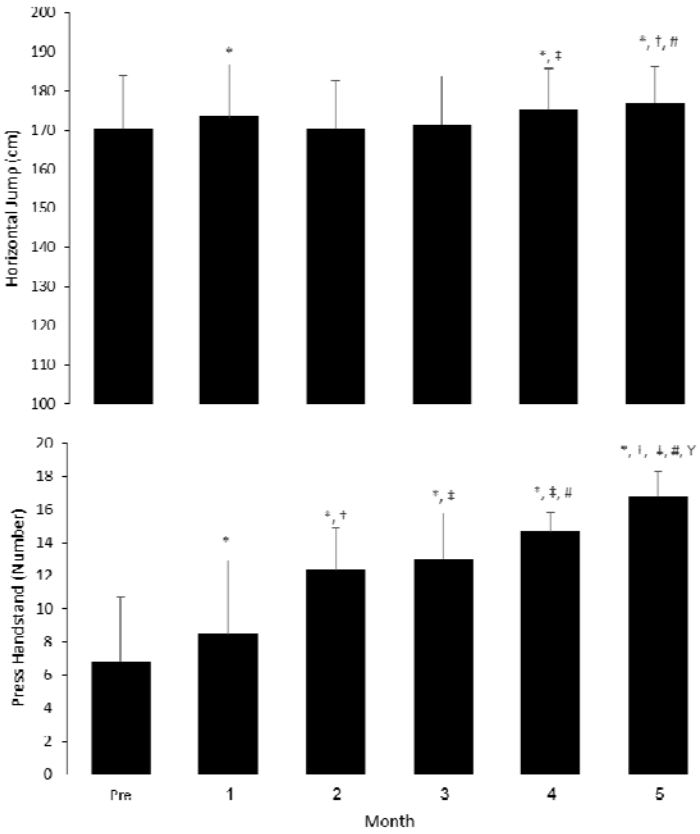

Figure 4. Means and standard deviations of Horizontal Jump (top graph), and Press Handstand (bottom graph) tests of aerobic gymnasts during 6 months specific training. *, Significant differences from pre-training values; †, Significant differences from 1 month ago values ‡, Significant differences from 2 months ago values; #, Significant differences from 3 months ago values; ¥, Significant differences from 4 months ago values ($p<0.05$).

Gymnastics is one of the key sports as any physical exercise on the floor or apparatus that offers a great deal of locomotive, stability and body control movements that are highly critical for the development of the children (Bučar Pajek Čuk, Kovač, & Jakše, 2010). Gymnastics needs a great variety of movement; transitions from dynamic to static elements and conversely, many changes of the body situation in space (Bressel, Yonker, Kras, & Heath, 2007; Čuljak, Ćavar, Crnjac, Marić, & Ćorluka, 2011). Gymnastic has different branches include artistic for men, artistic for women, acrobatic, trampoline, gymnastic for all, rhythmic and aerobic gymnastic. Because of lake research in this context, we try to descriptive the results of this study and highlight the effect of each motor ability roll in success of gymnast. Also we explain roll of specific aerobic gymnastic training in develop of motor ability in young children.

Aerobic gymnastics is a sport with great technical demand and needs specific characteristics in some ability: anaerobic endurance, relative strength, explosive power or strength and flexibility (López et al., 2002; Abalo Núñez, Gutiérrez-Sánchez, & Vernetta Santana, 2013). In addition, because of the current high level sports cause continues difficulties to the gymnast (Torrents et al., 2005).

Follows these results we can conclude that the specific aerobic gymnastic training had a positive influence on explosive strength, dynamic and static muscular endurance, flexibility and frequency of movements in 10 to 12 years-old boys. Changes happened in aerobic gymnastic training are partially anticipated because gymnastics is physically complicated and has a key role in the development of motor

abilities (Côté, Salmela, & Russell, 1995). According to the statically analysis, the boys' motor abilities in the final measuring, compared with the initial measuring, had, in general, improved significantly.

The progress achieved in boys was in the test of explosive power, dynamic and static muscular strength. The results show that applied aerobic gymnastic training improved all motor abilities. Interesting fact is that there was exceptional improvement of explosive strength that it has a more percentage of genetic. The reason may be partly prescribed and observed during the final measurement, where the children evidently improved technique of performing the tests, which finally was more effective (Čuljak, Ćavar, Crnjac, Marić, & Ćorluka, 2011).

Poest et al (1990) reported that providing young children with the intently planned movement experiences will increase fundamental movement skills. Their results show that the applied dance program for preschool children differently affects boys (Poest et al., 1990). Thus, use of music in aerobic gymnastic can be useful in improvingthe motor ability of the gymnasts. Katić, Maleš, & Miletić (2002) have proposed that the same kinesiologictraining can differently affect 7-year-old boys, and he identified the morphological – motor variables to be addressed by general and differentiated programs of kinesiologicprogram in order for them to be achieved during the development of the child's body. Obviously, the morphological – motor development should be observed through the interaction of morphological and motor systems, thereby employing target kinesiologic treatments to bring the structures of these systems into optimal interrelationships (Katić, Maleš, & Miletić, 2002).

In Iran, PE classes (just second grade) do not contain gymnastics skills performed on the apparatus and gymnastic branches but only some simple floor exercises. Generally, the PE curriculum focuses on ball games (such as volleyball, football, tennis, etc.), track and field activities,however, the most experts would agree that gymnastics and their branches is important activities for the healthy growth and development of children. Specially, gymnastics may promote the development of coordination, strength, muscular endurance, flexibility and balance (Bencke, Damsgaard, Sækmose, Jørgensen, Jørgensen, & Klausen, 2002; Bressel, Yonker, Kras, & Heath, 2007; Werner, Williams, & Hall, 2011). Jeleska (2007) and Males et al. (2006) found that children who are in the PE classes and are regularly active in the sport branches have superior improvement in all motor abilities, compared with a group of children who participated only PE classes.

Based on the results of this study it can be concluded that specific training in aerobic gymnastic, (independent of growth and maturation) causes positive changes in motor abilities in 10 to 12-year-old boys.

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