

THE EFFECTS OF 4 MONTH VOLLEYBALL TRAINING ON FLEXIBILITY, JUMP, SPEED, AND AGILITY IN PREADOLESCENT GIRLS

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Abstract

Purpose. Training programs for volleyball players can benefit their physical and physiological development (R. Lidor et al, 2010). Therefore, the purpose of this study was to determine the effects of 4 month volleyball training on flexibility, jump, speed, and agility in preadolescent girls.

Methods. Twenty girls (x_{age} : 10.5 ± 1.5 , $x_{sports\ age}$: 1.1 ± 0.4) volunteered to participated in this study. The informed consent was taken from all parents. Pre-test, mid-test (on the 2nd month) and post-test (on the 4th month) measurements were taken. The body height and weight, flexibility (sit and reach test), speed (20 m run test), vertical jump (with arm swing allowed), standing long jump, agility (Illinois agility run test) were measured.

Results. 4 month volleyball training significantly affected subjects' body height, body weight, flexibility, jump, speed, and agility performance ($p < 0.05$). The jump, speed and agility performance were significantly improved, although flexibility decreased for this period.

Conclusions. Our results were parallel to the previous studies (R. M. Malina, 1994, D. R. Melrose et al., 2007). Subjects' body height and body weight was increased, this results could be related the physical development. In the further study, these performance tests would also be applied on the control group at the same age, to test whether this positive improvement arose from the volleyball training.

Keywords: volleyball training, preadolescent, performance.

Purpose

Training programs for volleyball players can benefit their physical and physiological development (R. Lidor et al, 2010). How might physical activity during childhood and adolescence, particularly athletic participation, affect physical growth? This question is a major concern of parents, coaches and physical educators (T. W. Rowland, 2005).

On the other hand, it is accepted that increased physical activity and musculoskeletal stress are important for promoting growth in children (D. A. Bailey et al., 1978, K. T. Borer, 1995). Moreover, children's involvement in sport training might provide particular long-term health benefits (e.g., stimulation of bone growth and density may ameliorate the risk of future skeletal diseases) (T. W. Rowland, 2005).

There are some assessment protocols in order to investigate exercise effects on growth. These protocols typically include laboratory and field tests, but access to laboratory equipment and staff is often limited. Therefore, field tests are used to assess performance and often include evaluation

of sprint, jumping, and agility (W. B. Young et al, 2002, J. B. Cronin et al, 2005, T. Little et al, 2005).

Consequently, the purpose of this study was to determine the effects of 4 month volleyball training on flexibility, jump, speed, and agility in preadolescent girls.

Methods

Twenty girls (x_{age} : 10.5 ± 1.5 , $x_{sports\ age}$: 1.1 ± 0.4) volunteered to participated in this study. The informed consent was taken from each subjects' parents.

Pre-test, mid-test (on the 2nd month) and post-test (on the 4th month) were applied to the subjects in order to examine the physical and physiological effects of volleyball training. For this purpose, the body height and weight, flexibility (sit and reach test), speed (20 m run test), vertical jump (with arm swing allowed), standing long jump, agility (Illinois agility run test) were measured. Before the tests, subjects performed the

warming up and stretching exercises approximately 15 minutes.

Volleyball trainings consisted of 60 minutes at each weekend and in total eight training unit per month. The volleyball trainings contained the warm up and stretching (~15 min.), fundamental skill training combined with quickness, strength, and reaction exercises (~30 min.), and mini volleyball match (at the end of the training, ~15min.).

Data were analysed using by Sigma Plot 11.0 (Systat Software Inc). Friedman repeated measures analysis of variance on ranks were applied. The statistical significance was set at $p < 0.05$.

Results

4 month volleyball training significantly affected subjects' body height, body weight, flexibility, jump, speed, and agility performance ($p < 0.05$). Subjects' body weight increased along with their body height. The jump, speed and agility performance were significantly improved, although flexibility decreased for this period. All anaerobic tests results were significantly different in the 4th month test compared with first test (Table 1).

Discussion and conclusion

Physical activity might influence growth in children by three possible mechanism (a) exercise draws on caloric stores and competes with the energy demands of normal growth for available nutrients. Through 'caloric stealing' physical activity may thus potentially impair growth on a nutritional basis. (b) Physical activity serves as a potent stimulus for production of growth factors. (c) Muscular activity creates local mechanical stresses that trigger musculoskeletal growth (T.W. Rowland, 2005).

According to G. E. Theintz et al. (1993), intense training might delay linear growth in young female gymnasts. This result shows a similarity with our findings.

R. M. Malina (1994) found the body height and body weight 141 ± 6.6 cm, 31.3 ± 3.5 kg, respectively in 10-year-old girls volleyball players and Prokopec et al (2003) found 144.6 ± 5.2 cm, 33.7 ± 4.2 kg in 9-10-years-old girls volleyball players. Our subjects' body height and weight values are higher than both two studies at the same

age group (150.8 ± 9.0 cm, 44.6 ± 10.1 kg, respectively).

R. Lidor et al (2007) investigated the effects of 15 month volleyball training using with the motor, physical and skill tests (2 speed tests, agility run test, 4 explosive power tests, endurance test and serving velocity test) in fifteen male adolescent volleyball players. They found that all participants improved their results in all but 2 tests (endurance and skill tests) and vertical jump with approach was found to be a good indicator for distinguishing between two level group players (starters and nonstarters). Stamm et al (2005), found relationship between the volleyball players' jumping ability and their team's ranking. They reported that players from teams that were ranked 1-6 had better jumping abilities than players in team ranked 7-12 in a European Youth Volleyball Championship. In one study (D. R. Melrose et al, 2007) vertical jumping with arm swing allowed values of 12-14-years-old players were 33.2 ± 6.0 cm. This result is higher than our subjects' vertical jumping result (30.6 ± 5.5 cm), but our subjects were 2 year younger than their subjects.

R. Lidor et al (2007) also suggest that physical and motor tests do not reflect open skill ability in volleyball. Thus, these general field tests can be used to determine the differences of players' motoric performance (and it does not show directly specific skill ability such as volleyball) or to follow the players' physical and motoric development. On the other hand, it could be insufficient to follow the children and adolescents' physical, physiological and motoric development with only the field tests. Because, the result of the study which investigate the relationship between sprinting, agility, and jump ability in female athletes indicate that linear sprinting, agility and vertical jumping are independent locomotor skills and suggest a variety of tests ought to be included in an assessment protocol for any athletes (J. D. Vescovi et al, 2008).

In conclusion, we could say that our results were parallel to the previous studies (R. M. Malina, 1994, D. R. Melrose et al., 2007). Subjects' body height and body weight was increased, this results could be related to the physical development. In the further study, these performance tests would also be applied on the control group at the same age, to test whether this positive improvement arose from the volleyball training.

Table 1. Preadolescent girls' physical characteristics and flexibility, jump, speed and agility performance in volleyball.

	First test (a) (n=20)	2 nd month (b) (n=20)	4 th month (c) (n=20)
Body height (cm)	148.9±9.4 ^c	149.7±9.3 ^c	150.8±9.0 ^{a,b}
Body weight (kg)	42.0±10.3 ^{b,c}	43.6±9.9 ^{a,c}	44.6±10.1 ^{a,b}
Flexibility (cm)	30.8±6.9 ^c	30.5±5.8 ^c	25.7±4.5 ^{a,b}
Vertical jump (cm)	23.8±5.8 ^{b,c}	26.9±5.5 ^{a,c}	30.6±5.5 ^a
Standing long jump (cm)	135.9±20.6 ^{b,c}	143.2±19.9 ^a	145.9±21.7 ^a
20 m run test (sec)	4.39±0.37 ^{b,c}	4.10±0.27 ^a	4.09±0.26 ^a
Illinois agility run test (sec)	22.6±1.8 ^{b,c}	21.4±1.2 ^{a,c}	20.6±1.4 ^{a,b}

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