

# **Effect of kids athletics training on power among kids**

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## **Abstract**

The “IAAF Kids Athletics” Programme aims to ensure a steady and sustainable policy of development of the sport of Athletics. The programme is not intended only for clubs and Member Federations but also for schools and all institutions who are interested in the well being of children. The IAAF aims to popularise athletics in the six areas through a programme of several competitions called “A Team Event for Children”, which comprises of three event groups: Sprinting/Running Event Group, Jumping Event Group and a Throwing Event Group. There are three age categories targeted by the programme: 7-8 yrs, 9-10 yrs and 11-12 yrs. Core Strength is the motor control and muscular capacity of the lumbopelvic-hip complex, The aim of this study was to determine the effect of 10-week core strength training program on dynamic balance, power and program skills among kids athletics. Twenty kids athletics. Divided into two groups, the experimental group comprised of (10) kids in the age groups of 7-8 yrs. The subjects in this group underwent a core strength training program comprising of body weight, Swiss ball and medicine ball for (10) weeks. The control group comprised of (10) kids as the same age for the experimental group. Parameters assessed the high, weight, power, dynamic balance and training age. All subjects were free of any disorders known to affect performance, such as bone fractures, osteoporosis, diabetes and cardiovascular disease. The participants did not report use of any anti-seizure drugs, alcohol and cortoon consumption, neither smoking cigarette. And all participants were fully informed about the aims of the study, and gave their voluntary consent before participation. The measurement procedures were in agreement with the ethical human experimentation. All statistical analyses were calculated by the SPSS statistical package. The results are reported as means and standard deviations (sd). Differences between two groups were reported as mean difference  $\pm 95\%$  confidence intervals (meandiff  $\pm 95\%$ ). T test for samples was used to determine the differences in the parameters between the two groups. The results indicated that an increased significantly between the pre and post measures for the experimental group in dynamic balance, power and program skills. In Conclusions. (10) weeks of core strength program can improve physical, skills and dynamic balance for kids athletics.

**Key words:** core strength - dynamic balance- power – kids athletics

in 2005, the IAAF created a global athletics policy for Youth from 7 to 15 years old. This policy has two objectives, to make Athletics the most practiced individual event in schools in the whole world and to enable children from federations and others to prepare for their future in Athletics in the most efficient way. This approach hinges on forms of competitions that are appropriate to all age categories and to the institutions that implement this programme.

“IAAF KIDS’ ATHLETICS” is intended to bring excitement into playing Athletics. New events and innovative organisation will enable children to discover basic activities: sprinting, endurance running, jumping, throwing/putting in just about any place (stadium, playground, gymnasium, any available sport area, etc.). The

athletics games will provide children with the opportunity to make the most of the beneficial practice of Athletics, in terms of Health, Education, and Self-fulfillment.

As the normal child develops, his core muscle strength is established through repetitious active movements and movements against gravity. The child engages in small components of these movements before combining them to achieve a functional core. This functional, stable core serves as the foundation for coordinated movement in the child's arms and legs. (Janice Bee, 2011)

The core is defined as the lumbo-pelvic hip complex. It is where our center of gravity is located and where movements of the body originate. An efficient core allows for optimal acceleration, deceleration and stabilization of the entire kinetic chain during functional exercise. The core needs to be trained appropriately in order to efficiently distribute weight, absorb force, and transfer ground reaction forces during functional movements.

Classic literature classified the musculature of the core as being controlled by "local" and "global" muscular systems (Bergmark, 1989). The "local" system consists of all the muscles that originate and insert at the vertebrae, with the exception of the psoas muscles which flex the hip joints (Bergmark, 1989). The role of the "local" system is to control the curvature of the lumbar spine, aid in the coordination and control of motion segments, and provide sagittal and lateral stiffness to maintain mechanical spinal stability. On the other hand, the "global" system acts to transfer forces from the thoracic cage and the pelvis out to the extremities (Bergmark, 1989). The muscles of the "global" system have longer moment arms of force, as well as larger cross-sectional areas than the muscles of the "local" system, making them ideal for force production (Arokoski, et al., 1999).

Core training programmes include processes that target muscular strengthening and motor control of the core musculature.(Nadler, et al.2002) Core strengthening exercises are very popular in rehabilitation programmes despite little scientific evidence existing as to their efficacy on improving subsequent performance(Stanton, et al.2004; Cosio-Lima, et al.2003; Tse , et al.2005) although some research has suggested that a number of methods can enhance neuromuscular control. These include joint stability exercises,( Behm, et al.2002) contraction exercises (concentric, eccentric and isometric),(Pollock et al.1989) balance training,(Cosio-Lima, et al.2003) perturbation (proprioceptive) training,( Lewis & Hawke, 1983;Carriere, 1999) Plyometric (jump) exercises (plyometric training emphasises loading of joints and muscles eccentrically before the unloading concentric activity)( Axler & McGill, 1997) and sport-specific skill training.(Lehman, 2006) In the field of physiotherapy, proprioceptive training is believed to be important and, consequently, programmes use methods and exercises that challenge proprioception using equipment such as wobble boards, roller boards, discs and Swiss balls.

Comerford(2007) believes that to train core stability and strength it is important to perform both low- and high-load threshold training. Comerford(2008) identified the following sub-areas of core training that all need to be included when training core stability and strength:

1. Motor control stability: low-threshold stability where the CNS modulates the efficient integration and low-threshold recruitment of local and global muscle systems.

2. Core strength training: high-threshold and overload training of the global stabilizer muscle system and leads to hypertrophy as an adaptation to overload training.( Cotton,2005)

According to **Nick Evangelista**, (1996) most of coaches doesn't care about the development of muscle strength, tribunals and the belief that strength training may negatively affect the speed performance, and use of strength training muscle may lead to muscle hypertrophy and thus adversely affect the flexibility of the armed wing.

In addition, some Athletics coaches pay attention to the development of the physical demands of the sport of athletics alongside the development of skills,

The aim of this study was to determine the effect of 10-week core strength training program on dynamic balance, power and program skills among kids athletics.

### **Methods.**

Twenty kids athletics. Divided into two groups, the experimental group comprised of (10) kids in the age groups of 7-8 yrs. The subjects in this group underwent a core strength training program comprising of body weight, Swiss ball and medicine ball for (10) weeks. The control group comprised of (10) kids as the same age for the experimental group. Parameters assessed the high, weight, power, dynamic balance and training age. All subjects were free of any disorders known to affect performance, such as bone fractures, osteoporosis, diabetes and cardiovascular disease. The participants did not report use of any anti-seizure drugs, alcohol and cortoon consumption, neither smoking cigarette. And all participants were fully informed about the aims of the study, and gave their voluntary consent before participation. The measurement procedures were in agreement with the ethical human experimentation.

### **The Core Muscle Strength & Stability Test (CST)**

The objective of this evaluation is to monitor the development and improvements of an athlete's core strength and endurance over time.

- Flat surface
- Mat
- Watch or clock with second counter
- Conducting the Test
- Position the watch or clock where you can easily see it
- Start in the Plank Exercise Position (elbows on the ground). Hold for 60 seconds
- Lift your right arm off the ground. Hold for 15 seconds
- Return your right arm to the ground and lift the left arm off the ground. Hold for 15 seconds
- Return your left arm to the ground and lift the right leg off the ground. Hold for 15 seconds
- Return your right leg to the ground and lift the left leg off the ground. Hold for 15 seconds
- Lift your left leg and right arm off the ground. Hold for 15 seconds
- Return you left leg and right arm to the ground.
- Lift your right leg and left arm off the ground. Hold for 15 seconds
- Return to the Plank Exercise Position (elbows on the ground). Hold this position for 30 seconds

### **Static strength test (LS)(BS)**

A back dynamometer was used to measure the static leg strength. The subjects stood on the dynamometer platform and crouched to the desired leg bend position,

while strapped around the waist to the dynamometer. At a prescribed time they exerted a maximum force straight upward by extending their legs. They kept their backs straight, head erect and chest high. 3 trials were allowed to the subjects and the best score was taken. Subjects had a rest between the trials.

### **Standing Long Jump Test (SLJ):**

The subject stands behind a line marked on the ground with feet slightly apart. A two foot take-off and landing is used, with swinging of the arms and bending of the knees to provide forward drive. The subject attempts to jump as far as possible, landing on both feet without falling backwards. Three attempts are allowed.

### **Seated Medicine Ball Throw (SMBT):**

The subject stand with their back to a wall, on a mat facing the area to which the ball is to be thrown, and with the feet extended and slightly apart. The ball is held with the hands (two hands) on the side and slightly behind the center. The ball is brought to the chest, and then thrown vigorously out as far as possible. The back should remain in contact with the wall at all times. Three attempts are allowed. The distance from the wall to where the ball lands are recorded. The measurement is recorded to the nearest 10 cm. The best result of three throws is used.

### **Flying Start 30m Sprint Test (30m Sprint)**

Mark out a 40 metre run with a 'timing' startline 10 m into the run. Using a standing start run the 40 m as quickly as possible. Have someone start the run and time it from the 10 m line to the 40 m line, so a flying 30 m time is gained.

### **Dynamic Balance Test using the Star Excursion Balance Test**

1. Subjects will be instructed to stand in the center of the star grid and maintain a single-leg stance while reaching with the opposite leg to touch as far as possible along a chosen excursion.
2. Subjects will be instructed to touch the farthest point possible as light as possible along a chosen excursion with the most distal part of their reach foot.
3. Subjects were instructed to return to a bilateral stance while maintaining their balance.
4. Subjects were instructed to perform six practice trials in each of the eight excursions with a 10-second rest between each excursion.
5. After a one-minute rest following the last practice trial, testing began.
6. Three trials were performed in each of the eight excursions with a 10-second rest between each excursion.
7. Trials were discarded and repeated if the reach foot was used to provide considerable support when touching the ground, if the subjects' stance foot was lifted from the center of the star grid, or if the subjects were not able to maintain their balance at any point in the trial.
8. The average scores for each excursion were recorded as the subjects' dynamic balance score.

### **Core Strengthening Protocol**

Exercise of the core musculature is more than trunk strengthening. In fact, motor relearning of inhibited muscles may be more important than strengthening in patients with LBP. In athletic endeavors, muscle endurance appears to be more important than pure muscle strength.<sup>24</sup> The overload principle advocated in sports

medicine is a nemesis in the back. In other words, the progressive resistance strengthening of some core muscles, particularly the lumbar extensors, may be unsafe to the back.

Functional progression is the most important stage in the core-strengthening program. A thorough history of functional activities should be taken to individualize this part of the program.

The researcher adopted the application of core strength training on the following:

- That the focus is on strengthening the muscles and the stability of the center
- At the end of the module extend the training given for muscle relaxation in order to return to normal.
- Training method used, you see a high intensity training system using a ring.
- Loads within the circuit training is through the change between the time of performance and comfort between the exercise and also between groups.
- Circuit includes (6) exercises in the (3-5) groups

table 1 shows the Sahrman’s Lower Abdominal Exercise Progression.

### Statistical analysis

All statistical analyses were calculated by the SPSS statistical package. The results are reported as means and standard deviations (SD). Differences between two groups were reported as mean difference  $\pm$  95% confidence intervals (meandiff  $\pm$  95% CI). Student’s t-test for independent samples was used to determine the differences in fitness parameters between the two groups. The  $p < 0.05$  was considered as statistically significant.

### Results.

Table 1: Sahrman’s Lower Abdominal Exercise Progression

Base position	Supine with knees bent and feet on floor;
Cue	spine stabilized with “navel to spine”
Level 0.3	Base position with 1 foot lifted
Level 0.4	Base position with 1 knee held to chest and other foot lifted
Level 0.5	Base position with 1 knee held lightly to chest and other foot lifted
Level 1A	Knee to chest ( $\sim 90^\circ$ of hip flexion) held actively and other foot lifted
Level 1B	Knee to chest (at $90^\circ$ of hip flexion) held actively and other foot lifted
Level 2	Knee to chest (at $90^\circ$ of hip flexion) held actively and other foot lifted and slid on ground
Level 3	Knee to chest (at $90^\circ$ of hip flexion) held actively and other foot lifted and slid not on ground
Level 4	Bilateral heel slides
Level 5	Bilateral leg lifts to $90^\circ$

Data from Sahrman.14

Table 2. Mean  $\pm$  SD and " T" sign. between two Groups (experimental and control) in SLJ , SMBT, CST,LS and BS

Variables	Experimental group		Control group		T sign.
	Pre	Post	Pre	Post	
SLJ(cm)	169.25 $\pm$ 5.06	176.00 $\pm$ 5.11	168.92 $\pm$ 4.87	171.43 $\pm$ 5.11	Sign.
SMBT (meter)	6.23 $\pm$ 0.16	7.16 $\pm$ 0.54	6.21 $\pm$ 0.39	6.78 $\pm$ 0.47	Sign.
CST (Degree)	5.31 $\pm$ 0.08	7.11 $\pm$ 0.15	5.22 $\pm$ 0.23	5.39 $\pm$ 0.26	Sign.
LS (KG)	59.42 $\pm$ 3.84	62.22 $\pm$ 4.89	59.25 $\pm$ 4.26	60.74 $\pm$ 4.38	Sign.
BS (KG)	37.51 $\pm$ 4.26*	45.22 $\pm$ 3.79	38.05 $\pm$ 4.37	40.31 $\pm$ 3.28	Sign.
30m Sprint	5.61 $\pm$ 0.03	5.28 $\pm$ 0.09	5.65 $\pm$ 0.08	5.42 $\pm$ 0.06	Sign.

Table (2) showed a statistically significant differences between the post measurements for the experimental and control groups in all physical variables for the experimental group.

Table 3. Descriptive Statistics for the pre and Post-Tests Data for the Star Excursion Balance Test

Variables	Experimental group		Control group		T sign.
	Pre	Post	Pre	Post	
Anterior	95.16 $\pm$ 8.55	99.22 $\pm$ 7.78	90.75 $\pm$ 7.05	91.22 $\pm$ 8.04	Sign.
Anteromedial	96.25 $\pm$ 7.84	100.22 $\pm$ 7.26	93.54 $\pm$ 8.21	95.07 $\pm$ 7.12	Sign.
Medial	95.88 $\pm$ 8.08	102.43 $\pm$ 8.63	93.11 $\pm$ 7.21	94.76 $\pm$ 9.13	Sign.
Posteromedial	100.42 $\pm$ 6.84	106.22 $\pm$ 8.89	99.25 $\pm$ 7.26	100.74 $\pm$ 6.38	Sign.
Posterior	100.51 $\pm$ 6.26*	107.16 $\pm$ 8.79	98.05 $\pm$ 7.37	100.31 $\pm$ 7.28	Sign.
Posterolateral	94.61 $\pm$ 8.08	100.50 $\pm$ 9.05	92.62 $\pm$ 7.65	94.59 $\pm$ 8.16	Sign.
Lateral	83.54 $\pm$ 9.28	91.34 $\pm$ 0.05	85.14 $\pm$ 7.91	86.78 $\pm$ 9.06	Sign.
Anterolateral	85.24 $\pm$ 8.11	92.63 $\pm$ 10.05	81.02 $\pm$ 7.47	89.59 $\pm$ 8.13	Sign.

Table (3) showed a statistically significant differences between the post measurements for the experimental and control groups in Star Excursion Balance Test for the experimental group.

## **Discussion and conclusion.**

Based on the results of this study The t-test showed a statistically significant differences between the post measurements for the experimental group in all physical variables.

The researcher believed that this improvement Attributed to the core training program and to the good planning of the program of strength training functional and regulate training loads in a scientific manner appropriate for the age group and training for the research sample and to use exercise Swiss ball, and seats Swedish as a key part in strength training career in order to develop muscle strength, which took into account the researcher training loads gradually during the application of the program by training different muscle groups, especially the muscles of the center, arms and legs and the concentration of a researcher working on the muscle groups during the bout and the accuracy of selection, where functional strength training led to improved strength and balance as soon as distinctive.

In this regard, Dave, (2003) to that of the most important attributes of strength training job is to focus on the center emphasizes the core, where the muscles of the center strong connecting the lower end party top, in addition to strength training career includes movements multi-directional and multi-directional exercises lead by focusing on one side, making it the single limb of the best exercises used to improve the strength of the muscles of the center (middle of the body), balance.

And confirms Fabio, (2004) the balance is the key element in the athletics training, not only the balance between strength and flexibility or muscle working and non working, but it also may believe that the means used, for example, stand on one foot and be able to move without the other members of the body to fall, a feature important in interactive training career.

Improved strength and distinctive as soon as Adams, et al. (1992) confirms of the activity of reflection rubber allows for excellent power transfer speed to the same distinctive movements similar biomechanics that require a high capacity of the trunk, legs and show results when performing the broad jump.

The results of this study agree with the study of both Cress, et al. (1996) , Yasumura, et al. (2000) , Marijke, et al. (2004) , Cymara, et al. (2004) that contribute to core strength training was improved strength and balance as soon as distinctive.

Results for the Star Excursion Balance Test did indicate significant main effects for time for all eight excursions. It is surprising that there was a significant effect for all eight excursions, since some of them are more difficult than others (anterolateral excursion, posterolateral excursion and lateral excursion) according to feedback from subjects in both groups. Out of all the eight excursions the diagonal excursions (anterolateral, posteromedial, posterolateral, and anterolateral) are the most important since human movement is multidimensional and multiplanar. All eight excursions were significant between pre and post test for time, indicating that core stabilization-training enhances multiplanar dynamic balance and movement, which can improve athletics performance.

Although there were some basic similarities, in their findings, the subject population and design of the studies were different. In the Piegara(2003) study 39 healthy subjects were divided into four groups (core, core/balance, balance training, and a control group), whereas our study used healthy tennis athletes and an age matched cohort physically active control group. Swaney and Hess (2003) used healthy subjects for their control group and swimmers, while Lewarchick et al. (2003) used healthy controls and football athletes.

In Conclusions. (10) weeks of core strength program can improve physical, skills and dynamic balance for kids athletics.

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