



INFLUENCE OF IAAF KID'S ATHLETICS PROGRAM ON PHYSICAL FITNESS AMONG SCHOOL GOING CHILDREN

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Abstract

Background: IAAF Kid's Athletics program is one of the biggest grassroots development program in the world created in 2005 across the world. Athletics Federation of India launched the Kid's Athletics Program in India in 2013 with an objective of promoting balanced and healthy life style, to educate the children into sports in general and athletics in particular and to attract and sustain the budding talents of tomorrow.

Objective: The aim of the study was to analyze the influence of 12 weeks IAAF Kid's Athletics program on physical fitness among school going children aged 10 to 14 years.

Methods and Materials: The study consisted of 40 children selected as subject where 20 children were categorized as low age group age ranged between 10 – 11 years and high age group age ranged between 13 – 14 years for determining the effect of age. Further 20 subjects were randomly assigned to Kid's Athletics group and Placebo group which consisted of 10 low age children and 10 high age children each. The Physical Fitness variables selected were Flexibility, Explosive Strength, Speed, Agility and Speed Endurance. Fitness test were conducted at zero week, after six weeks of training and after twelve weeks of training. Two-way mixed ANOVA were employed as the statistical technique.

Results: All selected Physical Fitness variables were statistically significant in group x time interaction (p -value = 0.001 to <0.001) with high effect size and in age x time interaction in experimental group, Speed (p -value = 0.06) found to be non-significant while flexibility (p -value = 0.03), Explosive Strength (p -value = 0.01), Agility (p -value = 0.00) and Speed Endurance (p -value = 0.000) with low effect size.

Conclusion: The findings of the study revealed that the IAAF Kid's Athletics program may be considered as the appropriate program for the children aged 10 – 14 years for the development of physical fitness components without early specialization at the same time it helps to create interest in sports and educate the children. The result of age category effect shows that the program may be suitable for kids and has positive effect among school going children.

Keywords: Motor Fitness, Flexibility, Explosive Strength, Speed, Agility, Speed Endurance.

Introduction

The International Association of Athletics Federation (IAAF) specifically developed a program named IAAF Kids' Athletics to promote and expand Track and Field in schools as well as sports clubs. (Gozzol, C., Simonhamed, J., & Elhebil, A. M., 2006). It helps to improve the fundamental physical fitness components. IAAF Kids' Athletics program is designed on the basis of game-centered approach (Miller, 2015). Several modified preparatory drills and competitive games (individual and team games) are used to teach the most important aspects of track and field event methods, while others are designed to develop agility, coordination, speed, and strength and endurance (Gozzol, C., Locatelli, E., Massin, D., & Wangenmann, B., 2002).

Varied playful exercises and adventurous games are expected to create an environment that facilitates positive outcomes in children's affection (i.e., to experience the fun that makes track and field so appealing, to feel competent and successful by doing drills that are appropriate for their current abilities, and to understand the importance of event skills that will ultimately motivate them to put in more effort) (Miller, 2015) performance (i.e., physical fitness and event performance), and their intention to continue practicing track and field in the future, all of which are in line with the games-centered approach.

The foundational phase i.e., chronological age between 8-12 year and no history of systematic training consists of the following: First and foremost, this phase is defined by fun/enjoyment and involvement. There are no formal training sessions. The "training to train" phase i.e., chronological age between 13-16 years and systematic training age between 1-4 years consists of the

following: During this phase, the emphasis is on progressively introducing the concept of training rather than playing. While there is still a lot of fun based activities structured and presented in a "real session" format. (Dempster, 2005)

Participating in sports and games enhances the physical fitness (Ortega, 2008), (Fisher A, 2005), (Hands, 2008) as well as anthropometric parameters such as body weight and body composition (Sallis, J. F., & Patrick, K., 1994). This is regarded as one of the most important health indicators (Ortega, 2008). In addition, previous researches showed that sports participation at a young age positively contributes to the development of a child's motor coordination because physical activity provides more opportunities to learn and refine motor skill executions (Fisher A, 2005), (Okely, 2001). Differences in levels of physical fitness and motor coordination can partly be explained by the amount of hours spent participating in sports. In 10 to 12 year old boys, The findings of the study conducted by Fransen and colleagues (Fransen, 2012) discovered that the number of training hours per week had a beneficial influence on flexibility (sit and reach), explosive leg power (standing broad jump), and motor coordination.

The major treat to the young athletes are early specialization which ultimately leads to drop outs. Dropouts, according to (Bussmann, 1999) are athletes who have prematurely ended their sports careers, i.e. before reaching their peak performance. Body responses of children to strenuous physical activity differ from those of adults, and they are not simply "little grownups" biologically (Jones, 1993). Children are well-equipped to handle activities that require short but intense activity (phosphagen system) or moderate exertion over longer periods of time (aerobic system). They are unprepared to handle training that necessitates a large input from the lactacid system. Lactacid system training should therefore be postponed until after the growth spurt has passed.

(Gambetta, 1986) Gambetta also believes that a young athlete's first experience in athletics should focus on the fundamentals in order to lay a strong basis for future growth and development. Since the aim of young athletes' training is to prepare them for the best potential performances when they reach adulthood, the proper approach to training throughout their growing years appears to be the most essential factor in ensuring future success. Coaches must be conscious of the dangers of early specialization. Children are not the little adults. (Arens, D., 1983), (Arens, O., 1983), (Jones, 1993)

Children's athletics must be modified to incorporate "fun" in athletics (Frey, G., 1992). A well-balanced athletics curriculum for students should include a variety of activities backed up with motivating psychology. The training volume and frequency should not merely be scaled down versions of adult training programmes. A variety of exercises and fun based activities makes participation in athletics more appealing which can lower the number of dropouts. Kid's Athletics program is one of the best training method can be adopted for children for the improvement of physical fitness and to avoid early specialization. There are only few researches have been done on children's fitness through Kids Athletics programme by other researchers.

The aim of this research was to analyze the influence of 12 weeks IAAF Kids' Athletics program on selected physical fitness variables among the school going children, using a randomized two-way mixed ANOVA design. In this research the researchers employed a fitness development program in order to create interest in physical activities with emphasizing fun factor and through which to improve the indicators of motor fitness in the young school going children. The researchers hypothesized that the Kids' Athletics program would have a significant impact on physical fitness variables in the experimental group than the placebo group over time and have a significant impact on age categories.

Research Methodology

Participants

Forty young school going children age ranged in between 10 to 14 years of Labour India Public School; Kottayam Kerala, India took part in the study as participants. Twenty children were selected with the age in between 10 to 11 years and categorized as Low age group and another twenty children with the age in between 13 to 14 years and categorized as High age group to analyze the effect of age. Children of 12 years old purposefully neglected to bring an age classification in the study. Further the subjects were randomly assigned to Kid's Athletics group and Placebo group which equally consisted of 10 low age children and 10 high age children each. All subjects were participated voluntarily with no previous history of systematic training and musculoskeletal diseases or injuries which was assured prior to the study.

Procedure

The Placebo group school children (n=20) were engaged in the usual physical education classes and games times in the school. The experimental group school children (n=20) were additionally performed the IAAF Kid's Athletics program (Table 1) thrice alternatively in one micro cycle of 7 days week for a duration of 12 weeks. The training was focused on the development of motor abilities with maximum fun and pleasure-based elements added with the exercises.

Circumstances of Data Collection

The researchers were briefly explained the training protocols and procedures of fitness test to the subjects to avoid future ambiguities which may hinder the study affects the results. All the subjects were tested at the designated venue under the same conditions and in same order. The research study was started after signing the necessary ethical authorizations from the parents/guardians of the subjects. All the subjects have undergone three time (pre - 0 weeks, mid - after 6 weeks, post - after 12 weeks) testing. The physical fitness variables selected were Flexibility, Explosive Strength, Speed, Agility and Speed Endurance.

Test Used

The physical tests consisted of Sit-and-Reach (SAR) test, Standing Broad Jump (SBJ), 50m Sprint, Agility T-Test and 150m Run.

Sit-and-Reach test: it was used to assess children's hamstring and lower back flexibility (EUROFIT) (Lancaster, S. & R. Teodorescu, 2008), with an accuracy of 0.5 cm. The SAR test has adequate validity and reliability values ranging from to .60 to .73 and .70 to .98 respectively, measured in 4 to 18 year old children (Kraemer, W.J. & S.J. Fleck, 2004). Baseline Sit n' Reach trunk flexibility assessment testing box was used to measure the flexibility. The participants were instructed to sit on the floor with fully extended legs, with the bottoms of their feet fixed at the box, in a sit and reach flexibility assessment testing box positioned on a plain surface. The participants were then directed to stretch and reach directly forward, palms down, along the measuring scale for one second. There were three trails allowed, with the highest measurements being collected for analysis.

Standing Broad Jump: This study included standing broad jump to measure children's explosive strength with an accuracy of 1.0 cm (EUROFIT) (Lancaster, S. & R. Teodorescu, 2008). The SBJ showed adequate values for validity and reliability ranging from .52 to .78 and .66 to .97 respectively (Kraemer, W.J. & S.J. Fleck, 2004). The subjects' explosive strength was tested by performing a standing broad jump. The participants were instructed to stand several centimeters behind the take-off line, flex their knees, and swing their arms backwards, allowing them to jump forward. The three trials with the best results were recorded and analysed.

50m Sprint: It was used to assess the children's running speed (EUROFIT) (Lancaster, S. & R. Teodorescu, 2008). The purpose of this test was to determine the subjects' speed. At the start and finish points, a pair of photoelectric timing gates (Cronox sports, Madrid, Spain) were installed. The subjects took a sprint start behind the first timing gate and were timed between the first and second timing gates, which were 50 meters apart.

Agility T-Test: It was used to assess the agility of the children. At the start/finish line, pair of single beam photocell timing systems (Cronox-sports, Madrid, Spain) was installed. The subjects took start by standing behind the photocell. The participants were instructed to begin at cone A. On the researcher's command, the subject runs to cone B and touched the cone's base with their right hand. They then shuffled right towards the cone C, touched the base with their right hand this time. Then again shuffled sideward's to the left to cone D, where the left hand touched the base. Then they shuffled back to cone B and then touched it with their right hand and ran backwards to cone A. As they passed through cone A, time came to a halt.

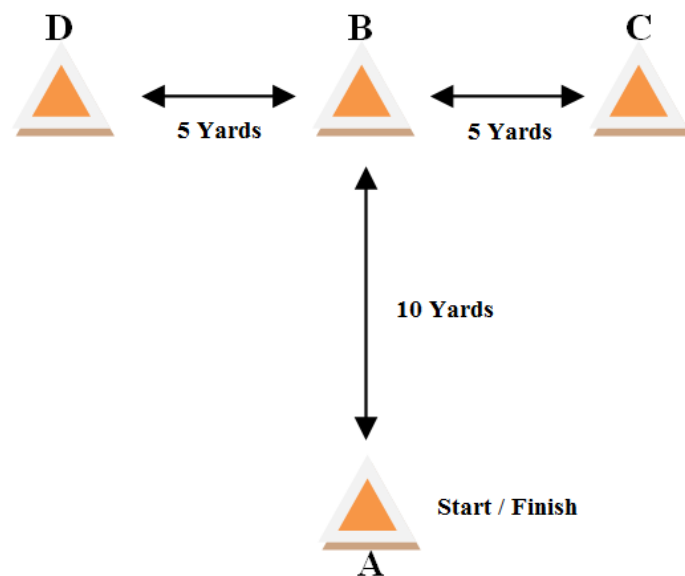


Figure 1: Graphical representation of Agility T-Test course

150m Run: It was used to assess the speed endurance. The photocell timing gates were installed 150 meters apart at the start and finish lines.

Data Processing

For the processing of data researchers used IBM SPSS software 20.0. We used the descriptive statistics method for distribution of the test sample in terms of group, age and time duration includes the mean \pm SD. For the characterization of the sample the researchers conducted normality testing with the Shapiro-Wilk test, sphericity assumption was tested with Mauchly's test. Greenhouse-Geisser and Huynh-Feldt were used in case of violation of sphericity assumption. Statistical analyses were performed separately for analyzing the effect of training groups and age categories in different groups. Physical fitness data (i.e., SAR, SBJ, 50m sprint, T-test, 150m run) were submitted to a 2 (group) x 3 (time duration) mixed-model ANOVA repeated measure. Physical fitness data of Kid's Athletics group submitted to a 2 (low age, high age) x 3 (time duration) mixed-model ANOVA repeated measure. The alpha level for all tests was set at $p = .05$.

Table 1: A model of micro-cycle plan followed by the Kid's Athletics group

Monday	Wednesday	Friday
Warm up (10 min) Recreational Games		
Form a group: Players run around in random directions avoiding body contact with other players. The coach calls a number and players form groups of that size. Sally & Steve: Players pair up and from various starting positions sprint to their marker to collect an object and sprint back to the starting line. The first player back wins a point.	Racing Relay: Players race each other in a relay, practicing hopping sequences along the way. Frogs & Lily pads: Players continuously jump from lily pad to lily pad using a two-foot forward jump. (Play in groups of 4 – 8.)	Flip it: Play time set for 45 seconds with two teams. Whichever team has the most domes or dishes standing at the end wins. Stone, Bridge & Tree: A relay race using various static and locomotion movements. (Play in teams of 6–8.)
Main Session (40 minutes)		
Ladder Drills (10m x 5 reps): Different speed & coordinative exercises. Reaction Drills (20m x 5 reps): Short Sprints from different position x 5 Curve Running (20m x 2 reps): Players run curves around various markers from the starting point, following the directions that are called by the coach. Slalom Sprint: (5 x 50m relay x 1 rep): In teams, players run slalom-style between markers in a relay race.	Forward Squat Jump (20m x 2) approx. 10 jumps: Do very explosive continuous 10 squat jumps to the front. Speed Bounce (20 seconds x 2): Players jump side to side over a foam wedge as many times as possible in 20 seconds. Skip to my Lou (40 nos. x 4): Holding the skipping rope behind the heels, players challenge themselves to skip as many two-foot jumps within a time limit.	Formula one: (80m x 2): A team event in which each team member has to complete the full course. Up to six teams can compete at the same time on one course. “8” Endurance Race (150m x 2): Each team has to run around a course of 150m from a given starting point. Each team member tries to run around the course as often as possible in 8 minutes. The start command is set for all teams at the same time by blowing a whistle.
Cool Down (10 minutes)		
Children do a slow jog to cool the body down followed by slight stretching. Working from head to toe stretching all main muscle groups.		

Results

Table 2: Average, Spread value of fitness variables in pre-mid-post-tests of Kid's Athletics and Placebo group

Variables	Kid's Athletics group			Placebo group			P-value (group× time)	ES (group× time) η^2_p
	Pre-test	Mid-test	Post-test	Pre-test	Mid-test	Post-test		
Mean [SD]								
SAR	21.6 ± 3.35	24.3 ± 3.36	27.28 ± 3.35	23.08 ± 2.94	22.38 ± 2.81	22.48 ± 3.02	0.001	0.91
SBJ	1.5 ± 0.23	1.61 ± 0.22	1.82 ± 0.19	1.53 ± 0.2	1.49 ± 0.22	1.5 ± 0.22	0.001	0.82
50m	9.19 ± 0.86	8.99 ± 0.82	8.6 ± 0.69	9.34 ± 0.64	9.35 ± 0.6	9.41 ± 0.68	0.001	0.66
T-test	14.06 ± 1.45	13.45 ± 1.27	12.61 ± 1.18	14.44 ± 1.31	14.5 ± 1.34	14.58 ± 1.36	0.001	0.79
150m	29.42 ± 3.41	27.63 ± 2.78	25.96 ± 2.57	30.4 ± 4.05	30.55 ± 3.99	30.75 ± 4.02	0.001	0.77

Note: Pre-test = 0 week, mid-test = 6 weeks, post-test = 12 weeks, SAR = sit and reach, SBJ = standing broad jump, η^2_p = partial eta squared,

As seen in Table 2, the Kid's Athletics and Placebo group children there were statistically significant difference between the pre, mid and post-test of all selected physical fitness variables ($p < 0.05$) with high and medium effect size.

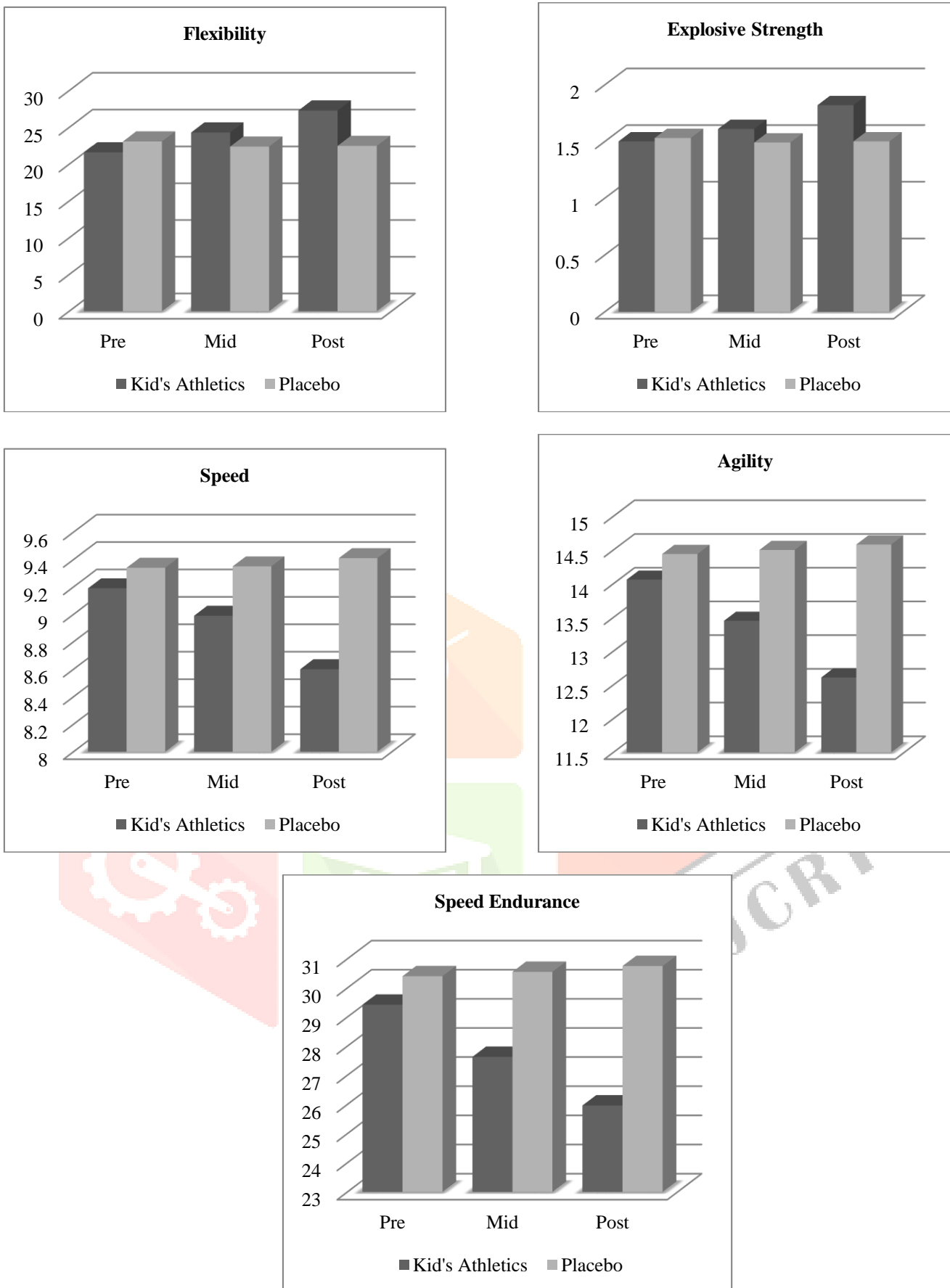


Figure 1: Graphical representation of mean values of physical fitness variables of Kid’s Athletics and Placebo group.

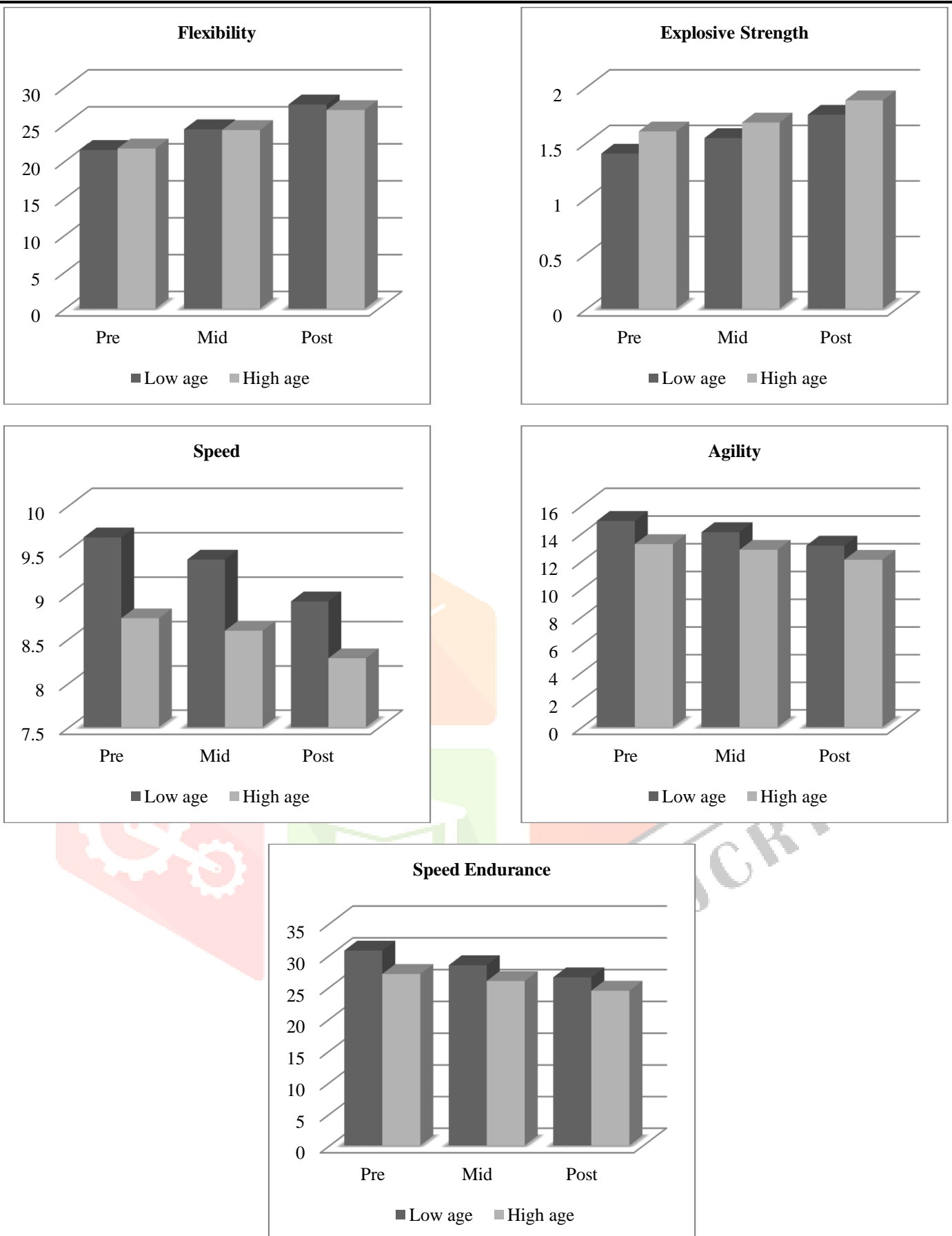


Figure 2: Graphical representation of mean values of physical fitness variables of Low and High age children of Kid's Athletics group.

Table 3: Average, Spread value of fitness variables in pre-mid-post-tests of low and high age children of Kid's Athletics group

Variables	Low age group			High age group			P-value (age× time)	ES (age× time) η^2_p	
	Pre-test	Mid-test	Post-test	Pre-test	Mid-test	Post-test			
	Mean [SD]								
SAR	21.5 ± 3.48	24.3 ± 3.42	27.65 ± 3.55	21.7 ± 3.39	24.2 ± 3.48	26.90 ± 3.28	0.03	0.20	
SBJ	1.40 ± 0.25	1.54 ± 0.23	1.75 ± 0.22	1.60 ± 0.16	1.68 ± 0.17	1.88 ± 0.14	0.01	0.20	
50m	9.64 ± 0.97	9.39 ± 0.96	8.92 ± 0.83	8.73 ± 0.40	8.59 ± 0.37	8.28 ± 0.30	0.06	0.17	
T-test	14.89 ± 1.47	14.08 ± 1.47	13.11 ± 1.20	13.22 ± 0.85	12.81 ± 0.87	12.09 ± 0.94	0.00	0.44	
150m	30.72 ± 3.92	28.42 ± 3.39	26.51 ± 3.29	27.04 ± 2.69	25.93 ± 2.50	24.41 ± 2.27	0.00	0.43	

Note: Pre-test = 0 week, mid-test = 6 weeks, post-test = 12 weeks, SAR = sit and reach, SBJ = standing broad jump, η^2_p = partial eta squared,

As seen in Table 3, the Low age group and High age group children of Kid's Athletics group there were statistically significant difference between the pre, mid and post-test of selected physical fitness variables ($p < 0.05$) except the variable speed ($p = 0.06$, $p > 0.05$) with low effect size.

Discussion

In this study we tried to analyze the influence of IAAF Kid's Athletics program on the physical fitness of the school going children with no previous history of scientific and systematic training. Additionally we investigated that IAAF Kid's Athletics program has any significant effects on the selected physical fitness variable among different age groups. This study can provide viable information regarding the implementation of IAAF Kid's Athletics program and the effects on young children that improve physical fitness and motor competence, particularly in novice children in the schools and sports clubs. It helps to avoid early specialization which leads to dropouts and helps to create an interest in sports and introduce a culture of sports in the grassroots level. As expected all selected physical fitness variables (e.g., flexibility, explosive strength, speed, agility and speed endurance) have improved significantly after six weeks and twelve weeks of Kid's Athletics training program progressively. Further the High age group children had improved significantly in all selected variables except speed among Kid's Athletics group comparatively. These results are consistent with those reported in previous studies (Kirk, D., 2005); (Pesce, 2013); (Petros, 2016). It should also be pointed out that physical fitness components have significantly improved in high age children than low age children.

The result of the study conducted by Wiersma (Wiersma, L. D., 2000) suggested that early specialization could suppress sociological and psychological development by reducing the number of opportunities for growth in these areas. Further, excessive training without adequate recovery can lead to burnout (Henschen, 1998). Overtraining can lead to burnout, which can be harmful to a child's ability to participate in sports as a lifelong healthy activity (Brenner, 2007). The primary training objective for young athletes should focus on the fundamentals to lay a solid base for productive growth and development (Gambetta, 1986). The proper approach of training for children from the beginning must to prepare them to exhibit the potential best performance at their adulthood and most essentially ensuring the future success. The trainers and coaches must treat children as children not as small adults and should know the adverse effect of early specialization (Arens, D., 1983), (Arens, O., 1983), (Jones, 1993).

The result of this study also supports previous reports that IAAF kid's Athletics program can help to improve the physical fitness and the track and field performance of school children. At the same time it can motivate school children to learn track and field, by helping them to realize the importance of the sports (Petros, 2016). During the elementary school years, it is widely assumed that children master basic movement abilities (Gallahue, D., Ozmun, J., and Goodway, J., 2012). Given the significance of physical fitness and motor skills in promoting an active and healthy lifestyle (Ortega, F. B., et. al., 2008); (Mintjens, 2018); (Britton, 2020). Schools, particularly physical education classes, should be considered a viable place for the development of motor competence and physical fitness because most students may be reached regardless of their socioeconomic background. IAAF Kid's Athletics program can be implemented as a part of the school curriculum the children may be benefited from this. Early life physical activity habits have been shown to be associated with physical activity behaviour later in life (Nelson, 2006); (Telama, 2014); (Rauner, 2015); (Rovio, 2018); (Hayes, 2019). The elementary school years appear to be a particularly critical period for the promotion of an active and healthy lifestyle even though various lifestyle habits are established during childhood and early life physical activity habits.

As a result, health-related fitness has been proven to be the best predictor of future physical activity during the transition from primary to secondary school, and increased physical activity levels due to improved physical fitness can also benefit motor development (Britton, 2020). To increase motor competence and physical fitness, just increasing movement time is insufficient; rather, focused practice with high-quality movement experiences and feedback is essential (Robinson, L. E., & Goodway, J. D., 2009); (Barnett, 2016); (Payne, V. G., & Isaacs, L. D., 2017); (Schmutz, 2020). In order to support the promotion of an active and healthy lifestyle, to avoid early specialization, build a solid foundation to children's fitness, to create interest to sports and games an appropriate program should be followed and include in the school curriculum.

Conclusions

In conclusion the IAAF Kid's Athletics program is one of the best grassroots program for young age school children in terms of improving physical fitness, to improve health and active life style, to create interest in sports especially track and field. Further it will be a best alternative to avoid early specialization and solution for dropouts. The objective of physical education can be achieved through the implementation of IAAF Kid's Athletics program as part of school curriculum (e.g., improvement of students' psychomotor abilities, their physical activity levels, and health related fitness). In addition the results revealed a positive impact on different age group. This program is beneficial for the children age ranged between 10 to 14 years for improving the physical fitness. It shows sufficient improvement after six weeks and more after twelve weeks progressively.

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