

Research Report

Effectiveness of FIFA's 11 Exercise Program on the Agility Performance in Young Football Players

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Abstract

Background: “The 11” injury prevention programme was developed by FIFA’s medical research centre (F-MARC) to help reduce the risk of injury in adult football players. There is a paucity of evidence regarding the use of injury prevention program for children participating in sport. Thus the objective of this study was to determine the suitability and effectiveness of “The 11” for younger football players and improving their agility performance. **Aims:** To check effectiveness of FIFA’s 11 exercise program on the agility performance of young football players under the age group of 11. **Design:** Pre-post experimental design. **Methods:** Fifty [25 experimental (EXP), 25 control (CON)] young football players (age 9.2 ± 1.04 yr) participated. The EXP group followed “The 11” training programme 5 days per week, for 6 weeks, completing all exercises. Prior to, and after the intervention, both EXP and CON groups performed football-specific physical tests. **Statistical analysis:** Changes in performance scores between the groups were compared using independent *t*-tests ($p \leq 0.05$). Number of injuries which occurred during the study in either group was recorded. **Result:** A significant pre post difference in experimental group was seen for Horizontal 3 step jump test and Illinois Agility test ($p < 0.001$). **Conclusion:** Given the observed improvements in the agility performance with physical abilities and perceived benefits of “The 11”, it would appear that the program is appropriate and should be included in the training of young football players, for both physical development and potential injury

prevention purposes.

Key words: Agility, Injury, Football, Children, Prevention.

Introduction

Physical activity plays a significant role in the well-being of a child. A well-designed exercise program enhances the immediate physical, psychometric and intellectual attainments of a child. Long-term health benefits depend on continuation of the physical activity, thus enhancing well-being and favouring the balanced development of a child.¹Agility is described “a rapid whole body movement with change of velocity or direction in response to a stimulus”. Agility has relationships with trainable physical qualities such as strength, power and technique, as well as cognitive components such as visual scanning techniques, visual scanning speed and anticipation. Agility testing is generally confined to tests of physical components such as change of direction speed, or cognitive components such as anticipation and pattern recognition. Agility as is related to running sports such as football, researchers addressed the multi-faceted influences involved in agility performance.²

At a young age, sports are for enjoyment and for health and personal development. Subsequently, young athletes train harder and longer and participate in sports throughout the whole year. As an undesired but inevitable consequence, sports-related injuries have increased significantly.

Incidence and distribution of sport-related injuries vary based on sport affiliation, participation level (e.g. grade level, age and skill level), gender and player position.¹

The range of age in which individuals can be considered children are as follows: young children are between 2 and 6 years (injury pattern is head and neck injury) older children are between 6 and 13 years (injury pattern is upper body 9.3%, lower body 90.7%) and teenagers are between 13 and 19 years old (injury pattern is upper body 26.2%, lower body 73.8%).³

Approximately 3–11% of school children are injured per year while participating in sport. Twice as many boys as girls sustain sports related injuries.^{4,5}

To understand children's injuries, it is important to have an insight into the peculiarities of the growing musculoskeletal system. Tendons and ligaments are relatively stronger than the epiphyseal plate and considerably more elastic. Therefore, in severe trauma, the epiphyseal plate, being weaker than the ligaments, gives way. Subsequently, growth plate damage is more common than ligamentous injury. In children, bones and muscles show increased elasticity and heal faster. Around the period of peak linear growth, adolescents are vulnerable to injuries because of imbalance in strength and flexibility and changes in the biomechanical properties of bone.^{6,7,8}

In immature athletes, as bone stiffness increases and resistance to impact diminishes, sudden overload may cause bones to bow or buckle. Physiological loading is beneficial for the skeleton, but excessive strains may produce serious injuries to joints.⁶ Low-intensity training can stimulate bone growth, but high-intensity training can inhibit it.^{9,10}

Growth plate disturbances as a result of sports injuries can result in limb length discrepancy, angular deformity or altered joint mechanics, and may cause significant long term disability.¹¹

Baseball, softball, soccer and football are highly

prevalent game for paediatrics sports injuries.¹² The types of upper and lower limb injuries are dislocation, fracture, epiphysal injury, stress fracture, avulsion fracture, epiphysal growth plate overuse injury, apophysitis, osteochondritis dissections, soft tissue injury and back injuries.^{1,37,38}

Football as a collision sport, with the high number of exposures per player, the FITS score (Frequency of injury per team per person) and the percentage of injuries considered serious, youth football should be a priority for injury studies.¹²

Football (soccer) is considered to be the most popular sport in the world and it continues to have a progressive annual increase in the amounts of active players and the number of games played per season. This in turn has lead to a drastic increase in the frequency, severity and number of injuries. The sport of football attracts tremendous attention and interest from all over the world. Although football injuries have received extensive scientific attention, there is limited information on the incidence of injuries in football players at different ages.³

Several studies have shown that the incidence of football injuries can be reduced by adopting various injury prevention strategies including warm-up, with an emphasis on stretching, proper medical attention for injuries, appropriate recovery methods and time, appropriate cool-down, use of protective equipment, good playing field conditions and adherence to existing rules.^{13,14,15,16}

Children and adolescents are becoming more involved in sports at earlier ages and with higher levels of intensity. Foot and ankle problems, in particular are the second most common musculoskeletal problem facing primary care physicians in children under 10 yr of age next to acute injury

Therefore, it is important that steps are taken early to prevent a young player's first injury, as this could potentially lead to long-term functional disability and deformity.¹⁷⁻²⁰

In sports performance, agility will give a good basic for motor skill function and neuromuscular control, improve overall performance in any situation and the most important is will decrease the injury risk. The acquisition to become agile needs the occurrence of suitable movement patterns. The developments of locomotion skills in children begin at an early age as children learn to walk without any help. If the child's movement efficiency is poor or the movement always associated with unbalanced posture, lack of coordination and timing and sometimes present of awkward hand movement, the children's agility level may not developed completely yet.²¹

Thus the primary aim of this study to determine the effectiveness of FIFA's 11 exercise program on the agility performance in young football player under the age group of 11.

Methodology

Participant and parental informed consent was obtained prior to participation and all participants completed a customised pre-exercise medical questionnaire. Subjects were randomly divided into experimental (EXP) and control (CON) groups. Fifty [25 EXP, 25 CON] young football players (age between 6 to 11 yr) from a local football club was included (mean±SD: age 9.20 ± 1.04 years for EXP group and 9.28±1.02 for CON; with 0.8 ± 0.75 years playing experience). Players with lower limb injury, overweight and malnutrition were excluded from this study. The study protocol was approved by the Institutional ethics committee of Padmashree Institute of Physiotherapy, Bangalore.

The experimental group followed "The FIFA's 11" training program 5 days per week for 6 weeks, completing all the 10 exercises with assistance.

The exercises focus on core stabilisation, eccentric training of hamstrings, proprioceptive training and dynamic stabilisation with Plyometrics and straight leg alignment.

Three exercises aim at core stabilisation: "the bench", "sideways bench" and "cross-country skiing". The so called Russian or "Nordic" hamstrings were included to increase eccentric hamstring strength. Three exercises in an active single leg stance with weight on the forefoot were chosen to train proprioception and balance. The centre of attention is the bent knee, bent hip and straight leg alignment (knees over toes).

Dynamic stabilisation and jump technique were trained with three exercises: "jumps over a line" (forward-backward, sideways), "zigzag shuffle" and "bounding". These exercises include plyometric training of the leg muscles, straight leg alignment and landing on the forefoot with bent knees and hips.

Exercise intervention - "The FIFA's 11"

The full version of "The FIFA's 11" training programme can be viewed online on the FIFA website. Following discussions with sports physicians, 10 exercises were demonstrated to the experimental group, using the exact guidelines outlined by FIFA with respect to the number of repetitions or duration of each exercise.⁷

Players were instructed to perform the exercises 5 times per week (on separate days) for 6 weeks. To facilitate understanding, compliance, ongoing safety and correct execution, full instruction in the technique of each exercise was provided to participants, coaches and parents in week 1. Once each week, the experimental group performed their exercises under supervision. Other sessions were performed at home, with assistance from parents where necessary. Each player in the experimental group received their own copy of "The FIFA's 11" DVD, the official instruction booklet and a personal diary to record their performance of "The FIFA's 11" and all other training. Both groups were instructed to continue with their usual football-based training regime (3 days per week), with no intervention programme or additional training for the control group.

Control group was advised to continue their normal training exercises (warm up and normal active exercises).

Prior to, and after the intervention, both experimental and control groups performed a battery of football-specific physical tests (Horizontal 3 step jump & Illionis agility test).

Horizontal 3 step jump (To measure co-ordination and explosive leg power)

To assess a player’s ability to transfer leg power in a horizontal direction, a 3-step jump for maximum distance was performed on a hard indoor surface. Participants started in a stationary position and were required to propel themselves forward, as far as possible, in three alternate leg steps. Participants initiated the movement using their dominant leg in each trial and three trials were performed. Distance was recorded to the nearest 0.5 cm, using a standard tape measure, from the start line to the rear heel position at landing. Reliability (intra-class correlation, ICC) of this test is very high (ICC = 0.97).

The player stands with their toes on a line marked on the court. They then swing their arms back while bending their knees and hips and jump as far as possible forward landing on both feet. The player stays in the finish position until the measurement has been taken. Measure the distance from the start line to the player’s heels where they landed. This is the distance jumped. Perform three attempts recording the best distance jumped. Equipment – tape measure, recording sheet. (Figure 1).



Figure 1: Horizontal 3 step jump line

Illionis agility test (To measure football specific agility)

Participants start the test lying face down, with the hands at shoulder level. Time was recorded to the nearest 0.01 s and the mean of the best two times recorded (Figure 2). Reliability of this test has been reported to be high (ICC = 0.88).

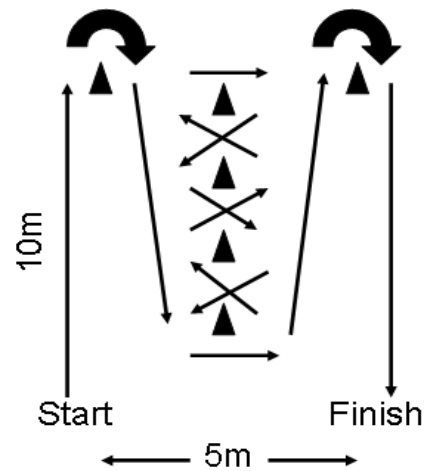


Figure 2 : Illionis agility test

Questionnaires

A short, custom-made questionnaire was administered to each player in the EXP group at the end of the intervention, to determine perceptions of the “The 11” programme. Questions focussed on 5 key areas: 1) enjoyment; 2) frequency of execution; 3) perceived benefits of participation; 4) intention to continue/adhere; and 5) feedback on specific exercises.

Results

Fifty [25 EXP, 25 CON] young football players participated. The EXP group followed “The 11” training programme 5 days per week, for 6 weeks, completing all exercises. Prior to, and after the intervention, both EXP and CON groups performed football-specific physical tests. (Illionis agility and Horizontal 3 step jump test). The response rate for the questionnaire was 100%. Eighty-nine percent of participants rated “The 11” programme

as ‘enjoyable’. Most participants (90%) felt it preferable that the programme be performed less than five times per week. Some players (64%) felt that not all exercises were helpful, but most (83%) felt that the program was, overall, beneficial.

Means, standard deviation and range were used to assess agility in terms of unit of time. Paired ‘t’ test was used to assess the pre and post test, agility in term of unit in both control and experimental group. Unpaired ‘t’ test was used to compare the post test agility between experimental and control group.

Table 1: Baseline data for demographic variables for EXP (n=25) and CON (n=25) groups:

Sl. No.	Variable	EXP group	CON group	p-value
1.	Age (in years)	9.20±1.04	9.28±1.02	0.78
2.	Experience (in months)	0.81±0.75	0.77±0.75	0.71
3.	Number of injuries Nil/middle	1/25	0/25	1.00

Demographic data are presented in Table 1. No significant differences were seen for age, experience and number of injury.

Pre-and Post-Treatment Results:

Pre training mean value of Horizontal 3 step jump in EXP group was 7.19±0.64 and post training mean value 7.93±6.65. Pre training mean value of Illionis agility test in EXP group was 28.76±4.40 and post training mean value 20.64±3.44 For both tests, the differences between past and pre training values were not significant (p<0.0001).

Pre training mean value of Horizontal 3 step jump in CON group is 6.89±0.42 and post training mean value 7.04±0.46 (p<0.0001). Pre training mean value of Illionis agility test in CON group is 26.68±5.02 and post training mean value 25.28±5.32 (p<0.0001). When the post- training

effect were compared between the two groups, significant improvement was seen in experimental group compared to control group (Table 2).

Table 2: Differences in mean (±SD) between EXP (n=25) and CON (n=25) groups for both outcomes

Sl. No.	Variable	EXP	CON	p-value
1	Horizontal 3 step jump test (in ft.)	7.93±6.65	7.04±0.46	<0.0001
2	Illionis test (in sec.)	20.64±3.44	25.28±5.33	<0.0001

Discussion

The aim of the study was to find out the effect of FIFA’s11 exercise program on the agility performance of young football player.

A pre post experimental study with total 50 subjects was to know the effectiveness of structured exercise program on young players. It appears that structured exercise program is effective in preventing young player first injury which may be the predictor of their future injuries. The differences between the groups were strongly significant, and with type of exercise program children showed clinically significant improvement.

In group A (FIFA’s 11 exercise program) the outcome variables Illionis Agility test & Horizontal 3 step jump showed statistically significant improvement. This improvement is in accordance with a study done by Kilding⁷ of FIFA’s training program for football players impact on physical performance. This study shows an observed improvement in physical abilities and perceived benefit of ‘The 11’. Leg power and speed improved significantly. Components of the ‘The 11’ exercise program were very effective to improve agility performance and thus preventing injury in football players.

In a prospective intervention study by Junge,²⁵ prevention of soccer injury in young amateur players was reduced by preventive interventions, specially in low skill level youth teams. Study recommendation was to include injury prevention strategies as part of regular training. Present

study with a beneficial result on improving agility performance on such young players, can be included as a regular training program on games like football where muscle power and speed with sudden change in velocity is highly noticed and thus will act as a injury prevention strategies.

According to Omev in his study of foot and ankle problems in young athletes, children and adolescents are becoming more involved in sports at earlier ages and with higher levels of intensity. They also reported that foot and ankle problems, in particular, are the second most common musculoskeletal problem facing primary care physicians in children under 10 yr of age next to acute injury. In this present study a significant improvement in physical performance reveals that well structured exercise program in this age group is beneficial to prevent such type of foot and ankle problems.

By finding significant differences for two tests, the results indicate that the “The 11” training improved times in the agility test measures because of either better improving muscle power or dynamic stabilization. “The 11” comprises ten physical exercises which focus on core stabilisation, eccentric training of thigh muscles, proprioceptive training, dynamic stabilisation and plyometrics. In a previous study of plyometric training, the authors speculated that improvements in agility performance were a result of enhanced motor unit recruitment patterns or neural adaptations.²⁴

From the results it is evident that structured exercise program showed more improvement in this age group. So when child starts such type of exercise program at their early stages, improvement occurs in their physical performance and agility activity which helps to reduce sports related injuries.

Conclusion

It can be concluded that FIFA’s 11 exercise program is effective in improving physical performance in young football players as well as active exercise program of the control group.

Acknowledgement

Our heartiest gratitude towards Dr. Shabnam Agarwal, Director-Education, NIHS, for providing the continuous guidance for framing this manuscript. I would also like to express my sincere thanks to all the faculty members of NIHS and our family for their constant support during preparing this manuscript.

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