

The Effect of Short Period FIFA 11+ Exercise as Physical Conditioning Program Among Young Amateur Football Players

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Abstract

This study aims to investigate the effectiveness of short period FIFA 11+ exercise, which used as a physical fitness improvement program for young amateur football players. This one group experimental study involving 13 football players as subjects (ages 14.92 ± 0.77 years, weight 55.23 ± 9.62 kg, height 1.64 ± 0.06 meters, BMI 20.42 ± 2.71 kg/m²). Subjects underwent FIFA 11+ exercises three times per week for four weeks. Measurements of physical fitness components include core strength, leg strength, leg power, speed, and agility performed before and after FIFA 11+ intervention. Changes in measurement results (pre and post-test) were analyzed using a paired t-test ($p < 0.05$). The results showed that the mean subjects experienced a significant increase in the components of the core strength ($p = 0.004$), leg strength ($p = 0.043$), and leg power ($p = 0.002$). The results of this study indicate that a short period of FIFA 11+ training is useful and can be used as an alternative program to improve physical fitness for young football players.

Keywords: physical fitness, FIFA 11+, football, conditioning

1. Introduction

Football is a popular sport and is played by more than 265 million people around the world [1]. This sport requires almost all aspects of physical fitness, both health-related and skills related fitness in the game [2]. Physical fitness is an important foundation so that football players can apply the skills and tactics that they have trained efficiently in a match. Studies show that low physical fitness will reduce performance and increase the risk of injury [3][4].

Conditioning is an attempt to improve physical fitness before athletes start the advanced stages of an exercise. Conditioning is essential to provide adaptation to the body when athletes prepare in a competition.

In contrast to professional football players who have strength & conditioning (S&C) coach and a specific time of conditioning in the periodization (preparatory phase), young amateur football players generally do not have this support. The observation showed that young amateur

football teams, for example, junior/senior high school teams, only have one coach (usually physical education teacher or extracurricular coach) and short preparation time (3-4 weeks) before the competition. The lack of preparation will affect the player's physical fitness, so the risk of sports injury in a competitive situation will be increased.

The FIFA Medical Assessment and Research Center (FMARC) has introduced the FIFA 11+ training program, which aims to reduce the incidence of injuries, especially for young amateur football players [5]. This program consists of 15 exercises that focus on improving physical fitness components that contribute to preventing injury, i.e., strength, power, balance, coordination, and agility. FIFA 11+ is a practical program that does not require additional equipment and can be completed in 15-20 minutes as a warm-up session. Studies show that FIFA 11+ has been proven to reduce football injury [6][7][8].

Although FIFA 11+ was designed as an injury prevention program, it can be considered as a physical conditioning program though it exercises components (strengthening, plyometric, proprioceptive, and balance). Several studies have shown that FIFA 11+ can improve the physical fitness component of football players [9][10][11]. However, studies to assess the effects of implementing a short period (4 weeks) of FIFA 11+ program to young amateur football players without S&C coach and short preparation time are still limited.

This study aims to determine the effectiveness of a short period (4 weeks) of FIFA 11+ exercise as a physical conditioning program for young amateur football players.

2. Material and Methods

2.1. Participants

Study Design and Participants

This one group experimental study recruited junior high school football players from the amateur football team in Yogyakarta, Indonesia, to take part in a 4-week intervention. The team was chosen by purposive sampling. The team that met the selection criteria including (1) does not have strength and conditioning coach (2) has an adequate football field facility (3) has a regular football training schedule at least three times a week, were participated in this research.

A total of 13 young amateur football players who met the criteria were included in this research. The inclusion criteria were (1) 13-15 years old male footballer (2) only performing routine exercise according to the football team; (3) has passed medical check-up by the researcher;

(4) obtained the consent of parents/guardians (by signing an informed consent research sheet); (5) committed to attending the complete series of the study. This study was approved for research ethics clearance from the Faculty of Sports Science, Universitas Negeri Yogyakarta, Indonesia.

2.2. Intervention

The subjects underwent the FIFA 11+ program, as mentioned in the guideline from FMARC [12]. The program was performed three times per week within four weeks as a warm-up program. Therefore, the players do not need to warm up before performing the intervention. The coach of the team was trained for the FIFA 11+ program as a preparation for the research intervention to be properly conducted.

2.3. Data Collection

Data on subject characteristics (e.g., name, birthdate, address, age, height, weight) was collected before the pre-test performed. The subjects performed physical fitness tests twice, before and after the four weeks of intervention. The tests were conducted at the same time (16:00 local time \pm 1 hour), in the same football field and condition with the same trained staff. The measurement of physical fitness conducted in this study are (a) *Plank Test* to measure the core muscle strength; (b) *Leg dynamometer test* to measure the leg muscle strength; and (c) *Illinois Agility Test* to measure the agility (d) *40 m sprint test* to measure the speed (e) *Vertical Jump test* using vertical jump meter (Takei Scientific Instruments Co., Ltd.) to measure leg power. Each test was performed twice, and the best test result was taken for data analysis. Subjects performed adequate warm-up and stretching before the test to prevent injury.

2.4. Statistical analysis

Statistical analyses were conducted using SPSS version 25.0 (SPSS Inc., Chicago, IL, USA). The normality test was performed using the Shapiro Wilk test because the total subjects were < 50 . Descriptive statistics were used to calculate the mean and standard deviation (SD). The dependent (paired) t-test was used to compare the differences between pre and post-intervention result in the subjects and Wilcoxon as an alternative test if the data were not normally distributed. A score of $p < 0.05$ was considered as statistically significant.

3. Result

3.1. Participants

A total of 13 subjects participated, and no subjects dropped out in this study. The flowchart diagram is displayed in Figure 1. The characteristics of subjects are shown in Table 1.

Figure 1. Flowchart of Study Participants

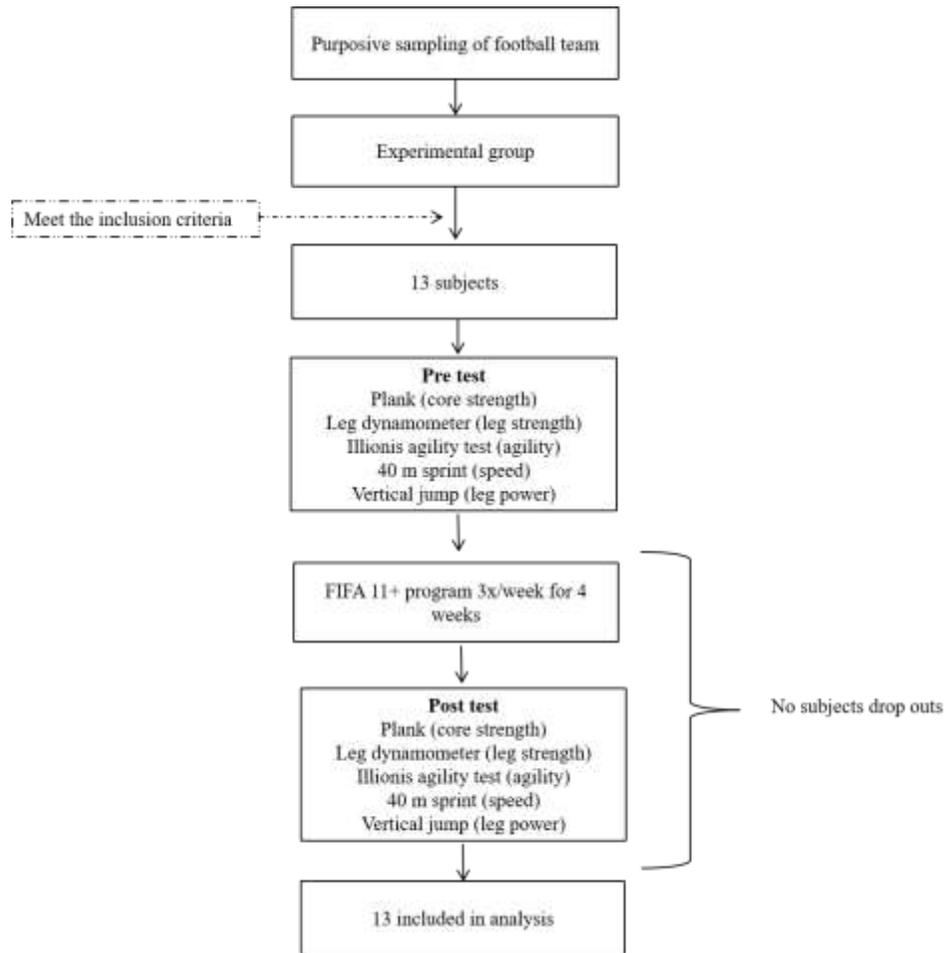


Table 1. Subjects Characteristics

| Characteristics | Mean \pm SD (n=13) |
|--------------------------------------|----------------------|
| Age (year) | 14,92 \pm 0,77 |
| Weight (kg) | 55,23 \pm 9,62 |
| Height (m) | 1,64 \pm 0,06 |
| Body mass index (kg/m ²) | 20,42 \pm 2,71 |

3.2. Effects of FIFA 11+ program on Physical Fitness

The measurement of physical fitness consisted of (1) core strength (2) leg strength and (3) agility (4) speed and (5) leg power using *paired t-test*, was carried out pre- and post-implementation of the FIFA 11+ in the subjects. The test result showed a significant increase in the leg strength ($p=0.043$), core strength (0.004), and leg power (0.002) components. The agility component also improved in the subjects but statistically insignificant ($p = 0.184$). The speed component was decline but statistically insignificant ($p = 0.69$). The result is presented in table 2.

Table 2. Changes in physical fitness components, pre- and post- FIFA 11+ program

| Physical Fitness Components | Pre-test | Post-test | <i>p</i> |
|-----------------------------|---------------|----------------|----------|
| Leg strength (kg) | 98.62 ± 23.22 | 103.23 ± 22.22 | 0.043* |
| Core strength (s) | 2.04 ± 0.48 | 2.15 ± 0.69 | 0.004* |
| Leg Power (cm) | 58.28 ± 4.70 | 69 ± 7.46 | 0.002* |
| Agility (s) | 16.32 ± 0.44 | 16.12 ± 0.35 | 0.184 |
| Speed (s) | 5.72 ± 0.37 | 5.83 ± 0.16 | 0.69 |

Note : * significant in performance (pre and post tests). $p < 0.05$

4. Discussion

The results of this study indicate that the application of FIFA 11+ for four weeks can improve physical fitness components, i.e., core strength, leg strength, and leg power significantly. This improvement is considered beneficial in supporting football performance that dominant in lower extremity action during the game.

The core muscle is a group of muscles consisting of abdominal, back, and hips muscles. Core muscle functions to stabilize the spinal column, align the body, maintain posture, and improve balance-coordination [13][14]. A good core will support performance in football. The characteristics of a football game that demands movements in multiple directions require good core muscle strength, especially the hip and trunk muscles [15][16]. Core stability will also help maintain balance and body position during body contact against opponents or performing tackling.

Core muscle has also been proven to reduce the risk of lower extremity injuries such as the knee, pelvis, and spine injuries. Also, the core muscle is useful in maintaining proper alignment for posture to reduce complaints of low back pain [16]. On the other hand, weak core muscle causes alterations in the transfer of energy, resulting in inefficient techniques and an increased risk of injury in the underdeveloped muscle group.

Considering the importance of core stability, strengthening exercise to correct weak core muscle group needs to be done [17], [18]. Plank or abdominal bridge is one of the recommended exercises for core muscle training [19]. Plank is an efficient isometric core exercise because it does not use equipment such as medicine balls or kettlebells. However, it provides a stimulating effect on core muscles such as rectus abdominis and external oblique abdominis [20]. Plank and side plank exercises are both included in the FIFA 11+ training program so that an increase in core strength in the subject is thought to be obtained from this exercise.

Leg strength and leg power improvement also occurred in the subjects of this study. This improvement is very useful in supporting the fundamental movements of football, such as kicking, dribbling, and sprinting. Studies show that leg strength is an important determinant of kicking performance [21], [22]. In addition to leg strength, other studies also show that leg power has positive correlations on ball velocity, both the free-kick and the instep kick approach [23], [24].

Football also characterized by multiple sprints and direction changes of around 1400-1600 times per match [25]. Good leg strength will support aspects of agility and repeated sprints with changes of direction [26]. In this study, there was an increase in the agility component, although it was not statistically significant. This is thought to be due to the effect of increasing leg strength, but the effect is minimal due to the short training period (only four weeks).

FIFA 11+ should ideally be applied 9-12 weeks to get optimal benefits. However, some studies show that applying less than that time has provided a changing effect on the physical fitness component. Dunsky et al. shows that three times per week for six weeks FIFA 11+ program can improve the balance of young football players [27]. The results of this study indicate that four weeks can provide an increase in physical fitness, even though it does not occur in all of the measured components.

The result of this study is in line with et al. that implemented three times per week for four weeks of FIFA 11+ program on young football players (under 14 years). The study results show improvement in agility and jump performance [28].

5. Conclusion

This study shows that FIFA 11+ can be used as an alternative short period physical conditioning program, especially for young amateur football players who have limited coaches and short preparation time, such as school football teams. Further studies to determine the effectiveness of the short period of the FIFA 11+ exercise program in reducing injuries in young amateur football players need to be performed.

Acknowledgments

This research receives a grant from the Faculty of Sports Science, Universitas Negeri Yogyakarta. Decree of the Dean: 180-2016. Letter of Agreement No: 599/UN34.16/PL/2016.

Authors' Contribution

Muhammad Ikhwan Zein (M.I.Z) and Saryono (S.S)

Conceptualization, M.I.Z ; Methodology, M.I.Z.; Software, M.I.Z.; Validation, M.I.Z., and S.S.; Formal Analysis, M.I.Z.; Investigation, M.I.Z. and S.S.; Resources, S.S.; Data Curation, S.S.; Writing – Original Draft Preparation, M.I.Z.; Writing – Review & Editing, S.S.; Visualization, S.S.; Supervision, M.I.Z and S.S.; Project Administration, S.S.; Funding Acquisition, S.S.”

Conflicts of Interest

None

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