

The FIFA 11+ for kids warm-up program improved balance and leg muscle strength in children (9–12 years old)

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Abstract:

Children's physical attributes, especially balance and leg strength, need to improve to reduce injury during football training. Playing football involves acceleration, deceleration, rapidly changing direction, running, jumping, and landing. It requires good physical attributes and strength to avoid injury. The FIFA Medical and Research Centre (F-MARC) developed the FIFA 11+ Kids warm-up program to prevent injury in football. The study's objective was to determine the effect of the FIFA 11+ warm-up program for kids to increase leg muscle strength and balance in youth football (9–12 years old). The study design used a quasi-experiment with one group pretest and post-test design. Thirty participants aged between 9 to 12 years, who were students at a football school, signed informed consent to participate in this study. The FIFA 11+ for kids warm-up program was conducted for 20 min, four times a week, for a month. The data measured static balance by stage with a stroke stand, dynamic balance by a modified bass test, and leg strength by dynamometer, taken two times before and after the program. The data analysis used a paired t-test and Wilcoxon signed-rank test. The study showed an increased static balance (left leg $\Delta + 8.23$) and (right leg $\Delta + 8.70$), dynamic balance ($\Delta + 5.24$), and leg muscle strength ($\Delta + 23.30$), $p = 0.00$, $p \leq 0.05$, between before and after intervention using the FIFA 11+ for kids warm-up program. Therefore, the FIFA 11+ for kid's warm-up program results in improved static balance, dynamic balance, and leg muscle strength in youth football players.

Key Words: Injury prevention, static balance, dynamic balance, leg strength

Introduction

Football is the most popular sport worldwide, with more than 200 million people who are active in the sport (Barengo et al., 2014). The risk of injury during a football match is higher than during a training session (Ekstrand et al., 2011b; FIFA Communications Division, Information Services, 2006). During tournaments and training sessions, the specific and dominant injuries were in the lower extremities and thigh strain (Ekstrand et al., 2011a, 2011b). Additionally, injury prevention strategies are crucial during weekly macrocycles with high loading, such as competitive seasons, where injuries are most common. It is well acknowledged that the amount of training required depends on the age group, training day, week, and position played. Coaches have chance to match training and match variables for static balance, dynamic balance, and leg strength (Jaka Pratama Galeko Et Al., 2022; Marek Tvrđý & Miroslav Holienka, 2022; Muhammad Hamdan et al., 2022)

The FIFA Medical Assessment and Research Center (F-MARC) created a warm-up procedure called FIFA 11+ to lower the rate of injury (Bizzini & Dvorak, 2015b). Various studies have shown that the FIFA 11+ program has a positive effect on athletes by minimizing the risk of injury, increasing performance, and enhancing physical attributes (Bizzini & Dvorak, 2015a; Pardos-Mainer et al., 2019a; Pomares-Noguera et al., 2018a; Rössler, 2016; Rössler et al., 2016; Spurrier, 2019a). The warm-up training program includes seven forms of motion exercises that are performed for a maximum of twenty minutes (Spurrier, 2019b). The motions focus on three training aspects: 1) three exercises for unilateral and dynamic stability of the lower extremities, 2) three exercises for full body strength, and 3) one exercise for the falling technique (Spurrier, 2019b).

The program helps to reduce the injury rate by 20–50% in football players (Al Attar et al., 2016; Soligard et al., 2008). Nevertheless, in Semarang city, Central Java province, Indonesia, the FIFA 11+ warm-up program was minimally used for kids in football clubs (Sumartinarsih et al., 2020). Therefore, we implemented the FIFA

11+ warm-up for kids to evaluate static and dynamic balance and leg muscle strength before and after using the program in youth football players. The impact of the FIFA 11+ as a football player injury prevention program has been investigated in earlier research. Additionally, FIFA 11+'s efficacy in enhancing athletic performance is required for both injury prevention and sport performance. Analyse the FIFA 11+ warm-up program's effectiveness at preventing injuries in football players of all genders. This study also aims to assess about how this program affects athletes' performance. Football players' muscle strength, sprint speed, jump height, balance, and proprioception are all factors in their performance. This review's main objective is to determine whether the teams should use the FIFA 11+ training program during their practices. Due to the high danger of injuries, particularly to the lower limbs, in football, the practical applications of this research are crucial. Warm-up regimens are extremely important, which is supported by the fact that these injuries are primarily caused by controllable variables. The FIFA 11+ program's suggestion that these initiatives be simple to implement and inclusive of all players is in line with this (Muhammad Hamdan et al., 2022; Ömer Aksoy et al., 2022; Vlachas & Paraskevopoulos, 2022).

Materials and methods

Ethics

The Human Subjects Committee of the Universitas Negeri Semarang approved the study (No. 146/KEPK/EC/2020). Before the experiment, each participant provided informed written consent. All procedures conformed to the standards of the Declaration of Helsinki.

Subjects

Thirty male children (age, 10.5 ± 1.1 years; height, 141.13 ± 13.8 cm; body mass, 34.8 ± 9.6 kg) volunteered to participate in the FIFA 11+ warm-up program. These children attended a football club in Jatayu Football School in Solo city. Inclusion criteria in the study required the children to follow the entire program without any absence, not take supplements, and have no cardiovascular diseases.

Design

The quasi-experimental study with one group pretest and post-test design was designed to analyze the effect of the four-week FIFA 11+ program on static and dynamic balance and muscle strength in youth football players. Before football training, the participants perform the FIFA 11+ warm-up program for 20 min each session for 16 sessions a month.

Measurements

The study was performed on the football field, with a mean temperature of 29°C, 70% humidity, and 10 km/h wind speed; the FIFA 11+ warm-up was performed from 15:00 to 15:20 during each session. The participants were tested for dynamic balance, static balance, and back and leg muscle strength.

Training programs

The FIFA 11+ kids warm-up program focuses on spatial orientation, anticipation, perception [especially when dual tasking (avoiding unintentional contact with other players or objects)], body stability and movement coordination (commons rather than specific) and learning proper falling techniques (to minimize the consequences of unavoidable falls) (Pomares-Noguera et al., 2018b).

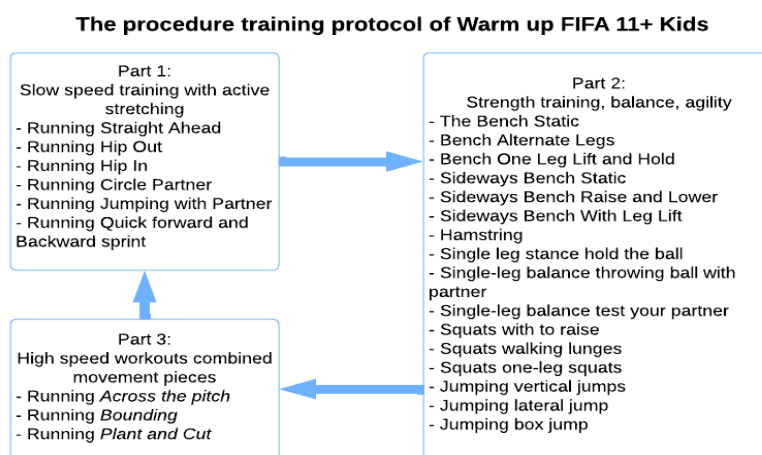


Figure 1. The FIFA 11+ kids warm-up program procedure

Testing protocol

Anthropometric measurements were taken before physical testing. Standing height (cm) and body mass (kg) were measured.

Static balance. The stock stand test was performed (balancing on left and right foot) by the participants on the outdoor football field.

Dynamic balance. The bass modified test was performed to evaluate the dynamic balance on the outdoor football field.

Leg muscle strength. The back and leg dynamometer test was performed to evaluate the participant's back and leg muscle strength.

Statistical analysis

Paired t-tests for standard data and Wilcoxon test for abnormal data were used to determine differences in pre- and post-intervention effects. All results were presented as the mean ± standard deviation (SD). The type 1 error of 5% or less in comparing mean differences was considered significant.

Results

The characteristic data of the participants is shown in Table 2.

Table 1. Characteristics data of the participants (n = 30)

Parameter	Pretest Mean ± SD	Post-test Mean ± SD
Age (year)	10.5 ± 1.2	10.6 ± 1.2
Height (cm)	141.1 ± 13.8	141.1 ± 13.8
Body weight (kg)	34.9 ± 9.6	35.0 ± 9.5
BMI (kg/cm ²)	17.3 ± 2.2	17.4 ± 2.2

Static balance

Figure 1 shows the static balance for the right and left leg before and after the FIFA 11+ kids warm-up program. Both legs showed similar increased static balance ($p = 0.00 < 0.05$).

Dynamic balance

Figure 2 shows the dynamic balance condition before and after the FIFA 11+ kids warm-up program. The dynamic balance improved by +5.67 after the intervention ($p = 0.00 < 0.05$).

Leg muscle strength

Figure 3 shows the leg muscle strength before and after the FIFA+ kids warm-up program. The leg strength increased by +23.30 kg after the warmup program ($p = 0.00 < 0.05$).

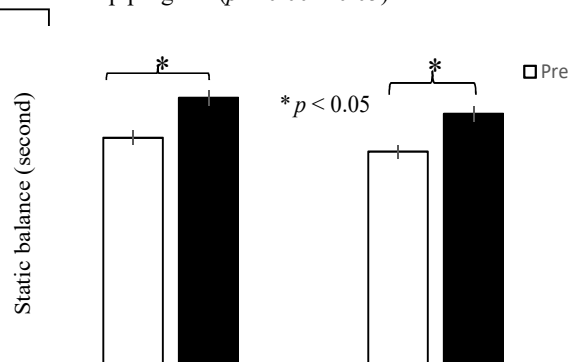


Figure 2. Static balance for the right and left leg; the paired t-test analysis showed significance difference between pretest and post-test, $p < 0.05$.

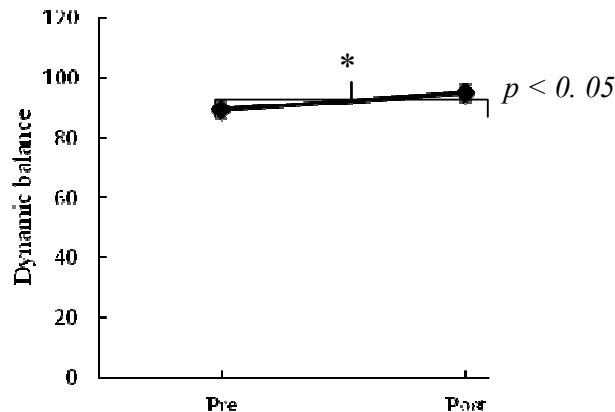


Figure 3. Dynamic balance before and after the intervention using the FIFA 11+ kids warm-up program; Wilcoxon analysis, $p = 0.000 < 0.05$

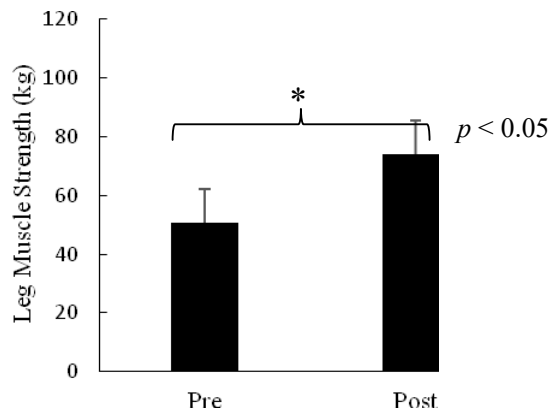


Figure 4. Leg muscle strength compared pre- and post-FIFA 11+ kids warm-up program; the paired t-test analysis was used, $p = 0.000 < 0.05$.

Discussions

The obtained results showed that the FIFA 11+ warm-up program performed for 20 min, 4 times/week for 1 month can improve static and dynamic balance in 9–12-year-old boys. A previous study showed that the FIFA 11+ warm-up program improved the balance of futsal players in high school students in Narmada (Yusuf et al., 2018). The score for right leg static balance at the pretest was 50 for only seven participants (23.3%). After the program, the score increased to 58 for 9 participants (30%). The left leg static balance before the program showed a score of 45 in 13.3% of the participants. After the program, the score increased to 60 for 9 participants. Our study was in line with the previous study. The FIFA 11+ warm-up program increased stability better than normal warm-ups in children under 10 years old (Gatterer et al., 2018). In the right foot static balance test, the pretest score was 49 for as many as 7 (23.3%) samples, while the post-test results increased by 9 scores or 27% to the pretest.

Similar to a previous study, our study reported that the FIFA 11+ warm-up program increased dynamic balance in football athletes aged 18–20 years (Mu'allimah & Wijianto, 2019). Our study obtained a similar result. Specifically, dynamic balance increased by +5.67 from 26.7% of the participants to 33.3% in football school students aged 9–12 years old. Another study found that six weeks of FIFA 11+ warm-up improved dynamic balance in young soccer players (Dunsky et al., 2017).

This study found a significant increase of 53% in leg muscle strength in 9–12-year-old football school students. Based on the leg muscle strength, the obtained results confirmed that the FIFA 11+ warm-up program reduced injuries by 21–32% in the lower extremities in 13–19 years old football players (Pardos-Mainer et al., 2019b) and by almost 50% in 7–13-year-old football players (Spurrier, 2019b).

Conclusions

The study concluded that The FIFA 11+ Kids warm-up program for 20 minutes each session in 16 times, improved static balance and dynamic balance as well as leg muscle strength in children 9-12 years old at Football club in Semarang city. FIFA 11+ Kid warm-up program aims to avoid injury and improve physical attributes of football players. The physical attributes like static balance, dynamic balance, and leg strength effect on their performance during game. Enhance physical attributes is a key to avoid and reduce injury in athletes. Recommendation to the coaches apply FIFA 11+ warming up program to improve physical performance and injury prevention in their young athletes.

Conflicts of interest

The authors declare that there are no conflicts of interest.

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