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Original article

THE EFFECTS OF THE FIFA 11+ WARM-UP PROGRAMME ON INJURY PREVENTION AT U15 – U23 LEVEL IN FOOTBALL: A SYSTEMATIC REVIEW

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Abstract

Problem statement. This research identifies what are the effects of the FIFA 11+ programme on injury prevention at U15-U23 level in football, when it is used as a warm-up before the training session.

Aim. The "FIFA 11+" program is designed as a low-cost injury prevention warm-up alternative, but studies have also been conducted on its impact on performance capacity for all age groups starting at 10 years old, in different countries on five continents, and at different levels of performance for both sexes. Most studies have focused on children under 14 and young adults over 16 years old. There are no relevant studies in Romania in this area, with most studies having been conducted in Scandinavia, the USA, the Middle East, and Brazil. Analyzing the results obtained, an increased effectiveness is observed in the prevention of injuries, with the chances of injury being reduced by up to 30%, while various forms of motor quality manifestation show an improvement of up to 12.4%. These studies were performed over different periods of time, ranging from 4 to 30 weeks. However, the results are related to the specifics of the country and the participants, which is why the groups are not homogeneous, and there are differences in the results obtained due to different football styles.

Conclusions. Studies to date show that this program has a greater influence on juniors and amateurs compared to performance athletes. It appears that improving static and dynamic balance, concentric and eccentric strength, and neuromuscular control will also significantly reduce the risk of injury. In order to perform better and prevent injuries, it is not enough to focus only on the lower limbs, attention should also be given to the core and upper body.

Keywords: FIFA 11+; warm-up; injury prevention

Introduction

According to research, a professional football team comprising 25 players experiences an average of 50 injuries per season (Ekstrand, Hägglund and Waldén, 2011), while youth elite teams suffer around 30 injuries (Materne et al., 2021). In recent years, numerous initiatives have been implemented to reduce these figures. Various injury prevention programs have been developed for male and female football players of different ages. New research suggests that most football injuries happen in the first and last 15 minutes of the match, underscoring the significance of a proper warm-up and the potential impact of player fatigue (Chomiak, Junge, Peterson and Dvorak, 2000). The majority of injuries in football, ranging from 60 to 90 percent, involve the lower extremities, such as the ankle, knee (anterior cruciate ligament), and thigh (quadriceps and hamstrings), and typically occur without contact (Chomiak et al., 2000). These injuries include sprains, strains, and contusions that affect the thigh and calf muscles as well as the ankle and knee joints. The primary causes of these injuries are thought to be inadequate warm-up, muscle fatigue, and muscle imbalances (Ekstrand et al., 2011).

The "FIFA 11+" protocol was created to prevent football injuries as much as possible. Taking into account the studies carried out, it is observed that this protocol is an effective one and that it fulfills its "mission" succesfully. The pillars on which this protocol is based are: increasing muscle strength in the abdominal and pelvic belts, increasing neuromuscular control and increasing static and dynamic balance, exercises in plyometrics and agility. Even if the most important results of this protocol are observed in the field of injury prevention, we must note that these results are obtained by correcting the defective biomechanics, where necessary, and strengthening the muscles. Following the results of the studies, greater or lesser improvements can be observed in the different forms of manifestation of the moric qualities. Although this protocol was created at the request of FIFA, the exercises are more common and very easy to use, so the protocol can be applied in other similar sports. The "11+" has three parts with a total of 15 exercises, which should be performed in the specified sequence at the start of each training session:

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Part 1: running exercises at a slow speed combined with active stretching and controlled partner contacts;

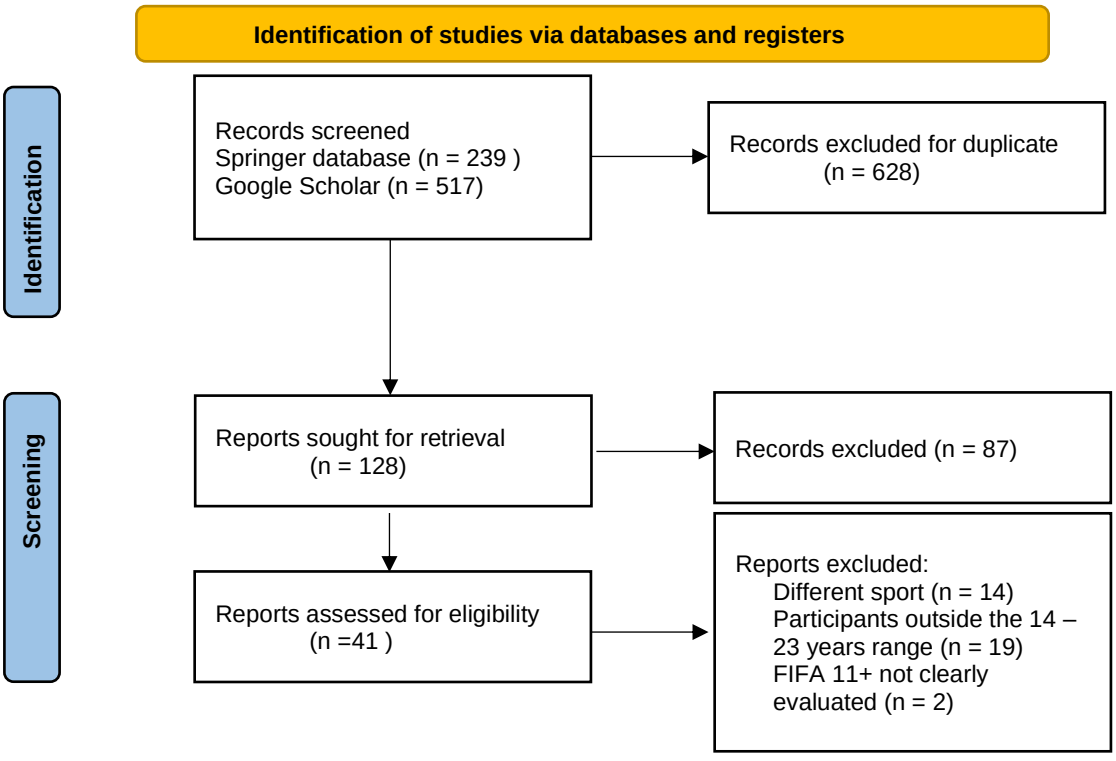
Part 2: six sets of exercises focusing on core and leg strength, balance and plyometrics/ agility, each with three levels of increasing difficulty;

Part 3: running exercises at moderate / high speed combined with planting / cutting movements.

The key elements of effective injury prevention programmes for football players are core strength, neuromuscular control and balance, eccentric training of the hamstrings, plyometric and agility. Core training - the "core" represents a functional unit, which not only includes the muscles of the trunk (abdominals, back extensors) but also of the pelvic-hip region. The preservation of core stability is one of the keys for optimal functioning of the lower extremities (especially the knee joint). Football players must possess sufficient strength and neuromuscular control in their hip and trunk muscles to provide core stability. There is growing scientific evidence that core stability has an important role to play in injury prevention. Neuromuscular control and balance - neuromuscular control does not represent a single entity, but rather complex interacting systems integrating different aspects of muscle actions (static, dynamic, reactive), muscle activations (eccentric more than concentric), coordination (multi-joint muscles), stabilisation, body posture, balance and anticipation ability. There is strong empirical and growing scientific evidence that sport-specific neuromuscular training programmes can effectively prevent knee and ankle injuries. Plyometrics and agility - plyometrics are defined as exercises that enable a muscle to reach maximum strength in as short a time as possible. Eccentric muscle contractions are rapidly followed by concentric contractions in many sport skills. Consequently, specific functional exercises that emphasise this rapid change in muscle action must be used to prepare athletes for their sport-specific activities. The aim of plyometric training is to decrease the amount of time required between the yielding eccentric muscle contraction and the initiation of the overcoming concentric contraction. Plyometrics provide the ability to train specific movement patterns in a biomechanically correct manner, thereby strengthening the muscle, tendon and ligament more functionally. Plyometrics and agility drills were the important componentsof the programme that proved to be effective in prevention, especially of ACL injuries, but also of other knee and ankle injuries.

Methods

This literature review conducted research using randomized controlled trials and utilized the Springer database and Google Scholar research engine. The study searched for eligible studies using keywords such as "FIFA 11+ injury prevention efficiency", "11+ warm-up program effects on injury prevation", "FIFA 11+ warm-up influences on injury prevention" and "FIFA 11+ on injury prevention". The selection process involved screening the titles and authors, then the abstracts, ultimately identifying 6 studies that fit the criteria. The criteria included availability of full-text papers, inclusion of only football players (male or female) aged 14-23, focus on the effects of FIFA 11+ on injury prevention, exclusion of studies on other sports, and publication in English.



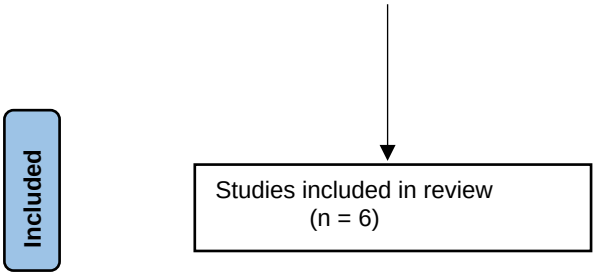


Figure1. PRISMA flow chart for studies selection

Out of the initial 756 studies, 628 were removed due to duplication. Following that, 41 studies were screened based on their titles and abstracts, and 35 were excluded after reviewing the full-text articles. The exclusions were based on three reasons: the study was conducted on a different sport (14), the participants were outside the age range (19), and 2 of them did not clearly evaluate the effects of the FIFA 11+ on injury prevention.

Results

Table 1 presents a summary of the studies that were reviewed to gain a better understanding of the effects of the FIFA 11+ on injury prevention. All studies included in the table focused on youth and amateur level football players, both male and female, who were divided into intervention and control groups.

Table 1. Studies summary

Study	Country	Age	Sample	Playing level	Duration	Results
Nuhu, Jelsma, Dunleavy and Burgess (2021)	Rwanda	20	626 male players	Amateur	7 months	The intervention resulted in a significant 35% decrease in the risk of injuries in the intervention group. The odds of sustaining an injury in the intervention group were also comparatively lower, with a reduction of 27% and 29% for training and matches, respectively.
Soligard et al. (2008)	Norway	13 – 17	1892 female players	Youth	8 months	The intervention group had a statistically significant lower risk of overall injuries, as well as a lower risk of overuse injuries and severe injuries compared to the control group. There was no significant decrease in the risk of match injuries, training injuries, knee injuries, and acute injuries (which ranged from 26% to 38%).
Steffen et al. (2013)	Canada	13 - 18	226 female players	Youth	2 football seasons	The study found that players who had high adherence to the 11+ warm-up program had a 57% lower risk of injury compared to players with low adherence. However, after accounting for covariates, this difference between the two groups was not statistically significant.
Owoeye, Akinbo, Tella and Olawale (2014)	Nigeria	14–19	416 male players	Youth	6 months	The FIFA 11+ neuromuscular warm-up program had a significant impact on reducing the overall injury rate in

						male youth football by 41% and lower extremity injuries by 48%.
Grooms, Palmer, Onate, Myer and Grindstaff (2013)	USA	18–22	41 male players	Amateur	2 football seasons	The season in which the intervention was implemented showed a 72% decrease in the relative risk of lower extremity injury and a decrease in the time lost due to lower extremity injury compared to the previous season without intervention.
Chena, Rodríguez, Bores and Ramos-Campo (2019).	Spain	16-23	219 male players	Amateur	12 months	In the experimental season, there was a significant decrease of 63.8% in the frequency of injuries. There were significant reductions in muscle-tendon and joint injuries by 65% and 56.7% respectively, with a significant decrease in lower limb injuries. The incidence of injuries decreased by 71.4%, with notable differences observed in the type, location, and severity of injuries.

A total of 6 studies were selected for this systematic review. These studies were implemented in 6 countries on 3 continents: 2 in Europe, 2 in North America, and 2 in Africa. Two studies involved female players and 4 studies involved male players. All participants were either youth or amateur players, and there were no professional players included. In total, there were 3420 participants, and the duration of the studies ranged from 6 months to 2 football seasons. Regarding the results, there was a range from not statistically significant to significant impact, with the lowest percentage of injury risk reduction being 26% and the highest being 72%.

Discussion

The studies conducted on FIFA 11+ indicate that this warm-up program can effectively decrease injury rates in football players. Overall, players who performed FIFA 11+ had fewer injuries compared to those who did a traditional warm-up. Moreover, the most significant reductions were observed in the areas most commonly affected in football, such as the knee, ankle, and thigh. A statistically significant reduction in football injuries among recreational/sub-elite football players was observed with the use of FIFA 11+ injury prevention program compared to the control group.

When we look at the countries where the studies were conducted, we can see that the best results were obtained in North America and Africa, and the lowest results were in Europe. One reason why this may have happened is the fact that in Spain and Norway, the training methodology is more strict and pays more attention to biomechanics. It seems that one of the greatest assets of the FIFA 11+ program is that it enhances general biomechanics and strengthens muscles.

The effectiveness of the FIFA 11+ program depends on the proper execution of the exercises, which must adhere to established standards. The player type is also an important factor as the majority of those studied were amateur players, who may be more vulnerable to injuries due to their lower technical abilities compared to professionals. Furthermore, professional players are more likely to adopt injury prevention programs (Soligard et al., 2008).

Conclusion

This systematic review aimed to examine the effectiveness of the FIFA 11+ warm-up program in preventing injuries in football players. The findings indicated that the FIFA 11+ program is an effective method of injury prevention that should be included in the training sessions of all football teams. The reduction in injury incidence may be attributed to the improvement of motor capacity. However, it is important to note that immediate results may not be observed, and significant differences between intervention and control groups may take several weeks to become apparent. Therefore, coaches and players should ensure high compliance and proper execution of the FIFA 11+ program to achieve its intended benefits. While the results are promising, more high-quality studies are needed to increase the transparency of the program's clinical implications.

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