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Review Article

Impact of the FIFA 11+ Warm-up Program on Injury Prevention in Soccer Players and Other Sports: A Systematic Review

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ABSTRACT

Background: This study systematically reviewed scientific literature regarding the effects of the FIFA 11+ warm up program on preventing injuries in soccer and other sports.
Methods: We performed a systematic review and conducted a keyword search on 10/09/2022, in PubMed, Google Scholar, CINHAL, Web of Knowledge, Cochrane, Scopus in English language, also in Magiran, SID, Google Scholar, and Noormags in Persian language were reviewed.
Results: The results of the study were from 1192 English papers and 143 Persian papers, finally 73 eligible studies were selected and a total of 18378 players were studied. The quality level of the studies was at Level II, Twenty studies, which were at least Level II. Analysis of studies shows that the FIFA 11+ warm-up program for the prevention of sports injuries had positive effects and improve the performance of soccer players.
Conclusion: One type of training for an amateur or professional group will not have the same effect and the intensity and duration of the program should be optimized. It is also necessary for the other sports to become more specialized in preventing injury programs.

Introduction

Soccer stands out as one of the most beloved sports worldwide, yet it also carries a significant risk of injury. Previous studies have underscored the heightened prevalence and risk of injuries within soccer [1]. Research indicates that the incidence of injuries in soccer surpasses that of other field sports [1].

Among male soccer players, the prevalence of sports injuries is estimated to range from 10 to 35 injuries per 1,000 hours of match play, translating to an occurrence of injuries in elite soccer players at least once per year [2]. Remarkably, between 65% and 95% of these injuries manifest in the lower extremities [1, 3], emphasizing the imperative to address these specific injuries to enhance the safety and well-being of soccer players. Implementing preventive programs becomes paramount to mitigating injuries and alleviating their substantial costs. Fundamental to these programs is thoroughly comprehending the mechanisms and causes of injuries [4].

Numerous studies have been conducted in the realm of soccer injury prevention, employing a variety of training methods and exercises. Warm-up programs have emerged as one of the most common preventive measures across various sports, including soccer [5].

A pivotal milestone in this area was marked by Ekstrand et al.'s pioneering study three decades ago [6, 7]. This study, conducted by Ekstrand and Gilkovist in 1983, implemented a comprehensive program for Swedish professional male soccer players, encompassing various preventive measures such as specialized exercises, modified training routines, and equipment adjustments. The findings of this study revealed a remarkable 75% decrease in injuries among the players. However, the multifaceted nature of the interventions employed in this

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program made it challenging to discern and isolate the effects of each intervention.

Following Ekstrand et al.'s seminal work, there was a notable gap in cohesive studies on soccer injury prevention until 2002. However, the field has grown significantly in such endeavors over the past decade. In 2002, Jang et al. designed the first comprehensive prevention program tailored for young male athletes aged 14 to 19, spanning various skill levels. Their findings indicated a noteworthy 36% reduction in injuries among participants in the training group [8].

The FIFA (Fédération internationale de football association) Research and Evaluation Group introduced a program (Warm-up for the Prevention of Injury) titled "11" in 2004, drawing inspiration from Jang et al.'s study. This initiative aimed to enhance core muscle strength, improve neuromuscular control, and augment soccer players' agility and explosive power. Subsequently, Stefan et al. investigated the efficacy of this preventive program among young female athletes aged 14 to 18. Their findings revealed no significant difference in overall injury incidence between the intervention and control groups, primarily attributed to varying degrees of adherence among coaches, trainers, and players in implementing the program [9].

Following numerous studies on injury prevention, FIFA's Center for Research and Evaluation recognized the need to address shortcomings in the FIFA Warm Up Program "11+," notably its lack of diversity and progressive training components. To remedy these deficiencies, FIFA collaborated with the Oslo Sports Trauma Research Center and the Santamunica Sports and Orthopedic Center to develop the widely renowned "11+" warm-up training program for preventing lower extremity injuries in soccer players.

Numerous studies have investigated the efficacy of the FIFA 11+ warm-up program, with findings consistently documenting its effectiveness in reducing lower extremity injuries [5, 10]. Furthermore, there is growing interest in exploring the applicability of preventive exercises, such as the FIFA 11+ warm-up program, in other sports disciplines [11].

While originally designed for soccer, the FIFA 11+ warm-up program has effectively reduced injuries across various sports disciplines. Notably, research has investigated its impact on basketball, revealing its efficacy in preventing injuries among Italian basketball players in a randomized controlled trial (RCT) [12]. Although fewer studies have been conducted on injury prevention in handball, those that have explored various warm-up protocols have consistently reported positive outcomes regarding injury reduction [13-15]. For instance, a recent study by Abedinzadeh et al. found that a modified FIFA 11+ warm-up program positively affected injury reduction among elite handball players [16]. Given these findings, this study aims to provide an overview of research progress concerning the effects of the FIFA 11+ warm-up program on injury prevention, both in soccer and other sports contexts.

Methods

This systematic review study aimed to examine published research articles in both English and Persian languages, focusing on the effectiveness of the FIFA 11+ warm-up program in preventing soccer injuries. The search, conducted as of 10/09/2022, yielded 1192 English articles and 143 Persian articles across various scientific databases. Specifically, 34 articles were identified in PubMed, while 1158 were found through databases such as Google Scholar, Web of Knowledge, Scopus, Cochrane, and CINHAL. Additionally, seven articles were retrieved from Magiran, three from SID, 128 from Google Scholar, and five from Noormags, all in Persian. The inclusion criteria for articles encompassed studies that investigated exercises incorporated within the FIFA 11+ warm-up program, as well as articles evaluating the overall impact of this program on injury prevention in soccer.

The search strategy employed a combination of English and Persian keywords. For English databases, the search utilized the following keywords: (football OR soccer OR handball OR basketball OR futsal) AND (fifa-11 OR fifa-11 + OR fifa-11-plus) AND injury.

((“football” [MeSH Terms] OR “football” [All Fields]) OR (“soccer” [MeSH Terms] OR “soccer” [All Fields]) OR handball [All Fields] OR (“basketball” [MeSH Terms] OR “basketball” [All Fields]) OR futsal [All Fields]) AND (fifa-11[All Fields] OR fifa-11+ [All Fields]) AND (“wounds and injuries” [MeSH Terms] OR (“wounds”[All Fields] AND “injuries” [All Fields]) OR “wounds and injuries” [All Fields] OR “injury” [All Fields])

For Persian databases, the search terms included variations of “FIFA 11,” “prevention,” and “injury” in the Farsi language.

Results

After identifying 901 articles, the titles and abstracts were reviewed by two members of the team (HA and RSH).

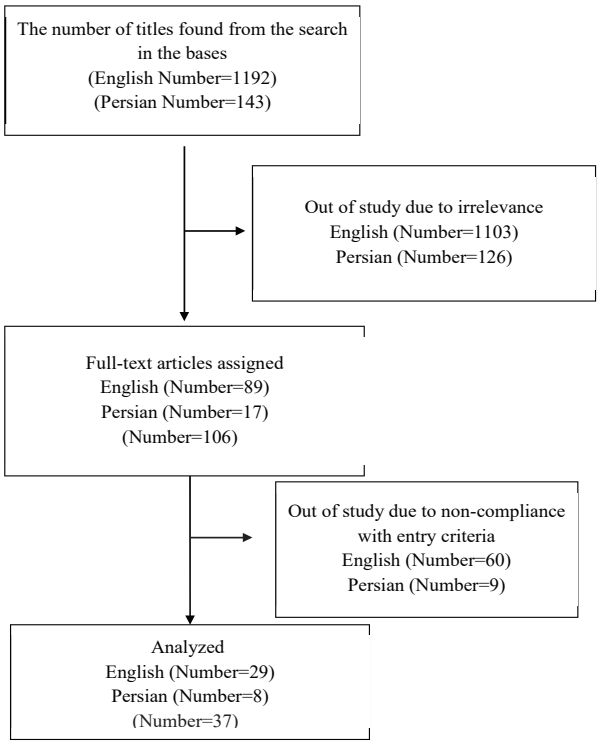

Figure 1: Articles selection process based on the Prisma model (October 2009)

The inter-rater agreement, calculated using Kappa statistics, yielded a significant result (Kappa 0.73), indicating substantial agreement (Landis & Koch, 1977) [17]. Following this initial screening, 39 relevant articles were subjected to thorough examination. Ultimately, 36 eligible studies were selected for inclusion in this study (Figure 1). Among the reviewed articles, 16 randomized controlled trials (RCTs) were clustered at level II.

Quality of Papers: Eight papers were identified as Persian articles (Table 1). Among them, two studies [18, 19] were categorized as level II [20] RCTs (American Academy of Orthopedic Surgery, 2008). Four studies employed purposive sampling and included a control group. At the same time, one article conducted a comparative study, comparing the FIFA 11 warm-up program with its modified version without a control group or comparing FIFA 11+ with a modified version of FIFA 11+ [21]. In the English papers (Table 2), ten studies were classified as RCTs and level II evidence. Two studies [22, 23] utilized randomization and included a control group, while two only had one group. Among the eight studies focused on other sports (Table 3), three cluster RCT studies were categorized as level II evidence (Level II), and four were randomized controlled trials.

Subjects: In most studies, the number of subjects was mentioned, with only two studies [24, 25] reporting the number of teams instead of individual subjects. A total of 10,866 players were included in the reviewed studies, and in those papers reporting the number of teams, a total of 166 teams were investigated. Five studies were conducted exclusively on women, while the remaining included male subjects. It is noteworthy that all subjects in Persian language studies were male.

Since 2008, FIFA "11" has been extensively studied, and the FIFA "11+" program was introduced by Soligard et al. in the same year. Since then, this enhanced FIFA Program has been widely adopted and implemented.

Table 1: Studies about FIFA 11 in Iran

Researcher and year of study	Sample				Method	Intervention	Duration, frequency, severity, and duration of intervention	Result
	Count	Age	Gender	Features				
Sadeghipoor et al 2012 [42]	24 players	19-20 years	Male	Isfahan Clubs	Targeted sampling available to the control group	FIFA 11+	Three times a week, two months	It increases the isometric strength of the quadriceps muscle, which is a factor in preventing injury. However, it did not affect hamstring muscle strength.
Minonezhad et al 2014 [43]	104 players	14-18 years	Male	Tehran League	Case study by comparing two methods	54 players modified 11+ group 50 players 11+ group	24 weeks for 6 months twice a week	Although the FIFA Training Team 11+ was moderated, it was about 43% less likely than FIFA 11+, but this was not statistically significant.
Zarei et al. 2015 [18]	35 team 980 players, control: 476, intervention: 504 players	15-19 years	Male	Iranian youth football	Random-ized controlled clinical trial	FIFA 11+	Twice a week during 30 weeks control group: regular exercises	There were 67383 hours of players' activity and 1220 injuries. The incidence of ankle injuries in the intervention group (65.3 injuries per thousand hours) was lower than that of the control group (6.84)
Zarei et al. 2015 [19]	4 team 66 players, control: 32 intervention: 34 players	14-16 years	Male	Asian Premier League of Vision	cluster random-ized controlled trial (CRCT)	FIFA 11+	In season (30 weeks) control group: regular exercises	Increase the vertical jump of the Sargent, countermovement jump, and anaerobic power of the lower limb muscles of youth soccer players
Ghasemi et al. 2016 [22]	24 players	16-20 years	Male	Youth Football Premier League of Ma-zandaran Province	Random block with control group	12 experimental and 12 FIFA warm-up programs in the experimental group	Three times a week 8 weeks	Neuromuscular features of the lower limb are improved, potentially reducing the risk of ACL injury during landing
Soltandoust nari et al 2017 [23]	30 players	14-16 years	Male	Mashhad teenage foot-ballers	Random with the control group	The FIFA 11+ in the experimental group	3 sessions per week for 8 weeks at evening time for 30 weeks	Reductions in the anterior knee shearing force after performing FIFA 11+ showed a significant difference between the ankle shear force in the training group and the control group
Ebrahimi et al. 2017 [44]	30 players	14 to 16 years	Male	Young soccer players	Random with Control Group	The experimental group performed the FIFA 11+ program	3 times a week for 8 weeks	FIFA 11+ could increase dynamic postural stability by improving neuromuscular coordination and proprioception
Kheiroddin et al., 2017 [21]	111	14-18 years	Male	Tehran League	Case study by comparing two methods	54 players of modified 11+ (adding wobble board) and 57 player control	24 weeks for 6 months twice a week	Despite a 55.88% decrease in the incidence of ankle injuries in the intervention group

Table 2: FIFA 11 and soccer studies

Researcher and year of study	Sample				Method	Intervention	Duration, frequency, severity, and duration of intervention	Result
	Count	Age	Gender	Features				
Kilding and et al. 2008 [26]	24 players	9 to 12 years	-	-	Random with Control Group	12 athletes in the experimental group performed the FIFA 11	5 times a week for 6 weeks.	No injury was observed in the intervention group during the study. Significant increases were also reported in improving performance and preventing injury.
Steffen، and et al. 2008 [9]	34 players	16 to 18 years	Female	High School Football Player	RCT	The effect of FIFA 11 on the prevalence and type of injury in the intervention group	Duration: 15 minutes; 3 times a week for 10 weeks	The intervention did not affect the incidence of injury
Soligard and et al 2008 [10]	2729 players	13 to 17 years	Female	Norway football clubs	Cluster RCT	The effect of FIFA 11+ on the prevalence of lower limb injuries	Duration: 20 minutes; 3 times a week, 8 months	Injuries in the intervention group were 32% lower than in the control group. The risk of injury from excessive use was 53%, and severe injury decreased by 45%.
Soligard and et al 2010 [27]	1055 players	13 to 17 years	Female	-	Cluster RCT	The effect of FIFA 11+ on the prevalence of injury in the experimental group	Duration: 20 minutes; 2 times a week, 8 months	46% less injury in coaches who adhered to the program moderately, and Instructors who had more adherence to the program had 35% fewer injuries in all types of injuries
Brito and et al. 2010 [5]	20 players	18 to 26 years	Male	Semi-Professional	One Group	Effect of the FIFA 11+ in the experimental group	3 times a week; For 8 weeks	The FIFA 11+ program reduces lower limb injury and improves balance and strength
Beijsterveldt and et al 2010 [28]	310 players	18 to 40 years	Male	Amateur High Level	Cluster RCT	control group: 155 athletes, 12 clubs experimental group: 155 athletes, 12 clubs conducted the FIFA 11+	2 to 3 times a week; It was done in a season.	There were no differences in the incidence and severity of injuries in the two groups during the training and the competitions
Junge and et al 2011 [25]	5549 coaches	-	Male	Swiss Football Federation	Cohort study	The effect of education and implementing the FIFA 11+ program in trained teams	Practice twice a week and one match per week.	The injury prevalence in the teams that performed this program was reduced by 11.5% in the competition and 25.3% in the training.
Gatterer and et al 2012 [24]	3 team	-	Male	Amateur	Experiment with Control Group	The experiment group performed the FIFA 11+ program	First half of Italian Amateur League	FIFA 11 is not very effective for middle-level teams
Steffen et al 2013 [29]	266 players	13-18 years	Female	-	Cluster RCT	Impact of the FIFA 11+ warm-up program on the youth soccer team	Duration: 20 minutes; 3 times a week for 4 months	The risk of injury to players with high adherence was 57% lower than the FIFA 11+ program.
Groom et al 2013 [30]	41 players	18-25 years	Male	Academic	Cohort Study	The FIFA 11+ program and its effect on the prevalence of injuries in the intervention group	Duration: 20 minutes; 5-6 times a week for 2 seasons	Reducing the relative risk of lower limb injury by 72% and the time lost to lower extremity damage compared to previous seasons
Owoey، et al. 2014 [31]	416 players	14-19 years	Male	African	Cluster RCT	The FIFA 11+ program and its effect on the prevalence of injuries in the experimental group	Six months each week to evaluate players for injury and loss time	The FIFA 11+ program effectively reduces the overall injury rate by 41 percent for male youth soccer players.
Hamme et al. 2015 [32]	256 players	45 years	Male	Protagonist	Cluster RCT	The FIFA 11+ program and its effect on the prevalence of injuries in the experimental group	9 months, 20 minutes; Once a week for one season	FIFA 11+ injury prevention does not adversely affect veteran players. There was no significant difference between the intervention and control groups.
Silvers-Granelli، et al 2015 [33]	61 team, 1525 players	-	Male	American University League	Cluster RCT	The FIFA 11+ program and its effect on reducing injury	the FIFA 11+ program for 20 minutes 3 times a week throughout the 2012 season	The incidence rate of injury decreased. Also, loss of time was reduced due to injuries, and eventually, the number of players required for treatment also decreased

Takata ، et al. 2016 [34]	11 players	25-33 years	Male	5 Amateur and 6 recreation	One group	investigating changes in muscle activity after part 2 of the FIFA 11+ program	Part 2 of the FIFA 11+ program for 20 minutes for 4 weeks	Part 2 of the FIFA 11+ program for 4 weeks induces changes in muscle activity that may contribute to reducing sports injuries.
Rössler et al. 2016 [35]	20 team, 157 players	Under 9, 11-13 years	Kids and juvenile	Northwest Switzerland	Cluster RCT	Effects of FIFA 11+ Children's and Adolescent Injury Prevention Program on motor function The risk of injury to players with high adherence was 57% lower than the FIFA 11+ program.	15 minutes; Twice a week for 10 weeks	The FIFA 11+ kids have affected physical fitness factors, which can potentially help reduce the risk of injury by improving motor performance.
Silvers-Granelli، et al 2017 [36]	65 team, 1625 players	18-25 years	Male	-	Cluster RCT	Investigating FIFA 11+ on the number of ACL injuries in a quiz or practice, player post, level, and type of ground	15 to 20 minutes; 2-3 times a week before the competition and practice	ACL injury in the match, in all posts, especially the midfield midfielder, in both types of land, artificial and natural grass, especially artificial turf, fell
Saho et al. 2017 [37]	2344 athletes	12–18 years	1815 male 529 female	Adolescent Japanese football players	Cohort study	FIFA 11+ program	2 times a week throughout the intervention seasons	The FIFA 11+ program reduced non-contact injuries and reduced the risk of injury in Japanese female football players.
Nawed et al. 2018 [38]	57 players	18 to 22 years	Male	Amateur soccer players	Random with Control Group	FIFA 11+ experimental group n=29 control group n= 28	5 times a week for 12 weeks	Sprint speed and vertical jump were improved. The FIFA 11+ may improve the performance of young amateur soccer players.
Lopes et al. 2018 [39]	71 players	Aged ≥18 years	Male	Futsal players from 6 amateur clubs	Random with Control Group	34 athletes in the control group and 37 athletes in the intervention group performed the FIFA 11+ program	2 times a week for 10 weeks. 10-week follow-up period	Differences in training exposure, body mass index, weight, flexibility, and sprint. Jump performance,
Gioftsidou et al. 2020 [40]	32 players	18 to 20 years	Young male	soccer players	Random with Control Group	16 control group and 16 intervention group FIFA 11+ (level 2)	Duration: 20-25 minutes; 3 times a week for 8 weeks	Beneficial effects in total stability index and anterior-posterior index, eccentric and concentric strength, and conventional H/Q ratio. improve lower limb equilibrium and the strength of the hamstrings
Arsenis et al. 2020 [41]	32 players	18 to 20 years	Male	young soccer players first Greek division	RCT	The intervention group performed the FIFA 11+ program	3 times a week for 8 weeks	Increasing the balance ability, the concentric strength of the hamstring muscles, and the conventional muscle ratio of soccer players

Regarding other sports, three studies focused on Futsal utilizing the FIFA 11 program. At the same time, a randomized controlled trial was conducted in basketball—additionally, two studies employed modified versions of the FIFA 11+ program in handball.

Most studies reported the effects of the FIFA 11+ program on the prevalence of injury, the assessment of physical fitness, neuromuscular function, and balance, while some studies have included a financial assessment of the FIFA 11+ program, such as its impact, compliance with the plan, or methods of performing. In general, most studies reported a significant reduction in injury. Of course, few studies reported the warming-up program's low or no effect.

Discussion

This systematic review aimed to explore the effectiveness of the 11+ warm-up program in preventing injuries in football and other sports. The review encompassed 793 English-language papers and 98 Persian-language papers. Ultimately, 27 studies met the eligibility criteria, with 12,851 players included in the analysis.

Quality of Papers: This systematic review adhered to the PRISMA statement guidelines (http://www.prisma-statement.org/). Two blinded research team members (RS and HA) independently reviewed and assessed all studies. A third researcher (SA) reassessed the study in case of conflicts. The overall quality of the studies was rated as moderate to high, with 14 studies employing a randomized controlled trial design. In contrast, the remaining studies utilized prospective cohorts or non-randomized experimental designs (rf: Tables 1-3). Among these, 20 studies were classified as at least Level II according to the American Academy of Orthopedic Surgery criteria, indicating relatively good quality. However, many studies faced challenges recruiting sufficient samples, which should be considered in future

Table 3: Studies Fifa 11 and other sports

Researcher and year of study	Sample				Method	Intervention	Duration, frequency, severity, and duration of intervention	Result
	Count	Age	Gender	Features				
Longo et al. 2012 [12]	121 players, 11 teams	11-19 years	Male	Basketball player	Cluster RCT	7 intervention teams and 4 teams in the control group, implementing the FIFA 11+ warm-up program in the experimental group	During a season and 9 months	The FIFA 11+ effectively reduces the injury rate in male elite basketball players. The experimental group (80 players) were significantly less affected than the control group (41 players)
Reisʿ et al., 2013 [45]	36 players	16-18 years	Male	Futsal player	Randomized Cohort study	The FIFA 11+ program in the intervention group	2 times a week for 12 weeks	"FIFA 11+" is an effective practice, meaning it is useful for improving the physical fitness and performance of young futsal players
Grit-sanadilok et al. 2013 [46]	21 players	15-18 years	-	Futsal player	Experiment with the control group	The FIFA 11+ program in the intervention group	10 weeks	FIFA 11+ improves, develops neuromuscular balance, and increases the sense of joint position, which is associated with the prevention of lower extremity injuries in futsal players
Zein et al. 2013 [47]	20 players	15-18 years	Male	Futsal player	Random with the control group	Experimental group: 11+ Control Group: Regular exercises	2 times a week for 4 weeks	FIFA 11+ improves agility, strength, core muscle
Parsons et al. 2017 [48]	47 players	9-11 years	Young female	Develop-mental Indoor Soccer Club	Random with Control Group	FIFA 11+ program	2-3 per week for 5 months	With improved core stability, the 11+ program may not be more effective than other dynamic warmups at improving neuromuscular control and agility.
Abedinza-deh et al 2017 [16]	48 players	-	Male	Handball player	With control group	The experimental group of the modified FIFA 11+ program	3 times a week for 2 months	The FIFA 11+ has been modified to reduce injury rates in male elite handball players. The intervention group players (24 players) were significantly lower than those in the control group (24 players)
Abedinza-deh et al 2019 [49]	48 players	-	Male	Handball player	With control group	The experimental group of the modified FIFA 11+ program	3 times a week for 2 months	The FIFA 11+ is modified by the increase in flexion of the trunk, knee flexion, and knee valgus abnormality in lowering the jump of elite male handball players
Salgues et al. 2021 [50]	64 Players 4 team	16 to 18 years	Young female	Semi-pro-fessional basketball players	Random with two Groups	The FIFA 11+ group adapted to basketball and the PEP group	3 times a week for 9 months	Improvements of the lower limb in strength, agility, symmetry, dynamic valgus, stability, Core Stability, and hip abductor moment. The adapted program for basketball gives more time to the components of strength, plyometrics, and balance

field-based studies. The reviewers found a low risk of bias for allocation concealment and blinding outcome assessment across all domains.

Sample Material: Studies involving male subjects consistently reported a positive impact of FIFA 11+ exercises, except for one study where the sessions were conducted once a week, and the subjects were older, likely due to their high athleticism. Conversely, studies involving female subjects showed a positive effect in cases where the exercises were repeated or implemented over a prolonged duration [10]. In contrast, two studies reported low or no effect, possibly due to weekly meetings [9] or shorter implementation periods spanning half a season [24].

The type and intensity of the exercises: The results of the FIFA 11 warm-up program were not particularly effective or significant until 2008. However, with the program's evolution into "FIFA 11+," as proposed by Soligard et al. in 2008, more impactful results have been reported. The addition of two extra exercises, as well as power training elements such as the Nordic, has notably reduced injuries.

In the study by Soligard et al. (2008), 376 injuries were recorded, with 215 cases occurring in the control group and 161 cases in the experimental group. The authors noted significant differences between the two groups regarding the number of knee injuries and a reduction in the risk of injury during tournaments and practice sessions. Two years later, in another study by the same group led by Soligard in 2010, it was observed that the

risk of injury was lower in the group that participated more actively in the program compared to athletes with a moderate level of participation. Additionally, instructors who had fully embraced and implemented the program witnessed a 46% reduction in injuries compared to those who showed moderate commitment. Furthermore, instructors who demonstrated higher adherence to the program reported a 35% decrease in injuries [10].

One notable study demonstrating the effectiveness of the 11+ program was conducted by Jang et al. (2011) [25]. In this study, following implementing a nationwide campaign aimed at reducing injuries among amateur soccer players in Switzerland, there was a notable decrease in injury rates, with a reduction of 11.5% during matches and 25.3% during training sessions. The authors attributed this success to the successful implementation of the program across the country, resulting in fewer soccer-related injuries among amateur athletes and a consequent reduction in medical expenses. According to Swiss National Insurance Company data, 42,260 soccer-related injuries were reported in 2003, amounting to $130 million in treatment costs. The study findings underscore the potential effectiveness of a nationwide campaign to implement such warm-up programs, leading to tangible reductions in injuries and associated treatment costs.

Moreover, several review papers [51, 52] and meta-analyses published in recent years [53] have further corroborated the effectiveness of the 11+ program in reducing injuries across various anatomical areas of the body.

Impact of the program: Among the 36 studies included in our review, 22 directly investigated the reduction of injuries, while others explored various effects of the FIFA 11 warm-up program on factors such as changes in muscle activity [34], muscular strength [40-42, 50], and physical fitness [35, 38-41, 45, 47, 48, 50], as well as the reduction of knee shearing force [23].

Four studies reported either no influence or a low impact of the FIFA 11 warm-up program. These studies focused on amateur soccer or futsal players, where the timing or duration of FIFA 11 training was limited (e.g., one session per week or half a season), or the program was not modified for futsal. Nonetheless, these studies suggested that increasing the intensity and duration of the program training may lead to more favorable outcomes [28].

The study by Beijsterveldt et al. (2011) found no significant difference in injury occurrence or severity among athletes who performed the FIFA 11 warm-up program. They recommended that future studies consider the exercise's duration and intensity, suggesting that these factors could influence the program's effectiveness. Another study by Stefan et al. (2008) [9] also reported a lack of impact of the FIFA 11 program. Their findings may be attributed to low adherence to the program among teams in the intervention group and insufficient training sessions (only one session per week). Therefore, the authors suggested that the low adherence to the program likely contributed to the lack of reduced injury rates. In a follow-up study, Stefan et al. (2013) criticized the FIFA-provided program, noting that it fails to offer sufficient motivation for athletes to adhere to the program consistently throughout the season, which could lead to decreased adherence and, consequently, diminished effectiveness.

Therefore, it is crucial for coaching staff and athletes to recognize the significance of such exercises in injury prevention and to adhere to the prescribed programs diligently. These limitations can be addressed by enhancing awareness among coaches and athletes regarding the program's benefits. Furthermore, adjusting the program to make it more appealing and suitable for the teams' fitness levels could encourage greater adherence. It is suggested that educational workshops be conducted periodically to increase educators' understanding of injury prevention benefits and familiarity with the FIFA 11+ program. Educated and trained educators in this regard can help reduce injury incidents, enhance efficiency, and improve players' performance. Additionally, it is recommended to customize the FIFA 11+ program for other sports to suit specific sport-related factors such as field type, injury prevalence, and mechanisms.

Iranian Studies

Studies in Iran have been conducted since 2012, primarily focusing on male athletes. Most of these studies have involved skilled players in the national league, except one study [23] that involved adolescents, although the players' skill levels were not specified. Among these studies, four have examined the effectiveness of the FIFA 11 warm-up program in reducing injuries [18, 19, 21, 43]. Additionally, other studies have explored the program's effects on increasing muscle strength [42], improving muscle nervous function [22], enhancing proprioception and neuromuscular coordination [44], and reducing knee shearing force [23].

FIFA 11 in Other Sports

The FIFA 11+ program has been adapted and implemented in sports, such as basketball, handball, and futsal, as summarized in Table 3. In basketball, a Cluster RCT demonstrated that the FIFA 11+ program effectively reduced injuries among elite players [12]. Salgues et al. (2021) [50] also reported improvements in various physical fitness factors, indirectly contributing to injury prevention. Among futsal players, four studies implementing the FIFA 11+ program observed enhancements in physical fitness components, including strength, agility, joint position sense, balance, and core stability, all of which are crucial for injury prevention [45-48].

In handball, a modified version of the FIFA 11+ program reduced injury rates by influencing kinetic and kinematic factors such as jump height, power, and balance, as well as increasing trunk and knee flexion angles and reducing knee valgus during landing among elite handball players [16, 49].

Conclusion

The analysis of studies indicates that implementing the FIFA 11 warm-up program for preventing sports injuries has yielded positive effects, notably reducing the risk of injury and enhancing overall safety in sports.

Integrating this program into regular training routines can be done seamlessly without consuming significant time. However, it is paramount in enhancing physical fitness, mitigating injury risks, and expediting the return to play process after an injury, ultimately contributing to improved performance among soccer players.

It is important to acknowledge that one-size-fits-all approaches may not yield identical results across diverse groups, whether amateur or professional. Thus, the intensity and duration of such programs should be optimized based on specific needs and contexts. Additionally, there is a pressing need for tailored injury prevention programs for various sports. Future research endeavors should prioritize investigating the implementation of the FIFA 11+ program, with a focus on customization for different sports, while considering factors such as the skill level, gender, and age of the participants.

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