



ORIGINAL SCIENTIFIC ARTICLE

## LIMITED IMPLEMENTATION OF THE FIFA 11+ SHOULDER INJURY PREVENTION PROGRAM (FIFA 11+ S) AMONG PROFESSIONAL SOCCER GOALKEEPERS

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### Abstract

**Purpose.** Soccer is one of the most popular sports worldwide. Soccer goalkeepers are more likely than outfield players to injure their upper extremities, particularly their shoulders. The Fédération Internationale de Football Association (FIFA) 11+ Shoulder Injury Prevention Program (FIFA 11+S) was developed to prevent upper extremity injuries. The aim of this study was to assess soccer goalkeepers' and goalkeepers' coaches' awareness, implementation, and opinion of FIFA 11+S effectiveness in reducing upper extremity injuries.

**Materials and methods.** A self-administered questionnaire was developed and distributed to worldwide professional soccer goalkeepers and goalkeepers' coaches. The survey was available in 10 different languages. The questionnaire consisted of questions covering the awareness, implementation, and goalkeepers' and goalkeepers' coaches' opinion of the FIFA 11+ Shoulder Injury Prevention Program in reducing upper extremity injuries. Questions development was guided by several authors expert in sport medicine and injury prevention programs.

**Results.** A total of 722 goalkeepers and goalkeepers' coaches completed the survey. The vast majority (97.60%) of the participants were goalkeepers. Only 204 (28.25%) participants were aware of FIFA 11+S, and 155 (21.46 %) were implementing FIFA 11+S in their current practice. Participants who implemented FIFA 11+S reported a positive opinion about the program efficacy, with a score of  $8.19 \pm 0.93$  out of 10.

**Conclusions.** This study is the first to investigate goalkeepers' and coaches' awareness, implementation, and opinion of the effectiveness of the FIFA 11+S program in reducing shoulder injuries globally. Overall, the awareness rate was exceptionally low, but the implementation level among aware participants was good. Goalkeepers and coaches attained a positive score regarding the FIFA 11+S effectiveness in reducing shoulder injuries. Further efforts and research are needed to increase the awareness and usage of the FIFA 11+S program.

**Keywords:** football, shoulder trauma, upper extremity, surveys, questionnaires.

### Introduction

Soccer (which is also known as football) dominates the global sporting world; there are a total of 275 million male and female players internationally (Tomlinson, 2014). The

Fédération Internationale de Football Association (FIFA) assumes a governance role for the sport while also overseeing the organization of international competitions, such as the World Cup, which occurs every 4 years (Longo et al., 2012). Previous studies have shown that elite soccer players sustain 1.5-7.6 injuries for every 1,000 hours of training, while 12-35 injuries may occur for every 1,000 match hours (Ejnisman et al., 2016). Previous studies have also revealed that lower limb injuries are the most frequently occurring injuries

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(67.7%), while upper limb injuries account for 13.4% of all cases (Ejnisman et al., 2016). During the World Cup that was held in Athens in 2004, 3.8% of athletes sustained a shoulder injury; while a slightly higher percentage (4.4%) was recorded for the same injury during the European Football Championship in 2004 (Ejnisman et al., 2016). Most shoulder-related injuries affect the glenoid labrum (84%); whereas labral injuries with associated rotator cuff involvement are less likely to occur (8%) (Ejnisman et al., 2016). A similar proportion (8%) was found for isolated rotator cuff injuries (Ejnisman et al., 2016). Sports injuries are usually associated with considerable costs, which places financial burden on injured players in terms of funding surgical interventions or rehabilitation programs. Furthermore, being forced to withdraw from sporting participation owing to injuries may adversely affect athletes' overall health and well-being (Al Attar et al., 2021).

Most shoulder injuries gradually manifest over a period of time, with chronic strain conditions resulting from overload (Cools, Johansson, Borms, & Maenhout, 2015). Overhead athletes may experience chronic shoulder pain because of repeated exposure to exercise arising from the principle of adaptation. Other contributory factors include changes in strength, flexibility, and posture, which may occur in the glenohumeral joint and other kinetic chain links (Cools et al., 2015). Thus, shoulder-related injuries indicate a clear need to develop prevention strategies. Furthermore, the identification of risk factors associated with shoulder injuries may be essential in their prevention (Asker et al., 2018).

Depending on the nature of sport, overhead athletes may be exposed to various levels of risk of sustaining shoulder injuries. For example, athletes who are engaged in contact sports were found to be at a greater risk of experiencing traumatic shoulder injuries (Asker et al., 2018). In addition, the key characteristic associated with overhead sports is the need to perform repeated overhead movements (Asker et al., 2018). Therefore, similarities may be observed between the mechanisms that can cause non-traumatic shoulder injuries and those that are required to participate in overhead sporting activities (Asker et al., 2018). Furthermore, age and gender-related variations may have a link to shoulder injuries, as evidenced by different anatomical positioning seen in diverse types of sports. Biomechanical risk factors are also important to consider; impaired shoulder functioning and coordination or poor throwing techniques may increase the risk of developing shoulder injuries during overhead sports (Asker et al., 2018). Accordingly, in seeking to address these challenges, sport injury prevention programs (IPPs) have been the subject of significant attention over recent years (Al Attar et al., 2016).

Based on the well-established FIFA 11+IPP, which has a proven record of accomplishment in preventing injuries, the FIFA 11+ Shoulder IPP (FIFA 11+S) program adopts a similar format (Ejnisman et al., 2016). A collaborative effort between leading global experts in the fields of orthopedics, physiotherapy, and sports rehabilitation with a particular interest in shoulder injuries led to the development of the FIFA 11+S program (Ejnisman et al., 2016). Ensuring that all sporting activities are performed correctly is critical to its success. Thus, coaches are essential in overseeing its implementation and advising the players, if required, on how to perform the exercises to ensure optimal benefit (Ejnisman et al., 2016). FIFA 11+S injury prevention program was

used by Al Attar et al. (2021), who observed a reduction of 50% in upper extremity injuries among soccer goalkeepers compared to using normal warm-ups. The FIFA 11+S program can be divided into three main parts. Part I consists of general warm-up activities, while Part II focuses on building strength and balance for the shoulder, elbow, wrist, and finger muscles. Finally, in Part III, participants engage in a series of advanced exercises to strengthen core stability and muscle control. The program requires 20-25 min to complete in full, and it is typically used instead of normal warm-up activities before training practice (Ejnisman et al., 2016). All exercises included in the program pay particular attention to players' skills such as core stability, neuromuscular control, eccentric rotator strength, and agility (Ejnisman et al., 2016). It is recommended that these exercises are performed three times per week, and they should be incorporated into the training sessions of soccer goalkeepers. Part I usually requires 7 min to complete as part of general warm-up activities. Part II aims to enhance participants' strength and local muscular endurance. Program developers recommend that these exercises are performed for 9-10 min using a combination of low-resistance (light tubing strength or 2-3 kg) and high-resistance (three sets of 15-20 repetitions) approaches. Program developers also suggest that these exercises should be adapted based on the tolerance levels of individual athletes. The aim of exercises outlined in Part III is to increase muscular endurance; therefore, participants are required to perform activities at high velocity with either 5 or 6 sets of 15-20 repetitions (Ejnisman et al., 2016).

Therefore, this study aims to assess soccer goalkeepers and goalkeepers' coaches' awareness, implementation, and opinion of FIFA 11+S in reducing upper extremity injuries.

## Materials and methods

### *Study Design and Questionnaire*

Based on the study objective, a questionnaire was developed by the study authors to collect information about the awareness, knowledge, and opinion of goalkeepers and coaches, along with their views regarding the FIFA 11+S program. The developed questionnaire was validated through pilot testing that was performed before beginning the study. The study was a cross-sectional survey that targeted goalkeepers and coaches from different continental football federations. The questionnaire consisted of socio-demographic questions that included: gender, age, type (goalkeeper or coach), and the country. The second section was on the awareness, where participants were asked whether they were aware of the FIFA 11+S program; the participants could answer yes or no. The third section was on the implementation (yes or no) and was supposed to be answered only by aware participants. Then, participants who reported implementing the FIFA 11+S program were asked about their opinion regarding the program effectiveness in the prevention of shoulder injuries on a 10-points scale from 0 (ineffective) to 10 (highly effective). The survey was available in Arabic, Chinese, English, French, German, Italian, Japanese, Portuguese, Russian, Spanish, and Turkish. This study was reviewed and ethically approved by the Biomedical Ethics Committee at Umm Al Qura University, approval number: HAPO02K012202011487.

### Questionnaire Administration

The survey was uploaded to the well-known online survey software Google Forms (Alphabet Inc., Mountain View, California, United States). The link was sent to the goalkeepers and coaches from different Football Federations; the purpose of the survey was outlined, and survey questions were provided. The link was limited to one responder only. Participants were informed that their participation was voluntary, and that all data would be kept anonymous, confidential, and used for research purposes only. Responses were collected from June 2019 to June 2020.

### Sample Size and Statistical Analysis

Considering a 4% margin of error at 95% confidence level, the target number was 900 participants. Responses were organized in Microsoft Excel 2019 (Microsoft Corp., Redmond, Washington, United States). The data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 24.0 (IBM Corp., Armonk, New York, United States). Descriptive statistics were presented as percentages. Percentages with a 95% confidence interval (CI) are reported. The p-value of 0.05 was set as statistically significant.

### Results

The total number of respondents was 722 goalkeepers and coaches; most of them were males (95%), while females represented only 5%. Coaches represented 2.40%, and the remaining 97.60% were goalkeepers. The highest participation rate was from the Union of European Football Associations (UEFA) (36.60%), followed by the Asian Football Confederation (AFC) (30.60%); while the lowest contribution was reported from the Oceania Football Confederation (OFC) (2.20%). The participant characteristics are shown in Table 1.

When the participants were asked if they were aware of the FIFA 11+S program, most of them reported «No» (71.70%); while only 28.30% reported that they were aware of it. When evaluating the implementation rate among the minority who were aware of the FIFA 11+S program, it was determined that most participants were implementing it (21.50%) vs. 6.80% of those who were not implementing the FIFA 11+S program. Regarding the opinion of effectiveness of the FIFA 11+S program in preventing shoulder injuries, almost all of the participants consider it as being effective at diverse levels of effectiveness, with the mean ( $\pm$ SD) score of 8.19 ( $\pm$  0.938).

The obtained results show significant association between both the awareness and implementation and the effectiveness of the FIFA 11+S program. The awareness level did not significantly differ either by gender (because the P value was 0.14) or by the continental football federations; the awareness level was the highest among the participants from UEFA (41.7%) and the lowest among those from OFC (3.4%) ( $P = 0.33$ ). The data are shown in Table 2.

The continental football federation that reported the highest implementation of the FIFA 11+S program was OFC (37.5%), followed by the Confederation of North, Central American and Caribbean Association Football (CONCACAF) (29.8%); while the lowest implementation rate was

**Table 1.** Participant Characteristics:

Indicators	Frequency (%)
<b>Continental Football Federations</b>	
AFC	221 (30.6%)
CAF	116 (16.1%)
CONCACAF	57 (7.9%)
CONMEBOL	48 (6.6%)
OFC	16 (2.2%)
UEFA	264 (36.6%)
<b>Gender</b>	
Female	36 (5%)
Male	686 (95%)
<b>Type</b>	
Coach	17 (2.4%)
Goalkeeper	705 (97.6%)
<b>Age groups</b>	
18-25	61 (8.45%)
26-30	616 (85.31%)
31-35	36 (4.99%)
36-40	9 (1.25%)

Asian Football Confederation (AFC); Confederation of African Football (CAF); American and Caribbean Association Football (CONCACAF); South American Football Confederation (CONMEBOL); Oceania Football Confederation (OFC); Union of European Football Associations (UEFA)

reported from the South American Football Confederation (CONMEBOL) (14.6%); however, the difference was not significant. Moreover, the continental football federations did not differ significantly in their opinion regarding the effectiveness of the FIFA 11+S program in preventing shoulder injuries, as shown in Table 2. The implementation level by country is shown in Figure 1.

### Discussion

This cross-sectional survey study was designed to assess goalkeepers' and coaches' awareness and implementation of the FIFA 11+S program and to assess their opinion regarding its effectiveness in preventing shoulder injuries. This study is the first to address this topic. The results of this study revealed that, globally, the awareness level of the FIFA 11+S program among goalkeepers and coaches was poor. However, the implementation rate among aware participants was good, and they rated it as effective in preventing shoulder injuries.

It is known that goalkeepers are more exposed to upper limb injuries than other soccer players (Cohen, Abdalla, Ejnisman, & Amaro, 1997; Terra et al., 2012). In addition, shoulder injuries are more common than other soccer injuries (Hart & Funk, 2015). Therefore, goalkeepers and coaches should be aware of the programs that may help prevent such injuries (e.g., the FIFA 11+S program); however, unexpectedly, the results of this study showed that the majority of

**Table 2.** Comparison between the continental football federations

Indicators	Continental Football Federations					
	AFC (n = 221)	CAF (n = 116)	CONCACAF (n = 57)	CONMEBOL (n = 48)	OFC (n = 16)	UEFA (n = 264)
<b>Awareness</b>						
No	165 (74.7%)	89 (76.7%)	39 (68.4%)	37 (77.1%)	9 (56.3%)	179 (67.8%)
Yes	56 (25.3%)	27 (23.3%)	18 (31.6%)	11 (22.9%)	7 (43.8%)	85 (32.2%)
<b>Implementation</b>						
No	19 (8.6%)	5 (4.3%)	1 (1.8%)	4 (8.3%)	1 (6.3%)	19 (7.2%)
Yes	37 (16.7%)	22 (19.0%)	17 (29.8%)	7 (14.6%)	6 (37.5%)	66 (25.0%)
<b>Opinion*</b>						
0	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
1	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
2	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
3	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
4	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
5	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
6	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
7	8 (21.6%)	8 (36.4%)	2 (11.8%)	4 (57.1%)	2 (33.3%)	17 (25.8%)
8	16 (43.2%)	8 (36.4%)	4 (23.5%)	1 (14.3%)	3 (50.0%)	27 (40.9%)
9	11 (29.7%)	3 (13.6%)	5 (29.4%)	0 (0.0%)	1 (16.7%)	20 (30.3%)
10	2 (5.4%)	3 (13.6%)	6 (35.3%)	2 (28.6%)	0 (0.0%)	2 (3.0%)

Asian Football Confederation (AFC); Confederation of African Football (CAF); American and Caribbean Association Football (CONCACAF); South American Football Confederation (CONMEBOL); Oceania Football Confederation (OFC); Union of European Football Associations (UEFA) \*10-points scale from 0 (ineffective) to 10 (highly effective).



**Figure 1.** The FIFA 11+ Shoulder Injury Prevention Program implementation level by country

worldwide goalkeepers and coaches were unaware of such programs. However, the lower degree of awareness seems plausible because coaches are the program deliverers (not the goalkeepers), and coaches represented less than 2.5% of the total participants. In addition, the results of this study showed that the level of awareness and implementation was significantly higher among coaches.

Previous studies confirmed the preventive and performance improvement effect of the FIFA 11+ program in female and male amateur soccer players (Bizzini & Dvorak, 2015). Based on this, FIFA 11+S was structured to prevent shoulder injuries. Al Attar et al. (2021) conducted a randomized controlled trial aimed to investigate the FIFA 11+S effectiveness in reducing the incidence of upper extremity injuries, and they determined that FIFA 11+S implementation reduced the upper extremity injury rate among goalkeepers more than usual warm-up training sessions. The results of this study confirm the results of the abovementioned study because most of the participants who implemented this program stated that it was effective.

Regarding the implementation rate, the results of FIFA 11+S seem to agree with those obtained for FIFA 11+, and Al Attar et al. (2018) demonstrated that most of the aware Australian coaches used it. Though most of the aware participants in this current study reported implementing FIFA 11+S, a considerable number did not apply it. Similar incomplete implementation has been also observed in other IPPs (McKay, Steffen, Romiti, Finch, & Emery, 2014; Wilke, Niederer, Vogt, & Banzer, 2018). Unfortunately, this study did not address the reasons for non-usage; however, several factors have been addressed in previous studies including non-availability of equipment, limited space, lack of time, and lack of rated program quality (Joy et al., 2013; McKay, Merrett, & Emery, 2016).

The results of this study highlighted the need for further research. Based on the obtained results, the adherence to FIFA 11+S necessitates both raising awareness among unaware subjects and facilitating usage in aware subjects. Increasing awareness level can be done by improving communication strategies aimed at promoting injury prevention and warm-up programs. For those who are already aware but do not use the program, they might need a more detailed explanation about the program, or they may have difficulties implementing the program that need to be addressed. Inadequate implementation knowledge has been reported to be the major obstacle in delivering the prevention program for anterior cruciate ligament injuries (Joy et al., 2013). Therefore, it is highly recommended that FIFA 11+S contents should be adjusted based on the coaches' educational background.

As with any study, this study has some limitations. The implementation of IPP is a complex process, and the variable 'implement,' which was assessed in this study, is only one facet. In addition to goalkeepers and coaches, who were invited to participate in this study, medical professionals and players are other relevant participants that may affect the success of implementation. Another related aspect to be considered is the questionnaire design. Overall, and based on the obtained data, further research should aim to define and allocate several factors that contribute to concepts such as program usage, feasibility, or suitability. Despite these limitations, the data were collected from different continental

football federations; therefore, the results can be generalized globally.

## Conclusions

This study is the first to investigate goalkeepers' and coaches' awareness, implementation, and opinion of the effectiveness of the FIFA 11+S program in reducing shoulder injuries globally. Overall, the awareness rate was exceptionally low, but the implementation level among aware participants was good. Goalkeepers and coaches attained a positive score regarding the FIFA 11+S effectiveness in reducing shoulder injuries. Further efforts and research are needed to increase the awareness and usage of the FIFA 11+S program.

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## Conflict of interest

The authors declared no conflicts of interest.

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## ОБМЕЖЕНЕ ВПРОВАДЖЕННЯ ПРОГРАМИ ПРОФІЛАКТИКИ ТРАВМ ПЛЕЧЕЙ FIFA 11+ (FIFA 11+ S) СЕРЕД ПРОФЕСІЙНИХ ФУТБОЛЬНИХ ВОРОТАРІВ

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Реферат. Стаття: 7 с., 2 табл., 1 рис., 16 джерел.

**Мета дослідження.** Футбол є одним з найпопулярніших видів спорту в усьому світі. Футбольні воротарі частіше, ніж польові гравці, травмують свої верхні кінцівки, зокрема плечі. Програма профілактики травм плечей 11+ Міжнародної федерації футболу (FIFA) була розроблена для запобігання травмам верхніх кінцівок. Дане дослідження мало на меті оцінити обізнаність, рівень впровадження та думку футбольних воротарів та їх тренерів щодо ефективності FIFA 11+S у зменшенні травм верхніх кінцівок.

**Матеріали і методи.** Було розроблено опитувальник для самостійного заповнення та розповсюджено серед професійних футбольних воротарів та тренерів воротарів у всьому світі. Опитування було доступне 10 різними мовами. Анкета складалася з питань, що охоплювали

обізнаність, впровадження та думку воротарів та тренерів воротарів щодо Програми профілактики травм плечей FIFA 11+ у зменшенні травм верхніх кінцівок. Розробкою питань керували кілька авторів, спеціалістів зі спортивної медицини та програм профілактики травм.

**Результати.** Всього в опитуванні взяли участь 722 воротарі та тренери воротарів. Переважну більшість (97,60%) учасників склали воротарі. Лише 204 (28,25%) учасники знали про існування FIFA 11+S, а 155 (21,46%) впроваджували FIFA 11+S у своїй поточній практиці. Учасники, які застосовували FIFA 11+S, дали позитивний відгук про ефективність програми з оцінкою  $8,19 \pm 0,93$  з 10.

**Висновки.** Це дослідження є першим, у якому досліджується обізнаність, рівень впровадження та думка

воротарів і тренерів щодо ефективності програми FIFA 11+S у зменшенні травм плечей у всьому світі. Загалом рівень обізнаності був надзвичайно низьким, але рівень впровадження серед обізнаних учасників був хорошим. Воротарі та тренери дали позитивну оцінку щодо ефек-

тивності FIFA 11+S у зменшенні травм плечей. Необхідні подальші зусилля та дослідження для підвищення обізнаності та рівня використання програми FIFA 11+S.

**Ключові слова:** футбол, травма плеча, верхня кінцівка, опитування, анкетування.

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