

ORIGINAL ARTICLE



Do Prevention Programmes Have an Impact on Injury Incidence in Football?

¹Alen Marosevic^{ID}, ¹Ivan Belcic^{ID*}, ¹Ivan Krakan^{ID}

¹Department of Sport, Faculty of Kinesiology, University of Zagreb, Zagreb, Croatia.

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ABSTRACT

Background. Injuries in football are often, and they cause many problems for clubs and players, for this reason, it is of utmost need to try to restrict them to the lowest possible level. **Objectives.** The main objective of this study is to confirm whether clubs that regularly implement prevention programmes will have a significantly lower incidence of injuries than clubs that do not implement them or do not implement them regularly. **Methods.** The sample of participants consisted of 340 football players who compete in the highest ranking of competition in Croatian football. Data collection was carried out in a prospective way, where the person in charge of a particular club entered data into the database every two weeks. **Results.** A comparison of the application of preventive programmes with respect to their non-application shows a statistically significant difference in the occurrence of injuries ($p < 0.009$), which means that a significant difference was observed between these programmes. The presence of injuries in clubs that use preventive programmes is 60.12% compared to 73.45% in clubs that do not use preventive programmes. **Conclusion.** It has been confirmed that preventive programs reduce the frequency of injuries in the First Croatian Football League, exactly as the already proven reduction of injuries in other European leagues.

KEYWORDS: FIFA11+, Football Injuries, Players' Knowledge, Injury Prevention.

INTRODUCTION

Daily high-intensity training, frequent trips, playing in domestic and European leagues with the imperative to achieve positive results put football players in a situation of high risk of injury. Football is not without risks, and injuries are an inherent part of the game. These injuries, ranging from minor sprains to severe concussions, can have profound and lasting effects on the well-being of players. The possibility of injury to players increases exponentially if it is taken into account that their occurrence mostly occurs at the moment of contact between players, which is an essential feature of this sport (1–4). Precisely because of a large number of matches and loads (often in a very short period), as well as the previously mentioned contacts and collisions, the risk of injury in football

is very high. The risk of injury for a professional football player is 1000 times higher than that of a worker doing a dangerous job in the industry (5–7). In addition to the huge cost that an injury brings to the club and the footballer, the player's injury also calls into question the continuation of the season but also increases the risk of repeated, more serious injuries. Thus, a football player who has suffered a minor injury will usually return to full training load in less than 7 days (8). Injuries that are more serious and require an absence of more than 28 days should be treated with much more caution. One of the reasons is that in more than 50% of cases of such injuries, a repeated injury occurs. This injury is an identical one and occurs at the same place. In such cases, apart from the high

*. Corresponding Author:
Ivan Belcic, Ph.D.
E-mail: ivan.belcic@kif.hr

risk for the club that loses a large amount of money, there is also the risk of jeopardizing the player's career (9). From this comes the conclusion that it is extremely important to reduce the risk of injury to football players, which is approached by ensuring quality conditions for the implementation of training processes. Ekstrand (10) together with his colleagues proved in 1983 on amateur teams that football players who participated in prevention programmes had 75% fewer injuries than the control group. Similar data were obtained by Junge et al. (9) on young amateurs who conducted research within the F-Marc group belonging to the FIFA organization. Previous research has generally shown that prevention programmes have positive effects on reducing the number of injuries in football players, regardless of whether they are professionals or amateurs (11–16).

Quite well-known and widely accepted strategies for reducing the risk of injury are prevention programmes that have been implemented for many years at all levels of competition. One of the most researched injury prevention programmes is the FIFA 11+ programme. In many scientific studies, this programme reduced the number of specific football injuries and, from a psychological perspective, better-prepared players for competitive conditions (11–13, 17, 18). Research on many participants who are predominantly amateurs showed that the mentioned programme has a significant effect on reducing the number of injuries, and this is particularly true for teams that are at a higher competitive level (14–16).

In recent years, there has been a growing awareness of the need to prioritize player safety and reduce the incidence of football-related injuries. This awareness has led to a wave of research aimed at understanding the causes of these injuries and developing effective prevention strategies. As the sport continues to evolve, so too

must our approach to mitigating injury risks and ensuring that players can enjoy the game they love without compromising their health.

In Croatia, there are practically no studies on injuries and the effectiveness of prevention programmes in football. In today's practice, many sports injuries are observed, but there is no specific data on this, so it is a great need to determine the current situation to start with the approach of injury prevention approach in Croatian football in the best possible way. According to this hypothesis of this study, which will be proved, clubs that regularly implement prevention programmes will have a significantly lower incidence of injuries than clubs that do not implement them or do not implement them regularly.

MATERIALS AND METHODS

Ethics Committee approval. This study was approved by the Ethics Committee of the Faculty of Kinesiology, University of Zagreb, and was carried out in accordance with the Helsinki Declaration. All examinees signed a statement expressing their willingness to proceed with all the testing for this research.

Participants. For the purposes of this research, the sample of participants consisted of 340 male football players (Table 1). Research participants competed in the First Croatian Football League, which is the highest ranking of competition in Croatian football. A player entering/leaving a cohort, eg through inbound/outbound club transfers, was included/excluded from the study cohort on the date of the change. Players who have an injury that they received before the start of the study or who subsequently joined the study by transfer/loan will not be excluded from the study, but their injury (if any at that time) is not recorded in the study.

Table 1. Basic descriptive parameters of the participants

	Height (cm)	Weight (kg)	Age (y)
Valid	340	340	340
Missing	0	0	0
\bar{x}	183.31	79.54	24.22
Sd	6.87	8.44	3.96
Min	159	55.00	18
Max	203	96.00	37

Procedure. Before conducting the research, a letter of intent was sent to the main football organization, the Croatian Football Association (CFF). The letter briefly explained the tasks and goals of this investigation, which was carried out on the players of the first Croatian Football League. The next step of the research was arranging meetings with the clubs (directors/sports directors) where the research plan was presented, how and in what way the players and professional teams will participate in the research, and what the obligations and duties of everyone. The protocol contained all-important research factors and their definitions so that the research was uniform for all clubs equally. After arranging all the details, players received their club's questionnaire form which they needed to fill out, and club staff sent completed forms back to the authors. Data collection was carried out in a prospective way, where the person in charge of a particular club entered data into the database every two weeks. The type of injuries that were assessed in this research is categorized as brain concussion, fracture, other bone injuries, dislocation/subluxation, sprain/ligament injury, lesion of the meniscus/cartilage, muscle rupture/strain, laceration, tendon injury/rupture, tendinitis/bursitis, hematoma/bruising, cramps, abrasion, nerve injury and dental injury.

Data Analysis. Data analysis was performed with the software SPSS 20 statistical package (SPSS Inc., Chicago, IL). Descriptive statistical data (mean, standard deviation, appearance of distribution) are calculated for all anthropometric measurement parameters. The frequency and percentages of responses to questions about attitudes towards prevention programmes are calculated from categorical data (cross-tabulation). The exposure of players in matches/training as well as the incidence of player injury per 1000 hours of exposure in matches/training was also calculated. The frequency and percentages of responses to questions about attitudes toward prevention programs were derived from Crosstabulation tables. The chi-square test was used to determine differences and the significance level was set to $p < 0.05$.

Questionnaire. The questionnaire distributed to the players was used to examine the attitudes towards prevention programmes. A modified questionnaire on attitudes towards lower extremity injuries was used to examine attitudes

towards prevention programmes (according to the study by O'Brien and Finch (19)). The questionnaire was divided into three parts: 1. general information about the respondents; 2. opinions about sports injuries and 3. opinions about prevention programs. Respondents filled out this questionnaire only once at the very beginning of the research.

General information:

1. The name of the club you play for
2. Your body mass
3. Your body height
4. Your age
5. Dominant leg
6. Position in the team

Opinions about prevention programmes

1. Did you hear about prevention programmes before filling out this questionnaire?
2. Is your team currently conducting prevention programmes?
3. If your team is conducting a prevention programme, please name it.
4. Have you ever been on a team that used FIFA 11+ programme?
5. Does the prevention programme have to be improved for use in your team?
6. Has your club developed its own version of a prevention programme?

RESULTS

The results of the participants according to the point of view on prevention programmes show that when asked if they had heard about prevention programmes before completing this survey, 49.7% of the participants said yes, 47.9% of the participants said no, while 2.4% of the participants said they were not sure (Table 2).

The particle according to the matrix belongs to the reach dimension (R). Furthermore, when asked if their team currently uses a prevention programme, 47.1% of the participants stated yes, 45.6% of the participants stated no, and 7.4% of the participants stated that they were not sure. The particle according to the matrix represents reach, adoption, and maintenance. When asked if your team uses a prevention programme, please indicate which one can be seen as 7.7% of participants mention FIFA 11+, 2.8% of participants mention the PEP programme, 3.7% of participants mention Knaekontroll and 85.8% of participants state another. According to the matrix, this particle belongs to reach and adoption (Table 3).

Table 2. Information on prevention programmes with RE-AIM dimensions

		N	%	RE-AIM dimensions
Did you hear about prevention programmes before filling out this questionnaire?	Yes	169	49.7%	R
	No	163	47.9%	
	Not sure	8	2.4%	
	Total	340	100.0%	
Is your team currently conducting prevention programmes?	Yes	160	47.1%	R, A, M
	No	155	45.6%	
	Not sure	25	7.4%	
	Total	340	100.0%	

R: reach, E: effectiveness, A: adoption, I: implementation, M: maintenance.

Table 3. Information on prevention programmes with RE-AIM dimensions

		N	%	RE-AIM dimensions
If your team is conducting a prevention programme, please name it	FIFA 11+	25	7.7%	R, A
	PEP programme	9	2.8%	
	Knaekontroll	12	3.7%	
	Others	278	85.8%	
	Total	324	100.0%	

R: reach, E: effectiveness, A: adoption, I: implementation, M: maintenance.

When asked if you have ever been on a team that used the FIFA11+ programme, 19.5% of participants said yes, 32.7% of participants said no, and 47.8% of participants said they were not sure. According to the particle-matrix, it falls under reach and adoption. Furthermore, when asked whether the prevention programme should be improved for use in your team, 38.1% of the participants said yes, 30.4% of the participants stated no, and 31.6% of the participants stated that they were not sure. The question refers to

adoption, implementation, and maintenance. When asked if your club has developed its own version of a prevention programme, 47.4% of the participants said yes, 27.1% of the participants said no, and 25.6% of the participants said they were not sure. The particle indicates the reach and implementation (Table 4).

A Chi-square test shows a statistically significant difference in the occurrence of injuries with the application of preventive programmes compared to their non-application (Table 5).

Table 4. Information on prevention programmes with RE-AIM dimensions

		N	%	RE-AIM dimensions
Have you ever been on a team that used FIFA 11+ programme?	Yes	66	19.5%	R, A
	No	111	32.7%	
	Not sure	162	47.8%	
	Total	339	100.0%	
Does the prevention programme have to be improved for use in your team?	Yes	129	38.1%	A, I, M
	No	103	30.4%	
	Not sure	87	25.6%	
	Total	339	100.0%	
Has your club developed its own version of a prevention programme?	Yes	161	47.4%	R, I
	No	92	27.1%	
	Not sure	87	25.6%	
	Total	340	100%	

R: reach, E: effectiveness, A: adoption, I: implementation, M: maintenance.

DISCUSSION

A comparison of the application of preventive programmes regarding their nonapplication shows a statistically significant difference in the

occurrence of injuries. It can be seen that $p < 0.05$, which means that a significant difference was observed between these programmes. The presence of injuries in clubs that use preventive

programmes is 60.12% compared to 73.45% in clubs that do not use preventive programmes. It has been established that preventive programs reduce the frequency of injuries both in the Europe-an and in the First Croatian Football League. Numerous authors obtained the same positive research results that investigated the impact of preventive programs on reducing the incidence of injuries (12, 14, 15, 20). The authors also concluded that long-term use of the programme can reduce injury rates by 20 to 50%. O'Brien and Finch (19) also investigated how best to implement scientifically proven prevention programmes in practice. One of the problems is "agents", that is, people who implement programs with end users - athletes. In the event that the agent is not a researcher, but a trainer or a therapist, his education is required in order to implement the programme in the prescribed manner. In the entire process of implementation of the prevention program and its implementation, the most important component is the "agent" mentioned by O'Brien and Finch (19). The scientific research cited in this paper was conducted under laboratory conditions and under a small sample, so positive results could be expected. This research was conducted on a huge sample of participants where personal influences played a significant role while the result was ultimately positive. It should also be noted the research by Soderman et al. (21), who conducted research on female football players with an average age of 20.5 years and a semi-professional

level of competition for 6 months, 5 times a week. Compared to other studies, this did not offer statistically significant conclusions. No significant differences were found between the groups considering the number, incidence, or type of traumatic injuries of the lower extremities. However, there is great room for improvement in the implementation of preventive programmes in teams that use it, that is, in the implementation of the same in teams that do not use it. The systematic implementation of these will lead to a reduction in the number of injuries, a reduction in material and technical costs, and ultimately to a prolongation of the player's career. It has been proven in previous research that prevention programs give positive results at the professional level. It was also proven in this research that teams that use prevention programs have a significantly lower number of injuries than teams that do not use them. In a practical sense, preventive programs should be introduced at all levels of competition in the First Croatian Football League, either in a unified form like FIFA11+ or in a modified form so that it is suitable for each team separately. Raising the awareness of players of the First Croatian Football League towards preventive programmes in terms of career extension is also one of the important practical conclusions. The attitudes of football players in the First Croatian Football League have been shown to differ from those of professional players in other leagues, which is also an indication that education in this area should be increased.

Table 5. Comparison of using / not using prevention programmes regarding injuries

	Injuries		Without injuries		Total		p*
	N	%	N	%	N	%	
Clubs that use prevention programmes	98	60.12%	65	39.88%	163	100.00%	p=0.009
Clubs that don't use prevention programmes	130	73.45%	47	26.55%	177	100.00%	

*: Chi-square test significance.

When the participants were asked if they were in a team that used the FIFA11 + programme (the particle belongs to reach and adoption), the results obtained are better than the results of other researchers (19, 22), where the players confirmed with 11% that they were in a team that uses FIFA11+, they are not sure with 51%, which is also a weaker result than the First Croatian football league, and 38% of participants are not sure, while in the First Croatian football league, that percentage is slightly higher and amounts to 47.8%. From this

data, it can be determined that the players of the First Croatian Football League recognized the prevention program and used it in their club, while the majority of players are also unsure. Another reason why an extremely small percentage of players have heard of the FIFA11+ program may be that the program was primarily developed for amateur and recreational teams, while the sample of participants in this research is a professional football player. The programme was introduced in 2006, and there is a high possibility that the players did not participate in

amateur clubs at that time. Another reason for the low representation of the program may be the slow integration of the program across all levels of the football organization in Croatia (national association, regional associations...). Research that supports the low representation and knowledge of the FIFA11+ programme is reported by Owoeye et al. (17) on the younger football players of the Nigerian First League, where only 21% of the players had knowledge of the program.

One of the more important factors that gives strength to this research is the level of competition at which the research was conducted. It should also be noted that almost 100% of the competitive level itself is included in the study results.

Addressing injuries in football is paramount for the well-being of players and the sustainability of the sport. Future research should remain dedicated to advancing our understanding of these injuries and developing effective prevention strategies. By focusing on concussion prevention and management, lower extremity injury reduction, heat-related injury prevention, overuse injury management, and muscle and soft tissue injury prevention, a safer environment can be created for football players at all levels of the game. Collaboration between researchers, medical professionals, coaches, and players is essential in implementing evidence-based preventive measures. In addition, the integration of technology, such as advanced helmets and wearable devices, can significantly aid in injury prevention and player safety. Ultimately, as research continues to shed light on the causes and prevention of football-related injuries, the sport can evolve to minimize risk while preserving the excitement and camaraderie that make football a beloved global pastime. This collective effort to reduce injuries not only benefits current players, teams, and management of the club but also ensures a healthier future for football and its athletes. Also, it will show the path for strength and conditioning coaches to implement injury prevention programmes for their plans for the season.

CONCLUSION

Results of this research show that the implementation of prevention programmes clearly has a significantly lower number of injuries. Players have a generally positive

opinion towards prevention programmes and they are clearly motivated to conduct this during their training, but there is still a significant number of players who are not sure or don't have knowledge about prevention programmes that are conducted in their clubs. It was found that the representation of prevention programs in the First Croatian Football League is lower when compared to the elite clubs that compete in the Champions League. Comprehensive education of all stakeholders in this system is needed, starting from the top in the football organization that will lead the process through all phases. As proven through previous research, the implementation of prevention programmes truly reduces the number and severity of injuries to which professional football players are susceptible.

APPLICABLE REMARKS

- Determination of the exact number, severity, and type of injuries that appear in the highest rank of football in Croatia is data that wasn't known until now, and it can be used for a better understanding of injury prevention and reduce the number of them. In addition to the number, severity, and type of injuries, based on the results of the players' attitude towards injuries and the use of prevention programs, the results of the study can further develop the existing prevention programs that are used or propose the creation of own programmes based on the results. Another practical implication of the results with applicable remarks is definitely additional education of all medical and sports staff which is needed for all participants in the football game in order to make the implementation of prevention programs easier, more precise, and more productive.

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AUTHORS' CONTRIBUTIONS

Study concept and design: Alen Marosevic, Ivan Belcic. Acquisition of data: Alen Marosevic. Analysis and interpretation of data: Ivan Krakan. Drafting the manuscript: Alen Marosevic, Ivan Belcic, Ivan Krakan. Critical revision of the manuscript for important

intellectual content: Ivan Belcic. Statistical analysis: Ivan Krakan. Administrative, technical, and material support: Ivan Krakan. Study supervision: Alen Marosevic, Ivan Belcic.

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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