Original Article

An Intervention Plan for Preventing and Handling Amateur Soccer Players' Injuries

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Abstract

Background: The majority of amateur soccer players are vulnerable to soccer-related injuries and many such injuries are avoidable with an adequate education. **Aim:** The present study aimed to measure the impact of an intervention educational plan on improving amateur soccer players' knowledge and skills in preventing and handling soccer-related injuries. **Subjects and Methods:** The study design is a group-clustered randomized intervention-control trial, and it was carried out in Taif city, Saudi Arabia. The "Neighborhood League of Football" players were randomly allocated to a soccer injury prevention education group (intervention group) and a control group. A predesigned and validated questionnaire was used to study the changes in knowledge and skills about soccer injuries before the intervention (response a) and after (response b). **Results:** The study included 246 participants in the intervention group and 256 in the control group (n = 502). The median age was 22 years. The comparison of both groups› participants› performance showed significant differences in response b analyses and participants in the intervention group achieved significantly higher scores than the control group in total score levels ($P < .0001$), injury mechanisms ($P < .0001$), injury treatment and prevention ($P < .0001$), and health status ($P < .034$). The intervention group›s scores on response b (after the educational sessions) were significantly higher than response a (before the educational sessions, $P < 0.001$). **Conclusions:** In multiple scales and overall score levels, intervention group participants achieved significantly higher scores than their control group counterparts. Educational assistance appears to have had a good impact on their knowledge and skills.

Keywords: *Amateur soccer players, injury risk, prevention program, soccer injuries*

Introduction

Soccer (or football) is without question the world's most popular sport, with more than 270 million registered players.[1] For over a decade, soccer has been the sport that people under 18 years of age most frequently play.[2,3] World soccer takes many forms, including formal association soccer clubs and national teams, as well as informal/pickup soccer, occasional recreational soccer, beach soccer, and indoor soccer.[4] All informal soccer forms enjoy a wide range of flexibility as far as the number of players per team, match duration, arena setup, and game rules. However, amateur players frequently tend to assemble into somewhat organized groups and engage in systematic competitions, mimicking formal soccer tournaments.

Soccer injury can be defined as "any physical complaint sustained by a player which results from a soccer match or training keeping player from participation for a certain time duration, e.g. one day."[5] A "Consensus Statement on Injury Definitions and Data Collection Procedures in Studies of Football Injuries" also defines soccer injury

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as "an injury that results in a player receiving medical attention is referred to as a 'medical-attention' injury and an injury that results in a player being unable to take a full part in future football training or match play as a 'time-loss' injury."[6,7]

The athletic-related injury rate was calculated as the number of injuries/1000 h of player activity time or the number of injuries per 1000 athlete exposures.[8,9] Researchers find it impractical to identify precise statistics for the incidence of all types of soccer injuries, especially among informal and amateur soccer. Generally, muscle injuries account for 31% of all soccer injuries and are responsible for 25% of days of absence away from training and competition of players.[10] In the European men's professional soccer league, injuries occur at a rate of 8/1000 player hours (two injuries per player/season),[9,11] which for a team of 25 players translates to 50 injuries of varying severity per season, resulting in high medical costs and lost playing time. In younger and amateur players, the incidence is lower, for example, 6.6/1000 hours of competition compared to 9.5.[9] The injury rate usually increases both in the latter portion of the season and when the game frequency increases.[9,11] Data from the National College Athletics Association (USA) show that between the 2004/05 and 2008/09 seasons, an overall injury rate of 7.7/1,000 athlete exposures had been reported, including 16.9 injuries/1000 athlete exposures in games, 5.1 injuries/1000 athlete exposures in practice, 7.5 injuries/1000 athlete exposures in season, and 4.6/1000 athlete exposures in the postseason.[12]

Young people make up the majority of amateur soccer players, making them the most susceptible to soccer-related injuries. Therefore, it is necessary that players must be well versed in injury prevention and management. A review of the literature revealed a scarcity of data on the impact of an educational intervention on amateur soccer players' awareness of soccer-related injuries. Therefore, the present study was aimed to measure the impact of an intervention educational plan on improving amateur soccer players' knowledge and skills in preventing and handling soccer-related injuries.

Material and Methods

We used a randomized, interventional control study design to achieve the study objectives. The study was performed at the Taif Neighborhood League of Football "Taif NLF" setting, Taif city, Saudi Arabia. The ethical review committee of the Ministry of Health, Taif, Saudi Arabia, approved the study (reference no. HAP-02-T-067-24).

The study population was male adults participating in Taif NLF in the April 2018 season. The venue to accommodate the intervention group was the General Authority of Sports (GOS) facility in Taif upon management approval, where lessons were taking place. The facility was well equipped for continuous education and could accommodate large numbers of learners.

In the present study, we included male amateur Taif soccer athletes aged ≥18 years of all nationalities who had been living in Taif city, Saudi Arabia, for at least the last 3 years and had a valid registration status in the NLF and NLF-Taif branches during the 2018 season and whose team had a valid membership status. Exclusion criteria were having a record of punitive action for misconduct in previous tournaments (unless punitive action was revoked), being a health-care professional or affiliated with any sports coaching organization or being a member of any professional or formal association soccer teams registered with Fédération Internationale de Football Association (FIFA).

The minimal required sample size was calculated using G power version 3.1.9.2 software.[13] G power is an analysis program that provides different statistical tests for different types of research; it is available for free download. With no previous similar studies performed, an assumption of a 30% effect size, which is considered a medium effect size, was used to calculate the sample size. The necessary sample size was calculated to be 176 players in the intervention group and 176 in the control group. Therefore, the estimated sample size was 352 players, with an alpha level set at 0.05 and power at 80%. However, the sample size was expanded to 500, considering the low follow-up rate.

A cluster sampling technique was chosen to conduct the experiment. Out of 62 Taif NLF teams with 40–50 (average 45) players per team,[14] a cluster of 12 teams (500/45 = 12) were randomly selected: 6 (250/45 ≈ 6) were randomly assigned to the intervention group and 6 were randomly assigned to the control group. First, all teams were coded from 1 to 62, and 12 teams were randomly selected using the Excel program "RAND ()" function (https://www.uwec.edu/help/Excel07/randomdata.htm). Members of each team were clustered and studied. Selected teams were also tracked on the NLF schedule, met on the match days in collaboration with team leaders, and were invited to take part in the study. The stadium recruitment continued on the scheduled days until all players from all 12 teams who participated in the study were invited. Candidates who agreed to participate were identified by ID, team name, and NLF registration number and then coded until the study was completed.

A predesigned questionnaire was used to address the concepts congruent with the study aim. The questionnaire used data derived from our literature review, which focused on the study problem, and were guided by the "theory of reasoned action" principles,[15] together with reviewing other published studies of youth soccer injuries. The questionnaire was validated through a panel of experts, including community medicine consultants, research experts, and sports medicine experts, where its face and content validity were evaluated. Amendments based on the panel's notes were made. Internal consistency of items was good (Cronbach's alpha = 0.885). Also test–retest reliability was assessed, and it was good (interclass correlation coefficient = 0.709).

Questionnaire domains addressed certain traits, particularly sociodemographic data, soccer injury patterns, and types (reflecting the level and quality of knowledge acquired in this area); soccer injury presentation, symptoms, and signs; attitudes toward safety behaviors and perceived outcomes of these behaviors and other questions that apply these concepts to soccer injury inquiry; subjective norms and perceived behavioral control factors relating to the level of support received, or expected to be received, if the player were to be injured; preventive attitude toward injury and health status; and history of previous soccer injuries and first aid measures or treatment or rehabilitations and absenteeism from participation. Those domains were further expressed as six main questionnaire scales, including (a) demographic scale, (b) health status scale, (c) soccer injury mechanisms knowledge scale, (d) injury risk beliefs scale, (e) injury treatment and prevention scale, and (f) soccer playing experience scale. Most items gave response options either "yes," "no," or "don't know" or as a Likert scale, such as "strongly disagree," "disagree," "neutral," "agree," and strongly agree." The questionnaire design allowed scoring for items, scales, and overall scores. The scoring system depends on giving the selected items an equal score range, 0–5 points (whereas 0 corresponds to an incorrect response and 5 corresponds to a correct response, as per the questionnaire's scientific background information).[15]

Forty-five items in four scales were selected to calculate the questionnaire's maximum scale totaling 215 points as follows: 7 items/health status scale (7 × 5 = 35); 5 items/injury mechanisms scale (5 × 5 = 25); 19 items/injury risks scale (19 × 5 = 95); and 12 items/injury treatment and prevention scale (12 × 5 = 60).

The questionnaire was given twice to all participants in both the intervention and control groups before and after conducting the educational session (educational session was given to participants in the intervention group only). Participants took 30–35 min to complete the questionnaire. Received questionnaire responses were entered into the analysis if they contained ≥80% valid answers.

The educational intervention

Each educational session consisted of two 90-min meetings, with a 15-min break time. The sessions were in the form of PowerPoint presentations on audiovisual technology available at the GOS facility, handouts, video material, and some mannequins and models. The best evidence resources were used to prepare lesson plans, considering FIFA11+ concepts as general guidelines.[16] The content of the educational session included the causes and mechanisms of soccer injuries, types of injuries, symptoms of injuries, and measures to prevent and treat them (first aid measures). The session was implemented by the investigator. Evaluation of the impact of the educational session on players' knowledge regarding mechanisms of soccer injuries, risks for their occurrence, prevention, and treatment was conducted 1 week after session completion using the predesigned questionnaire. The impact of training is shown in the Results section.

Statistical analysis

The categorical data were described as frequency and percent. The normality of quantitative data was assessed using the Shapiro–Wilk test. Skewed data were described as median and interquartile ranges. The Mann–Whitney test was used to determine whether there

Table 1: Study groups demographic characteristics (*n*=502)

Variable	Intervention group		Control group	
	n	%*	*n*	%
Age (years)				
Age category				
18-21	96	39.0	107	41.8
22-25	99	40.2	78	30.5
26-29	39	15.9	35	13.7
≥30	12	4.9	36	14.0
Nationality				
Saudi	220	89.4	249	97.3
Non-Saudi	26	10.6	7	2.7
Education				
Intermediate-secondary schools	60	24.4	57	22.3
College/Above	186	75.6	199	77.7
Current employment				
Employed	66	26.8	78	30.5
Unemployed	51	20.7	35	13.7
Student	129	52.5	143	55.8

was a significant difference between the intervention and control groups. Wilcoxon signed-rank test was used to assess the difference between response a and response b in the intervention and control groups. Analysis was performed using SPSS 25.0 (SPSS Inc. Chicago, IL, 2020). The *P* values were considered significant if it was < 0.05.

Result

Out of 620 athletes who agreed to participate in the study and who were randomly distributed to the intervention group and control group, 246 out of 310 participants in the intervention group and 256 out of 310 participants in the control group submitted valid questionnaire responses (response rate 79.4% and 82.6%, respectively). The participants' median age was 22 years (IQR = 5), and the age range was between 16 and 45 years. Most of the participants were in the age categories of 18–21 and 22–25 years [380/502 = 75.7%]. The majority of participants were Saudi (469/502 = 93.4%). Education wise, most participants (385/502 = 76.7%) were either current college students or held a university degree [Table 1].

The participants' score in the intervention group on the three main scales (injury mechanisms knowledge, injury risks beliefs and injury treatment, and prevention knowledge) was significantly improved on response b (after the educational sessions) compared to response

Table 2: Comparison of intervention group performance (scores) before and after the educational program (*n*=246)

Scale	Response[a]	Response[b]	Test statistic*	*P*
Injury mechanisms knowledge				
Mean (±SD)	10.67 (±3.03)	12.51 (±3.17)	*Z*=9.47	<0.0001
Range	15 (6-21)	15 (6-21)		
Median (IQR)	10.0 (4)	12.0 (5)		
Injury risks beliefs			*Z*=8.53	<0.0001
Mean (±SD)	71.57 (±13.92)	75.28 (±11.04)		
Range	72 (21-93)	70 (25-95)		
Median (IQR)	75.0 (9)	78.0 (3)		
Injury treatment and prevention knowledge			*Z*=9.41	<0.0001
Mean (±SD)	48.10 (±6.25)	51.6 (±3.17)		
Range	42 (18-60)	26 (33-59)		
Median (IQR)	49.0 (9)	53.0 (6)		
Overall score			*Z*=12.33	<0.0001
Mean (±SD)	162.14 (±17.40)	171.95 (±12.44)		
Range	117 (75-192)	83 (119-202)		
Median (IQR)	165.0 (15)	173.0 (16)		

*Wilcoxon signed-rank test

Table 3: Comparison of control groups' performance (scores) on the study questionnaire scales (*n*=256)

Scale	Response[a]	Response[b]	Test statistic*	*P*
Injury mechanisms knowledge				
Mean (±SD)	10.93 (±3.0)	10.99 (±3.0)	*Z*=1.41	0.157
Range	15 (20-25)	15 (20-25)		
Median (IQR)	11.0 (3)	11.0 (3)		
Injury risks beliefs				
Mean (±SD)	73.86 (±9.4)	73.78 (±9.3)	*Z*=1.53	0.126
Range	54 (38-92)	53 (36-90)		
Median (IQR)	76.0 (9)	75.0 (8)		
Injury treatment and prevention knowledge				
Mean (±SD)	49.30 (±4.5)	48.90 (±3.9)	*Z*=1.77	0.061
Range	24 (36-60)	21 (38-59)		
Median (IQR)	49.0 (6)	49.0 (6)		
Overall score			*Z*=1.68	0.09
Mean (±SD)	165.59 (±10.9)	165.88 (±10.5)		
Range	53 (133-168)	52 (135-187)		
Median (IQR)	169.0 (11)	169.0 (9)		

*Wilcoxon signed-rank test

Table 4: Comparison of intervention and control groups' performance (scores) on the study questionnaire scales (*n*=502)

Score of response-a	Intervention Median (IQR)	Control Median (IQR)	Test statistic*	*P*-value
Overall	165.0 (15)	169.0(11)	*U*=28371.0	0.550
Injury mechanisms	10.0 (4)	11.0 (3)	*U*=29884.5	0.320
Injury risks	75.0 (9)	76.0 (9)	*U*=21414.0	0.334
Injury treatment	49.0 (9)	49.0 (6)	*U*=28983.0	0.122
Health status	32 (5)	31 (5)	*U*=28252.0	0.420
Score of response-b	**Median (IQR)**		**Test statistic***	***P*-value**
Overall	173.0 (16)	169.0 (9)	*U*=20.851.5	<0.0001
Injury mechanisms	12.0 (5)	11.0 (3)	*U*=21414.0	<0.0001
Injury risks	78.0 (3)	75.0 (8)	*U*=26115.0	<0.0001
Injury treatment	53.0 (6)	49.0 (6)	*U*=18975.0	<0.0001
Health status	34 (5)	33 (5)	*U*=28158.0	0.034

* Mann–Whitney-*U* test

a (before the education session $P < 0.001$) [Table 2]. There were no significant differences between the two responses (response a and response b) in the control group ($P > 0.05$ for all scores) [Table 3].

The comparison of both groups' participants' performance on the study questionnaire's total score and all scale analyses showed significant differences in response b analyses and participants in the intervention group achieved significantly higher scores than the control group in total score levels ($P < .0001$), injury mechanisms ($P < .0001$), injury treatment and prevention ($P < .0001$), and health status ($P < .034$) [Table 4].

Discussion

Our research was based on the hypothesis that enhancing informal nonprofessional soccer players' knowledge and skills in managing and preventing soccer injuries will reduce the incidence and severity of the consequences of such injuries. Amateur soccer players may be responsible for more than 30% of soccer-related injuries,[17] with an incidence of approximately 6.6/1000 hours of competition injury.[9] Youth and young adults are most vulnerable, as they constitute the majority of informal nonprofessional soccer athletes.[18] The current study's findings demonstrated that boosting players' knowledge of soccer injury types and causes, as well as educating them on associated risks and preventive measures, helped improve their comprehension of injury mechanisms and the perception of improved risk-avoidance behavior toward these injuries.

The present study's participants were as young as 22 (IQR 5) years old, and the age range justifies engaging them in educational and soccer injury prevention experiments to minimize the burden of exposure to those injuries.[19,20]

Our results showed improvement in our subjects' perception of common soccer injury mechanisms, risks, and prevention measures after attending the predesigned lesson plan and utilizing educational tools. The number of achieved positive rank in favor of response b scores all over the examined scales was greater than that of response a (e.g. injury mechanism 117 vs. 0, injury risks 108 vs. 3, injury treatment 132 vs. 6, and positive rank in favor of response b for overall score 210 vs. 3, $P < 0.0001$ all scores). Expectedly, controls failed to achieve such improvement. Further, the subjects compared with controls achieved a significantly higher score on all examined areas of soccer injury knowledge, risks, prevention, and health awareness issues. The better results in the interventional group showed success in orienting study subjects on the importance of health and wellness and conveying these concepts through the delivered evidence-based educational activity.

The current study found a few factors that influenced the participants' understanding, like age and employment status. It has been found that subjects 26 years of age and above achieved a higher score than younger peers. It means there might be a need to pay more attention to the younger age groups while developing educational and training programs to raise their soccer injury knowledge and prevention skills. Such age category is more vulnerable to soccer injury consequences, especially in the absence of attending specialized health care and sports injury personnel at the arena.[18] Likewise, subjects who were presently students scored lowest, for example, compared with employed peers. Employment is generally associated with older age compared with studentship and this provides more evidence among this population sector for the effect of age on soccer injury and related inquiries.

Standardized soccer injury prevention programs such as the "FIFA 11^{+}" warm-up program[16] have proven remarkable success in minimizing soccer injuries' frequency and severity among amateur and professional athletes worldwide.[21,22] There was not much research on this topic, so we found limited articles to compare our results.

Amateur soccer players may sustain soccer-related injuries of varying forms and severity, some of which can be disabling; nevertheless, a significant proportion of such injuries are preventable with proper education,

such as raising the youth's awareness of the mechanisms and causes of these injuries and assisting them in improving their risk belief and the way they deal with such injuries.

Strengths and limitations

The interventional and randomized design selected for this study assures the validity of the obtained data. The study groups, that is, subjects and control, showed targeted matching, such as all were male amateur Taif soccer athletes aged ≥18 years, all had a valid registration status in the NLF and NLF-Taif branches during the 2018 season, and such state supports the validity of the results of the constructed comparison. Likewise, the large number recruited provides reliability and hence the high potential for generalizability of the study findings to the amateur athletic population.

On the other hand, the study may have been limited by the inability to extend the education plan, for example, to include field training within a comprehensive soccer injury prevention program, and hence be able to measure the effectiveness of such an integrated program upon the rate of soccer-related injuries among young amateur players in Taif. The relatively short duration (one month) of NLF season and lack of organized support and resources could be another reason against this process.

Practical implications

There is no official medical attendance in NLF leagues to offer immediate consultation to the injured participants in the arena, so the provision of basic medical supervision for NLF tournaments needs to be addressed by NLF officials and supplemented by Saudi Arabian Football Federation.

One of the currently needed policy actions is to consider continuing soccer injury prevention education, for example, based on the findings of this research, the FIFA 11+ program and other programs, as part of a national broader sports injury prevention program, directed to amateur athletes, school- and university-level students and all youth.

Conclusions

The present study showed that intervention group participants achieved significantly higher scores than control group peers in total score levels, injury mechanisms, injury treatment and prevention, and health status. Educational assistance appears to have positively impacted their knowledge and skills. Our findings provide direction for future planning to lower soccer injury rates among amateur soccer athletes. Furthermore, additional research is required to validate the impact of educational intervention on amateur soccer players.

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Conflicts of interest

There are no conflicts of interest.

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