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Comparing Two Methods of Education on First Aid Knowledge among Saudi Football Players: An Experimental Study Design

Hassan M Al Shaqqa¹, Isamme N Al Fayyad², Youssef M AlTannir³, Mohamad A Al-Tannir^{2*}

¹College of Medicine, Imam Abdulrahman Bin Faisal University, Kingdom of Saudi Arabia

²Research Center, King Fahad Medical City, P.O. Box 59046, Riyadh 11525, Kingdom of Saudi Arabia

³College of Medicine, Alfaisal University, P.O. Box 50927, Riyadh 11533, Kingdom of Saudi Arabia

*Corresponding Author: Mohamad Al-Tannir, Research Center, King Fahad Medical P.O. Box 59046, Riyadh 11525, Kingdom of Saudi Arabia, E-mail: maltannir@kfmc.med.sa

Abstract

Background: Football injuries account for more than half of all sports injuries, of which 10% require inpatient hospital management. Athletes in general and football players in specific are more prone to injuries since football is considered to be a contact sport. Thus, first aid management helps to treat common football injuries like bruises, sprains, and strains, none of which are particularly serious. However, although severe injuries are rare, knowing how to recognize them is essential so that appropriate action can be taken. The aim of this study is to assess and compare first aid knowledge among Saudi football players before and after the administration of two methods of education (lecture versus lecture and hands-on training). *Methods:* A representative clustered stratified sample of football players from football clubs in 10 regions across Saudi Arabia between August 2017 and July 2018 were recruited. First, a pre-tested self-administered questionnaire was filled by all participants; then players were randomly assigned either to lectures and hands-on training (experimental group) or lectures only (control group). A well-structured questionnaire consisting of 44 questions in addition to the demographic profile. Both groups were evaluated and compared in terms of first aid knowledge just after completion of the two educational methods. *Results:* A total of 321 football players (mean age: 26.52 ± 10.31 years) were included. Furthermore, the total mean knowledge score of the study group (81.45 ± 12.05) was significantly higher ($p < 0.001$) in comparison with that of the control group (65.92 ± 21.24). *Conclusion:* The first aid training program was overall effective in enhancing the knowledge of football players. The combined intervention including lectures and hands-on training had a better impact as compared to lectures only.

Keywords: Sports injury, Football, First aid, Training program, Interventional study, Saudi Arabia.

Abbreviations: US: United States; KSA: Kingdom of Saudi Arabia; CPR: Cardiopulmonary Resuscitation; SD: Standard Deviation

INTRODUCTION

It is widely recognized that participating in sports and physical activities are essential to maintain a healthy lifestyle [1-4]. This concept has been supported by clear evidence that links regular physical activity with an individual's fitness and mental wellbeing [1-3,5]. Engagement of an individual in sports and physical activity is highly beneficial; however, it is highly associated with the risk of injuries [6]. A sports injury or emergency is an incident that takes

place during competitive games, contact sports, and respective training sessions. Thus, sustaining an injury necessitates the player to contact the general practitioner or to visit the emergency room. Most contact sports, such as football, carry a risk of injury. Generally, all types of injuries that are sustained while practicing sports are called sports injuries [7]. In the United States (US), sports injuries are classified as the second highest cause of injury, after leisure incidents and the third in terms of severity after traffic accidents and violence [8]. Thus, hamstring strain injuries are the most common injuries in multiple sprint team sports such as football [9,10]. It is approximated that the annual prevalence of spinal cord injury is roughly 12,000 new cases or approximately 40 cases per million populations in the United States. Thus, the spinal cord injuries resulting from sports injuries now account for 8.9% of the total causes of SCI [11,12]. Thus, athletes can sustain different types of trauma, whereby, a systemic review reported that dental trauma is experienced by around 10% to 61% of the athletes [13]. Certain barriers have been reported in a study conducted in South Africa which is transportation delays after injury and admission to appropriate medical facilities [14].

A previous study at Asian Tournaments showed the overall injury frequency rate to be 45.8 out of 1000 sports hours [15]. Moreover, even moderate sports activities can result in accidents, and some of these traumas may result in long-term disabilities [16,17]. Furthermore, a recent study conducted reviewing 16,390,409 million athlete-seasons, representing 6,974,640 athlete years were examined, accounting for 36% of the total US high school athlete population. The results of the study showed that the rate of sudden cardiac arrest and death in male high school athletes was 1:44,832 athlete-years [18].

Football is considered globally as the most popular sport [19]. Injuries on the field are the commonest cause for football players' absence from matches and training sessions [20,21]. In addition, injuries of football players have a serious impact on the overall performance of the team [22]. Football accounts for more than half of all sports injuries and 10% of these injuries require hospital management [23]. The injury rate associated with football is 1000 folds higher than other high-risk occupations [24].

In compliance with the Saudi Vision 2030 and the Saudi General Sports Authority, the authorities intend to increase the number of sports clubs, and thus, encourage both, males and females, to participate in sports activities. This is estimated to increase the ratio of individuals exercising at least once a week from 13% to 40% [25]. However, this might, in turn, increase the number of sports injuries and emergencies. Thus, the implementation of 'first aid training program' will be very important as a preventive program of sports' adverse consequences [26].

Players can play a significant role in the event of sports injury or trauma before medical service arrives. However, the readiness, frequency, and quality of first aid provision are quite low globally and this can be improved with effective training [27-29]. This necessitates the implementation of 'first aid training programs' in order to deal with sports emergencies and help diminish their possible complications. Thus, football players, are at higher risk of injuries, since football is a contact sport. Moreover, considering its global popularity, it is important to provide 'first aid training program' to football players so that they can render basic first aid in times of emergency [7,23,26]. It has been highlighted in a study by Carr et al. that time is an essential and critical factor in determining trauma patient outcome [30]. Several studies globally highlight the positive effect of a first aid training program on children in schools, students in colleges, communities, etc. [31-38]. On the other hand, no previous studies assessed the effectiveness of first aid training programs among sport football clubs nor on the implementation of such programs in the Kingdom of Saudi Arabia (KSA).

Objectives

Thus, the study aims to:

1. Assess the knowledge and attitude of first aid among football players in KSA
2. Assess the impact of first aid training educational program on male football players in KSA
3. Identify the best first aid educational programs for male football players

METHODS

Study design

A randomized parallel controlled interventional study was conducted on a representative clustered stratified sample of football players from 10 regions across Saudi Arabia between August 2017 and July 2018.

Participants and recruitment

The sports clubs were stratified according to the geographical distribution of the 10 regions (clusters) in KSA. The list of sports clubs was obtained from the Saudi general sports authority. A random selection of representative clubs was performed, and invitations were sent to the clubs. Any literate male football player in the sports clubs was eligible for inclusion in the study.

Following a baseline evaluation, a sample frame was provided by the clubs' administration to assign the players to the study groups randomly. For every fifth appointment, the first player was assigned to the intervention group and the second fifth appointment to the controlled group until we reached 50% (more or less) distribution of the players.

Sample size

The estimated population of male participants registered in 115 clubs of Saudi general sports authority was 2000. The multistage sampling procedure was adopted to include 40% of the randomly selected regional football clubs from each of the cluster. While considering the post-test response rate of 60%, we accomplished a deemed sample of 300 members for this study.

Intervention

In the intervention group, players attended an educational program with lecture and hands-on training, while the control group received standard education in the context of lecture only. Emergency medical technician, with 15 years of experience, with the help of the investigator, imparted training to the players, included in the intervention group.

Data collection procedure

Although there is paucity in the research published in this field, the questionnaire was prepared based on the extensive literature review of the related articles. The study was carried out in two stages. In the first stage, a questionnaire was designed by the investigator and was piloted. It was further validated by the expert panel. The structured questionnaire was composed of questions focusing 1) socio-demographic variables, 2) knowledge of first aid and 3) attitude of the male football players towards first aid. Furthermore, the questionnaire assessed the availability of first aid kit bags in each club. A well-structured questionnaire for the assessment of knowledge and attitude that was approved by the ethics committee was brought into practice for data collection. The structured questionnaire consisting of three major sections measured:

1. Demographic data: It included questions focusing on the demographic profile such as region, name of the club, age, literacy status, time since registration
2. Attitude toward first aid training programs: It included 11 questions which assessed the importance of first aid training programs, the causes of not attending such programs, and if the players have been facing an emergency and felt guilty of not being able to help
3. Knowledge of participants: It included 33 questions regarding first aid knowledge and practice covering various topics of first aid

Then, the form was distributed to participants along with a cover letter which described the aim of the study. The questionnaire was self-administered, and the confidentiality of each football player was preserved.

During the second stage, after gathering the first data, the 'first aid training program' was conducted immediately for two hours which included the first aid training for all types of injuries or emergencies that have been reported in the clubs. The structured program prepared the male football players to be ready for action, obtain an overview of the situation and apply the basic first aid until the arrival of the ambulance. The following topics were included in the program:

1-Cardiopulmonary resuscitation (CPR), 2-Loss of consciousness, 3-Shortness of breath, 4-Bleeding and injuries, 5-Fractures, 6-Limb displacement, 7-Back and neck traumas, 8-Sprains, 9-Muscle tears, 10-Choking, 11-Sunstroke, 12-Epilepsy attacks, 13-Heat cramps

The training program included two interventions, a lecture and practical performance on mannequins; however, we aimed to divide the participants into two groups (Study Group: receiving lectures and hands-on training; Control group: receiving lectures only for the purpose of comparison between the two interventions. The same questionnaire

was immediately distributed to the same participants to examine the effectiveness of the program and after the collection of the questionnaire by the investigator; brochures were distributed summarizing the entire learned topics.

The knowledge was scored by a proportion of the total number of correct questions to the total questionnaire number as 100 points divided equally into questions. The score of a player was 0 if none of his answers was correct and 100 if all the answers were correct. Missing answers were considered as the wrong answer. Subsequently, data entry and data analysis were carried out by applying standard statistical norms.

Statistical analysis

The statistical analysis was conducted using Statistic Package of Social Sciences (SPSS version 25.0). The scores of each section in the questionnaire were calculated for each player. Also, the analysis included only those players who completed the program and the post-test. The descriptive statistics were performed, and metric data were presented as mean and standard deviation (SD). On the other hand, the categorical variables were presented as percentages. Both unpaired and paired comparisons were made by applying the most suitable tests to examine the effectiveness of the first aid training program. The statistical inference was made at a 95% confidence interval.

Ethical consideration

The study was reviewed and approved by the institutional review board of King Fahad Medical City. The participation of football players was entirely voluntary. Written informed consents were obtained, and the identity with personal information of the participant was kept confidential. In addition, permission was obtained from each club administration and the participants were informed about their right to withdraw at any time. The intervention did not have any harmful effects on participants.

RESULTS

A total of 321 participants with a mean age of 26.52 ± 10.31 years (age range: 12-37 years) were included in the analysis.

Table 1: Participants demographics

Participants demographics		n (n%)
Age in years (Mean \pm SD)		26.52 \pm 10.31
Province	Al-Namas	34 (10.6)
	Al-Bahah	30 (9.3)
	Asir	53 (16.5)
	Central	41 (12.8)
	Eastern	44 (13.7)
	Jazan	25 (7.8)
	Madinah	20 (6.2)
	Makkah	24 (7.5)
	Najran	25 (7.8)
	Qaysoma	25 (7.8)
Level of Education	Illiterate	2 (0.6)
	Primary school	15 (4.7)
	Intermediate school	26 (8.1)
	Secondary school	116 (36.1)
	University	151 (47.0)

	Post-graduate	8 (2.5)
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Out of 321 participants, 151 (47.0%) and 116 (36.1%) represented university and secondary school levels, respectively (Table 1).

The majority, 309 (96.3%) participants, believed that first aid training programs were important, and 301(93.8%) indicated that first aid training programs prepared them to deal with emergencies. However, about 207 (64.5%) participants reported that they never attended any first aid training program. One-hundred and five (32.7%) reported that no one advised them to attend a first aid course. Moreover, 135 (42.1%) revealed that they faced an emergency and were not able to help; of whom, 72 (53.3%) didn't know how to identify the cause or deal with the situation. In addition, 243 (75.7%) indicated that they did not have a proper first aid kit bag available in their club (Table 2).

Table 2: Attitudes toward first aid training programs

Attitudes toward first aid training programs	n (n%)
Do you think that first aid training programs are important?	
Yes	309 (96.3)
No	10 (3.1)
Do you think that first aid training programs prepare you enough to deal with emergencies?	
Yes	301 (93.7)
No	18 (5.6)
Have you ever attended any first aid training programs?	
Yes	110 (34.3)
No	207 (64.5)
If yes, then how many: (Mean±SD)	1.63 ± 1.24
If the answer is (No) in the previous questions, why have not you attended any first aid programs?	
I do not have enough money to pay for the courses	21 (10.1)
I think that the course is worthless/unimportant	14 (6.8)
No one advised me to attend a first aid course	105 (50.7)
I have other reasons: (Lack of training)	44 (21.3)
Have you ever read about ways to deal with emergencies?	
Yes	181 (56.4)
No	136 (42.4)
Do you think that your knowledge qualifies you to deal with emergencies and injuries in the club even in serious situations?	
Yes	53 (16.5)
No	265 (82.6)
Is there a proper first aid kit bag available in your club?	
Yes	75 (23.4)
No	243 (75.7)
Have you ever faced an emergency and were not able to help?	
Yes	135 (42.1)
No	184 (57.3)

If the answer is (Yes) in the previous questions, why you could not help?	
I didn't know how to identify the cause or deal with the situation.	72 (53.3)
I didn't feel confident or able to do anything	32 (23.7)
I didn't have first aid equipment	25 (18.5)
I have other reasons: (Lack of knowledge, confidence, and equipment)	8 (5.9)
Have you ever dealt with an emergency in the wrong way?	
Yes	29 (9.0)
No	287 (89.4)
Have you ever felt guilty when you were faced with an emergency and were not able to help?	
Yes	201 (62.6)
No	112 (34.9)

Comparison of the participants' knowledge in the pre-test and post-test

As depicted in Table 3, the results showed a statistically significant ($p < 0.001$) improvement in all topics covered in the training program. The results revealed that the mean knowledge score in the CPR topic improved from 8.34 ± 4.06 in the pre-test to 15.87 ± 5.19 post-test, and in the fracture topic from 10.24 ± 3.84 in the pre-test to 13.70 ± 3.67 post-test. In the ligament tears topic, the participants recorded a higher mean knowledge score in the post-test (6.66 ± 2.85) in comparison with the pre-test mean score (3.26 ± 2.42). Overall, the participants demonstrated a statistically significant ($p < 0.001$) improvement in their total knowledge post-test (73.66 ± 18.93) as compared to the pre-test (48.46 ± 16.63).

Table 3: Comparison of the participants' knowledge pre-test-and post-test

Sessions	Pre-test	Post-test	p-value
Cardiopulmonary resuscitation	8.34 ± 4.06	15.87 ± 5.19	<0.001
Fracture	10.24 ± 3.84	13.70 ± 3.67	<0.001
Bleeding	6.17 ± 3.54	9.01 ± 3.51	<0.001
Airway obstruction	1.88 ± 1.52	2.61 ± 1.16	<0.001
Neck and back injuries	4.66 ± 1.80	5.14 ± 1.74	<0.001
Thermal injuries	3.29 ± 2.66	4.78 ± 2.25	<0.001
Epileptic seizure	2.17 ± 2.29	4.61 ± 1.98	<0.001
Limb displacement	1.97 ± 1.51	2.57 ± 1.22	<0.001
Muscle cramps	1.38 ± 1.55	1.20 ± 1.5	<0.001
Strain	3.18 ± 2.27	4.57 ± 2.20	<0.001
Ligament tears (Sprain)	3.26 ± 2.42	6.66 ± 2.85	<0.001
Asthma	1.95 ± 1.51	2.38 ± 1.33	<0.001
Total Score	48.46 ± 16.63	73.66 ± 18.93	<0.001

Comparison of the post-test scores according to the type of education

Table 4 presents the comparison of the participants' post-test scores according to the type of education. The findings revealed a statistically significant difference in all topics between the interventional and control group. For CPR, the participants recorded a higher mean knowledge score (17.68 ± 3.87) in the intervention group than those in the control group (14.04 ± 5.68 ; $p < 0.001$). Also, participants in the intervention group have shown a mean knowledge

score (14.96 ± 3.02) greater than that of the participants in the control group (10.96 ± 3.83) in the fracture topic ($p < 0.001$).

Table 4: Comparison of the post-test scores according to the type of education

Sessions	Lectures and practice (Intervention group)	Lectures (Control group)	p-value
Cardiopulmonary resuscitation	17.68 ± 3.87	14.04 ± 5.68	<0.001
Fracture	14.96 ± 3.02	10.96 ± 3.83	<0.001
Bleeding	10.01 ± 2.74	7.93 ± 3.87	<0.001
Airway obstruction	2.83 ± 0.91	2.38 ± 0.11	0.001
Neck and back injuries	5.49 ± 1.56	4.79 ± 1.85	<0.001
Thermal injuries	5.29 ± 1.89	4.26 ± 2.47	<0.001
Epileptic seizure	4.88 ± 1.71	4.34 ± 2.19	0.013
Limb displacement	2.87 ± 0.93	2.25 ± 1.41	<0.001
Muscle cramps	2.29 ± 1.39	1.71 ± 1.56	0.001
Strain	5.20 ± 1.64	3.96 ± 2.50	<0.001
Ligament tears (Sprain)	7.15 ± 2.91	6.17 ± 2.91	0.002
Asthma	2.71 ± 1.06	2.05 ± 1.49	<0.001
Total Score	81.45 ± 12.05	65.92 ± 21.24	<0.001

Generally, the participants in the intervention group revealed a statistically significant improvement ($p < 0.001$) in their total knowledge post-test (81.45 ± 12.05) in comparison to the control group (65.92 ± 21.24).

DISCUSSION

Football is a sport with a high incidence of physical injuries [39]. Injuries to football players could cause serious long-term and life-threatening consequences [40,41]. Direct and adequate first aid management and control are vital for the prevention of long-term consequences [42]. Moreover, non-medics such as team officials, players and coaches should be qualified in first aid knowledge and skills [26,43].

This study aims to assess the impact of ‘first aid training program’ on male football players in KSA. Overall, the findings showed that the participants achieved a statistically significant ($p < 0.001$) improvement in post-test training knowledge as compared to the pre-test. Remarkably, the participants in the intervention group revealed a statistically significant improvement ($p < 0.001$) in their knowledge in the post-test in comparison with the control group.

Increasing awareness and educating junior football players about first aid as well as injury prevention programs may increase the safety and well-being of football players. In addition, providing continuous education in necessary techniques and skills in first aid may also help in reducing the incidence of sports injuries [44]. Besides, a player who has received first aid training could be morally driven to avoid injuries in line with appraising the anticipated harmful outcomes. Moreover, the first aid training should be based on the player’s skills, the available resources, and the complexity of the injuries that are likely to occur.

Adequacy of emergency treatment kits and equipment is necessary. The respective authorities also should consider formulating guidelines regarding needed first aid equipment and facilities that might be required by the team during an injury. Furthermore, they need to ensure that such kits are available for the team during seasons games as well as training sessions [26]. In reference to our study, the poor pre-test knowledge scores reveal the potential of sports injury that may occur among study participants. Therefore, trained first aid players are pivotal to provide the injured with successful and immediate primary care.

To ensure the safety and well-being of football players, efforts must be augmented to prevent and manage injuries. Such efforts require data through real injury surveillance and knowledge of the first aids and factors that influence injury. The current study provides insight into the urgent need for a comprehensive first aid training for football

players. Besides, it is known that coaches and the environments they create have an effect on the players' experiences. They are impacted by the values and the behaviors that they portray [44,45]. Moreover, a coach with a positive attitude towards injury prevention will ensure that an injury prevention strategy to be implemented which is vital to ensure the compliance of the players to the strategy set. [44].

Our finding supports several studies [46-51] which reported the positive impact of a training program on increasing participants' knowledge and practice among different age groups. However, the challenge remains in the method which will aid in the retention of the gained knowledge, either through lectures or through practical training. However, translating new knowledge into behavior change by stakeholders is recognized as a key component for injury prevention in sports [44,46]. In addition, sports clubs' administrators, besides their jobs should have the fundamental knowledge of emergency management, injury prevention, and control, medical kits, elementary assessment of injuries, knowledge regarding the medical history of club's players, in order to intervene to provide sufficient primary care.

Strengths and limitations

The strengths of our study rely on its uniqueness to assess the impact of first aid training on players' knowledge, and it covered a wide range of junior football clubs across KSA. However, only immediate assessment for football players was tested after they were trained on first aid. We didn't investigate the long-term retention of football players' knowledge. Moreover, several sports clubs declined participation in the study or did not respond to the study team communication. Also, our study did not assess the incidence of injuries in participating clubs.

CONCLUSION

This interventional study sought to assess the existing knowledge of football players regarding first aid and the impact of training on their knowledge. The findings showed a positive impact of first aid training on the participants' knowledge, and that the intervention provided football players with sound basic knowledge. The retention of knowledge is imperative among football players; they should undergo continuous training to assist them in retaining knowledge satisfactorily. Furthermore, we recommend that first aid training becomes mandatory such that sports clubs are able to attain their licenses and as an annual competency for all sports clubs' personnel. The current study results shall be shared and conveyed to the Saudi general sports authority.

DECLARATIONS

Ethics approval and consent to participate

Institutional review board approval was obtained from King Fahad Medical City (IRB approval log:17-278). Written informed consent was obtained from all participants prior to their participation.

Consent for publication

Not applicable

Availability of data and materials

All data generated or analyzed during this study are included in this published article.

Competing interests

The authors declare that they have no competing interests

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Authors' contribution

HMS, INF, MAT, and YAT conceptualized the study, developed a proposal and obtained research funding. HMS and MAT were responsible for recruitment, conducting the study interventions, and data collection. INF and MAT developed the statistical plan. HMS, INF, and MAT were responsible for data analysis and interpretation. HMS, INF, MAT, and YAT drafted the manuscript. All authors contributed substantially to drafting the manuscript, its revision and approved the final manuscript. We confirm that the manuscript has been read and approved by all named authors.

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