

# Analysis of Soccer Injury Type and Protective Behavior among Korean Soccer Club Members

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## ABSTRACT

*The purpose of this study is to identify the types of injuries and the protective behaviors of soccer club members to prevent injuries, and promote health. Data was collected from 395 soccer club members from thirteen football clubs in Seoul and Gyeonggi province using question tool developed by researchers. Data analysis was performed using SPSS 23 for descriptive analysis and Chi-square test. The results showed that sport for soccer injuries was serious and medical expenses was significant. The demographic information showed that 50-year-old and over adults were vulnerable and had a disproportionate number of injuries. Those employees who held administrative positions, white-collar and specialized jobs also experienced the high level of injury experience. Despite this many injuries, many respondents appeared to be lacking a protective actions, such as not wearing protective gear. It was critical for the club members to improve their knowledge and awareness of safe sports activities.*

**Key words:** Soccer Club, Injury, Safety, Protective Behavior.

## 1. INTRODUCTION

In Korea, 71.4% (about 3 million) of the population aged 10 years or older nationwide have been engaged in sport club activities due to increased interest in health, introduction of five-day workweek, [1] Among the various sports clubs, there are 14,855 clubs and about 490,000 clubs nationwide, and it is estimated that more than 1 million people are playing soccer, considering that more than half of voluntary clubs that do not join the club [2] In particular, the distribution of soccer clubs in the region shows that 30% is concentrated in Seoul (60,000) and Gyeonggi (95,000) in the Seoul metropolitan area [1], [2]. However, soccer, which many people like to participate in, has a high risk of damage, and 25.3% of the participants in all sports are reported to have high risk of injury due to soccer [3]. In addition to these trends, the economic loss caused by the damage is increasing. In recent years, the number of patients seeking hospitals has increased by 500,000 every year. This has resulted in the payment of 2.4 trillion won of health insurance for a year, and the fee for medical treatment of 300 billion won is increasing every year [4]. This does not include costs for unilateral and non-salaried services not covered by health insurance, so the actual cost of the damage is likely to be greater. This situation is confirmed through the data of the Sports Safety Foundation. In recent 5 years, the number of sports accidents increased by 120% from 1,452 cases in 2005 to 3,172 cases in 2009 [3], 5.1% of the general population over 10

years of age However, among the total 117 kinds of athletic sports in the past 5 years, 7,443 (51%) of the 8,760 rewards of accident compensation were the most, And the risk of damage is high enough to account for 44% of the total risk [3]. As mentioned above, some sports such as soccer, which are recommended by the national government for the promotion of public health, can easily be accessed without basic knowledge by the general public, and the aggressive exercise characteristics such as intense tackling, causing many socio-economic losses. Nonetheless, it is hard to find a study on the problem of exercise impairment of the sportsmen in the field of health promotion so far.

In addition, previous studies have shown that some injuries during exercise can be prevented by simple stretching or preparatory exercise. Sports scientists have reported that they can prevent injuries by 21% when they train coaches and manage training programs, including preparation and clean-up exercises [5]. Three-fourths of soccer injuries were reported to be preventable through stretching or preliminary exercises [6]. In the FIFA, the anti-amateur campaign has been carried out to lower the rate of football injury [7]. The problem of soccer injuries causes social costs such as personal health expenses as well as increased premiums or fewer work days. New Zealand is campaigning for a 'SportSmart' program to prevent soccer players' injuries [8]. The program includes pre-participation health checks to prevent risks before football players' injuries, including preparation, protective gear, water and nutrition, injury reporting, environment and injury management. However, it has been very rarely conducted to investigate whether or not the soccer club members of the Korea practice

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the protective actions to prevent injuries and damage caused by soccer.

The purpose of this study is to provide basic data on the prevention of injuries during exercise by understanding the types of injury and the protective behaviors of soccer players with the highest risk of injury. Through this, we aimed to prevent sports injuries and improve the health of soccer club members.

## 2. METHOD

### 2.1 Research Tool

The draft survey tool for this study is composed of 8 experts from the fields of health, preventive medicine, physical education, sports physiology, sports medicine, etc. Several expert advisory meetings were conducted to verify the validity and reliability of the survey tool. In addition, pilot test was conducted on 25 members of soccer clubs that were not subject to research, and the final version of questionnaire was completed by analyzing the results and revising and supplementing them.

In the final questionnaire, four types of exercise behavior (4 items), protective behavior (5 items), injury experience, 40 injured areas (head to toe), type of injury (Ligament injuries, Cartilage damage, Sprains, Muscle, Tendon rupture, Tendonitis, Crush injury, Deep Wound, Scratches, Fracture & Location, Concussion, etc.), cause of injury (3 items), and socio-demographic characteristics were included. The protective behavior to prevent injuries was included 'wearing a shin guards', 'do not drink before and during soccer', 'wearing soccer shoes only', 'warm-up exercise for more than 20 minutes' and 'do not betting soccer' based on previous studies [9] and the eight experts' advice.

### 2.2 Data Collection and Analysis

The questionnaire survey was conducted on two cities in the Seoul Metropolitan Area with the largest number of soccer players and the best accessibility. The 21 participating clubs (9 clubs in Kyunggi and 12 clubs in Seoul) participated in the survey. 395 respondents were surveyed. The data gathering was conducted during the two weeks from the last week of April to the first week of May, 2012, using pre-trained college student investigators to visit the playground where the soccer clubs are active on weekends and explain the purpose and contents of the investigation and voluntarily agree self-report questionnaire. In order to increase the response rate, a predetermined return product was paid. Data were analyzed using SPSS 12.0 version and technical analysis and chi-square test.

## 3. RESULTS

### 3.1 Socio-demographic Characteristics of Respondents

As a result of the survey, 395 members of 23 soccer clubs in Seoul and Gyeonggi - do responded to the questionnaire. The age distribution was the highest in the forties with 186 (47.1%), followed by 105 (26.6%) in the 50s and 48 (12.2%) in the 30s. The married status was 316 (80.0%) married, and 69 (17.5%)

single married or single, and the most frequent were college graduates 203 (51.4%), followed by 148 (37.5%), respectively. Among the respondents, 166 (42.0%) were self-employed, 49 (12.4%) were white-collar workers and 46 (11.6%) were technical and technical workers.

### 3.2 Activities and Protection Behavior

**3.2.1 Club Activities:** The participation rate of football clubs was the highest with more than 15 years 110(27.8%), followed by 63 (15.9%) participants from 10 years to 15 years, and 109 (27.6%) from 5 to 10 years %, And 30 participants (7.6%) from 1 year to less than 3 years. The number of soccer clubs participated was 227 (57.5%) per week, followed by 114 (28.9%) more than twice a week. The average number of hours played by the respondents was 222 (56.2%) for less than 2 hours, 113 (28.6%) for less than 3 hours and 46 (11.6%) for less than 4 hours, and 7 (1.8%) over 4 hours. Among the respondents, 149 (37.7%) had other sports besides soccer.

Table 1. Club Activities

Item	Category	N (%)
Participation period	Less than 1 year	28 (7.1)
	1 ~ 3 years	30 (7.6)
	3 ~ 5 years	30 (7.6)
	5 ~ 10 years	109 (27.6)
	10 to 15 years	63 (15.9)
	More than 15 years	110 (27.8)
	No answer	25 (6.3)
Number of regular soccer	More than twice a week	114 (28.9)
	Once a week	227 (57.5)
	3 times a month	29 (7.3)
	Less than 2 times a month	22 (5.5)
	No answer	3 (0.8)
Average playing time	Less than 2 hours	222 (56.2)
	2~ less than 3 hours	113 (28.6)
	3~ less than 4 hours	46 (11.6)
	More than 4 hours	7 (1.8)
	No answer	7 (1.8)
Other sports besides soccer	Yes	149 (37.7)
	NO	238 (60.3)
	No answer	8 (2.0)

**3.2.2 Practice of protective behavior:** To prevent soccer injury, 248 (62.8%) were wearing shin guards and 54 (13.7%) were drinking before or during sports. Among all respondents, only 41.3% of the respondents said that they were ready for more than 20 minutes before the game and only 225 (57.0%) were playing competitive soccer that bet something on their soccer.

Table 2. Protective Behavior

Type of Protective Behavior	Categories	Frequency (%)
Wearing Shin Guards	Never / Not	81 (20.5)
	Usually	51 (12.9)
	Always	248 (62.8)
	No Answer	15 (3.8)
Drinking Before & After Soccer	Never / Not	235 (59.5)
	Usually	79 (20.0)
	Always	54 (13.7)
	No Answer	27 (6.8)
Wearing Soccer Shoes Suitable Soccer Field	Never / Not	90 (22.8)
	Usually	76 (19.2)
	Always	203 (51.4)
	No Answer	26 (6.6)
Pre-exercise More than 20 Minutes	Never / Not	75 (19.0)
	Usually	132 (33.4)
	Always	163 (41.3)
	No Answer	25 (6.3)
Betting Soccer	Never / Not	225 (57.0)
	Usually	75 (19.0)
	Always	65 (16.4)
	No Answer	30 (7.6)

**3.3 Disease, Injury, and Hospital Utilization**

**3.3.1 Presence of Disease:** Of the respondents, 252 (66.84%) had experience in health screening within the last 3 years. Among them, 48 (13.3%) had hypertension, 28 (7.76%) hyperlipemia and 14 (3.88%) diabetes. Heart attack symptoms were chest tightness or pain, severe breathing symptoms, dizziness, nausea, muscle mass, and immobility. 79 (23.94%) of the respondents experienced extreme pain or pain during exercise, 144 people (42.23%) had been severely breathed. In addition, 70 (21.34%) answered that they had dizziness or nausea, and 165 (48.39%) of them said that they feel heavy and difficult to move.

**3.3.2 Injury Experience:** Among the soccer activities, 326 (82.5%) responded that they had been injured (multiple responses permitted), 213 (27.8%) had the most injured area (ankle, toe, and Achilles tendon), 85 (11.1%) in the knee, 123 (16.1%) in the knee, 77 (10.0%) in the hand area, 74(9.7%) in the thorax (back, sternum) 52(6.8%) in the neck (head and neck), 51(6.7%) in the arm (shoulder, upper and lower arms, elbow), 40 (5.2%) in the waist, and 31 (4.1%) in the lower extremity(sin and calf).

Twenty - six patients (74.4%) reported sudden traumatic injuries and 79 (25.7%) reported that the cause of injuries was excessive for a long time. Of the victims, 253 (79.3%) were found to have experienced damage during exercise or exercise during the game, 66 (20.7%).

The most common injuries were ligament injuries and sprains in 190 (38.7%), followed by muscle, tendon rupture, tendonitis, seated bone in 86 patients (17.5%), fractures and dislocations in 84 patients (17.1%), And 82 (16.7%) abrasions. Of the 266 subjects who experienced the injury, 229 (74.4%) reported sudden trauma and 79 (25.7%) had used it for a long time. Of the victims, 253 (79.3%) were injured during the soccer game, and 66 (20.7%) were injured during body relaxation or practice.

Table 3. Injury Experiences (multiple response)

Categories	Response	Frequency (%)	
Injury Experience	Yes	326 (82.5)	
	No	69 (17.5)	
	Total	395 (100.0)	
Injury Site	Foot (Ankle, Toe, Achilles tendon)	213 (27.8)	
	Knee	123 (16.1)	
	Upper extremity (Inner and Outer Thighs, Front and Rear)	85 (11.1)	
	Hand(Wrist, Finger)	77 (10.0)	
	Lower extremity(Sin, Calf)	31 (4.1)	
	Waist	40 (5.2)	
	Arm(Shoulder, Upper arm, Forearm, Elbow)	51 (6.7)	
	Neck(Neck, Head)	52 (6.8)	
	Chest (Back, Sternum, Rib)	74 (9.7)	
	Abdominal (including Inguinal)	2 (0.3)	
	Pelvis	17 (2.2)	
	Total	765 (100.0)	
	Type of Injury	Ligament injuries, Sprains	190 (38.7)
		Muscle, Tendon rupture, Tendonitis, Crush injury	86 (17.5)
Deep Wound, Scratches		82 (16.7)	
Fracture & Location		84 (17.1)	
Others		27 (5.5)	
Concussion		14 (2.9)	
Cartilage damage		8 (1.6)	
Total		491 (100.0)	

**3.3.3 Injury Situation and Playground Environment:** Of the 266 victims, 27 (52.0%) were injured in collision with other athletes. 87 (27.4%) were tackled and 86 (27.1%) were injured while reversing during the game, and 54 (17.0%) were jumping. The number of respondents who were injured by repeated

injuries was 185 (58.9%). In addition, 98 patients (30.9%) were left with permanent injuries and aftereffects due to missed treatment time among soccer-related injured people.

As a result of examining the kinds of playgrounds at the time of the damage, 200 (61.54%) were injured in the ground playground, 109 (33.54%) of artificial turf pitches and 12 (3.69%) of natural turf pitches. The types of shoes that were injured were soccer shoes 201 (50.9), artificial turf soccer shoes 75(19.0%), natural turf soccer shoes 31(7.8%), and general sports shoes 12(19.3%). At the time of injury, 67 (17.0%) did not wear a shin guards, and 142 (36.0%) did not perform enough warming-up exercises. Also, 107 (27.1%) were drinking before and during football, and 73 (18.5%) were playing betting soccer.

Of the total respondents, 232 (58.7%) had visited the hospital after having been injured while playing soccer. The mean number of outpatient visits was 12 days and the average length of hospital stay was 35 days. In the case of visiting a medical institution due to soccer injury, 136 (48.75%) were physically treated and bandaged, 86 (30.8%) were Gibbs, 76 (27.2%) were simple examinations such as X-Ray and Electro-Myelogram, and 56(20.1%) were simple drug prescriptions. As a result of soccer injuries, the average cost per person was 1,520,000 won per person.

**3.4 Differences in Injury Experience According to Socio-Demographic Characteristics**

The Chi-square analysis was conducted to investigate the difference in demographic and sociological characteristics. As a result of analysis, there were significant differences in age and occupation. By age group, 90% of the patients were in the age group of 50 or more, and the lowest rate was 72.1% in the 20s. Overall, the higher the age, the higher the damage rate. In terms of injury experience among all occupational groups, the rate of injury incidence was higher in the case of management (100%) and professional / liberal (94.7%) than other occupations. On the other hand, there was no significant difference in marital status and educational experience.

Table 4. Differences in injury experience according to demographic and sociological characteristics

Categories	Injury Experience		$\chi^2$	
	Yes (%)	No (%)		
Age Group	Under 29	31(72.1)	12(27.9)	8.2*
	30~39 years	39(81.2)	9(18.8)	
	40~49 years	149(80.5)	36(19.5)	
	Over 50 years old	94(90.4)	10(9.6)	
	Total	313(82.4)	67(17.6)	
Education	Less than high school	118(80.8)	28(19.2)	0.9
	College degree or higher	167(82.3)	36(17.7)	
	More than a graduate school	23(88.5)	3(11.5)	
	Total	308(82.1)	67(17.9)	

Occupation	Self-employment	132(80.5)	32(19.5)	12.7*
	Sales / Service	33(78.6)	9(21.4)	
	Technical / Skilled workers	35(76.1)	11(23.9)	
	Office work	43(87.8)	6(12.2)	
	Management	13(100.0)	0(0)	
	Professional / Freelancer	36(94.7)	2(5.3)	
	Unemployed / Students	18(69.2)	8(30.8)	
	Total	310(82.0)	68(18.0)	

\*P<.05

**3.5 Commitment to practice protective behavior**

We applied the stage theory of change to the pre – contemplation, the contemplation, the preparation, and the practice stage. The pre-contemplation means 'I have no idea at all', the contemplation stage is 'I will do someday', the preparation stage is 'going to be implemented within 30 days', and the action stage means 'currently being implemented.' Of the total respondents, only 217 (54.9%) were in the action stage and 53 (13.4%) were in the preparation stage for the intention to wear shin guard. Only 110 (18.0%) were in the action stage, 53 (13.4%) in the preparation stage and 109 (27.6%) in the pre-contemplation stage for the intention of alcohol-free soccer. As for the intention to wear a soccer shoes according to the field, 177 (44.8%) were in the action stage and 54 (13.7%) were in the preparation stage while 26 (6.6%) were in the pre-contemplation stage. Only 172 (43.5%) were willing to do enough warming-up exercises for 20 minutes or more during the soccer exercise, 77 (19.5%) were in the preparation stage, 13 (3.3%) were in the pre-contemplation stage. The intention of not playing betting soccer was relatively high as 95 (24.1%) in the stage of action, 42 (10.6%) in the preparation and 132 (33.4%) in the stage of action.

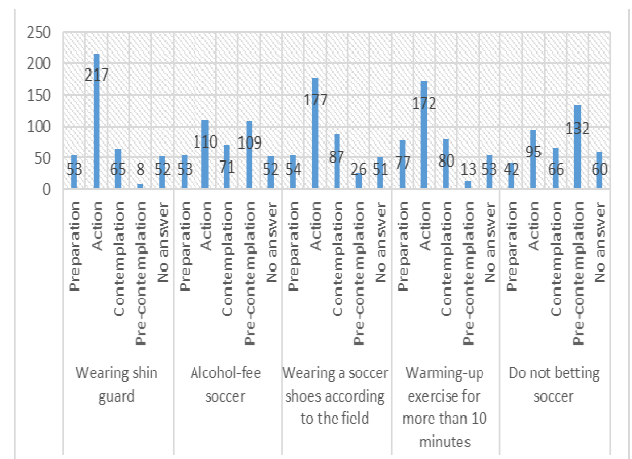


Fig. 1. Stages of Change of Protective Behaviors(N=395)

#### 4. DISCUSSION

For the purpose of maintaining health and improving friendship, various classes of people are participating in sports clubs and enjoying sports activities. Soccer is a fierce sporting event, but there are not many natural grass field and artificial grass field in Korea, so most of the hobbyists are playing soccer on a regular school playground instead of a soccer field. As a result, there is a lack of training for the players in the soccer game, such as systematic skill acquisition and training for improving the physical fitness. Therefore, the injuries that occur in the soccer game, which requires a lot of physical contact and physical power consumption, seriousness is a concern [10]. More than one million people across the country are playing soccer, but are exposed to the risk of large or small damage, lacking knowledge of sports injuries and prevention. The purpose of this study was to investigate the actual condition of injury caused by soccer activity and to provide basic data of the policy for prevention of injury.

The results of this study confirmed the serious injury status of Korean soccer club members and showed that they were exposed to many injuries while their protective behavior was not practiced. As a result of the investigation on the injury situation of the soccer clubs, 326 (82.5%) out of 395 respondents answered that they have been injured while playing soccer, and it was found that the actual situation of soccer sports in the sports field is serious.

The injuries were mostly on the feet and knees. Given that most of the players were kicking the ball with the left ankle and the left knee in the order of the left knee, we could see that the injuries were concentrated on the left foot, which was centered to kick the ball. In a relatively uncompetitive situation such as warm-up exercise or practice, 20% of the injuries were reported to be injured. However, the researchers found that when the warm-up before the game or the cooling down after the game were neglected, the injury rate was high [10].

It is urgent to develop the right knowledge to prevent damage and to develop programs to spread the practice of preparation, stretching and wearing protective gear, and policy support for it in order to prevent many parts injury by simple warm-up exercise or stretching. About 60% were injured repeatedly in the site where they were injured once, and 31% had permanent injuries or aftereffects due to injuries. This suggests that proper treatment for the first injury is necessary because secondary injury occurs when exercising without complete recovery after the first injury [11]. About 59% of the total injury victims had used medical institutions while playing soccer. The average number of hospital visits was 12 days and the average length of hospitalization was 35 days. In addition, the total amount of medical expenses paid by injured individuals due to soccer was an average of 1,520,000 won, which indicates that socioeconomic costs due to football damage are very high.

The rate of injury was high in the elderly people over 50, and the rate of injuries was higher in cases where there was not a lot of activity such as management, profession, and office work. As age increases, the flexibility and ability of the body to decline, and when engaged in professions or office work, there is a lot of sitting time and less activity. Therefore, if a person

with a small amount of activity on weekdays suddenly exercises like a soccer game on weekends, it is judged that the risk of injuries is greater in situations lacking preparatory exercise.

As the participation period of soccer clubs increased, the experience of injuries inevitably increased, and the proportion of practicing protective behaviors such as alcohol-free playing and not doing betting soccer very low. Particularly, drinking before and during exercise suggests that it is very important to change the consciousness of the community for safety because it lowers the cerebral function and lowers the cognitive ability [12], attention concentration and information processing ability [13]. The general public participating in sports clubs in Korea do not receive systematic management such as warm-up or cool-down exercise by professional coaches like athletes, and they are often omitted because it is not coercive. As the number of people participating in sports clubs increases, the number of cases of sports disruption due to sports injuries is also increasing [14], [15]. This is attributed to lack of knowledge about sports injuries and prevention [11]. In addition, the majority of sports injuries are caused by the lack of warm-up exercise [14]-[16] and the lack of protective gear [9], [14].

In conclusion, the participants of sports clubs in Korea are exposed to many injuries, and the socioeconomic cost is high. Nevertheless, due to the fact that it is a voluntary club, there is still no active intervention in order to protect the sportsmen in the national dimension from the threat of injury.

Based on the results of this study, systematic measures should be prepared for raising the awareness of the problem about the safety of life sports and for preventing the injuries of the participants. New Zealand's 'SportSmart' program offers a wide range of sports activities, from pre-participation health check-ups to preliminary prevention of soccer risk factors, to preliminary exercises, stretching exercises, organizing exercises, and physical conditions [8]. It is useful to refer to the systematic and comprehensive contents ranging from 'technique', 'protective gear', 'moisture and nutrition intake', 'injury report', 'environment' and 'injury management.'

Participants in soccer clubs in Korea are in the blind spot of safety. A systematic investigation into the health and safety net of the participants should be preceded. Education and safety guidebooks and video programs should be developed to raise awareness of safety for the participants.

Finally, to establish a nationwide sports safety net, it is necessary to construct a monitoring system of physical sports injuries and to collect rapid statistical data on injuries and deaths in the whole life sports and to prepare measures based on them.

All of the data in this study came from a self-report questionnaire of soccer club members in the two metropolitan areas, so there is a limit to generalizing to all football club members in rural areas.

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