



Pelagia Research Library

European Journal of Experimental Biology, 2014, 4(4):38-46



## Financial dimension of sports injuries

Murat Korkmaz<sup>1</sup>, Bülent Kılıç<sup>2</sup>, Fatih Çatıkkaş<sup>3</sup> and Ali Serdar Yücel<sup>4\*</sup>

<sup>1</sup>Güven Group Inc. İstanbul, Turkey

<sup>2</sup>Orthopedist, Tekirdağ, Turkey

<sup>3</sup>Celal Bayar University School of Physical Education and Sports BESYO, Manisa, Turkey

<sup>4</sup>Fırat University School of Physical Education and Sports BESYO, Elazığ, Turkey

### ABSTRACT

A variety of sports injuries, which are unique to every branch of sports, can occur. Type of injury may vary depending on the branch of sports and the severity of the incidence. Wearing protective equipment minimizes the sports injuries. Injuries can also be prevented by avoiding practicing mistakes. Cost of medical treatment in sports injuries as well as lost working days could be regarded as an indicator of financial dimension of sports injuries. In this study, the importance of sports injuries, cost of these injuries, and financial dimension of sports injuries in terms of athletes will be tackled.

**Keywords:** Injury, Sports, Financial Dimension, Equipment, Athlete

### INTRODUCTION

In recent years, athletic activities have gained significant importance in our country as in the whole world. The fact that huge amount of financial investments are made to sports has brought forward the issue of high level of performance expectation from athletes. Expectation of success in short time causes athletes to participate in competitions without getting well prepared physically and emotionally for the season. Training in inappropriate environments, using inappropriate equipment lead to an increase in the number of sports injuries as a result of reckless exercises. The fact that use of protective gear in especially contact sports (boxing, American football, ice hockey, handball and defence sports, etc.) during practices is rare, increases the risk of injury. In addition, injuries associated with overuse which occur after repetitive stress and micro traumas are of significant importance in sports injuries. Increase in the number of practices, in duration and intensity of practice in professional athletes have increased the number of injuries associated with overuse. The risk of sports injuries is high for beginners who have rapid increase in practice programs and for those who start practicing intensely after a long break. Sports injury is the collective name of any kind of damage which occur during an athletic activity (during practice and/or game). It goes without saying that health problems resulting from sports injuries are so frequent that it cannot be underestimated. Team physicians have great responsibilities for prevention and treatment of sports injuries which occur frequently because of a number of personal and environmental factors [1].

Sports injuries occur either because of direct traumas as in contact sports or because of repetitive stress and microtraumas. Although injuries resulting from direct traumas present acute symptoms, symptoms develop slowly in injuries associated with overuse resulting from microtraumas. Following the athletic activity, pain and tingling begin. Pain can last hours even sometimes for days. Sports injuries have increased in parallel with the increase in the frequency, duration and intensity of practices. Besides, floor of place where athletic activity is carried out, equipment, practice technique, weather conditions and anatomic structure of athletes are important, as well. With a

single macrotrauma; fracture in bones, sprain in joints and rupture in muscles could occur in athletes. As a result of repetitive microtraumas, microscopic injuries occur; clinic tables which are defined as injuries associated with overuse, which result from incremental microscopic injuries, are seen. Typical examples could be stress related fractures, compartment syndrome, lateral epicondylitis, Achilles tendonitis, supraspinatus tendonitis and Jumper's knee. An increase in one of the three pillars of practice, namely intensity, duration and frequency, results in an increase in injury risk. Team physicians should assume the responsibility of guiding in ensuring that these three factors are considered and their shares are regulated properly while preparing the practice programs [1].

There is not enough national statistical information regarding sports injuries in our country. It is known that in Germany, there are approximately 10 million individuals who do sports and the frequency of injury is about 1,5%, and this percentage corresponds to 75000 injuries in a year. Studies carried out in various countries reveal that the possibility of injury in a year is between 1-2% [2].

Football is in the first place in terms of hospital admissions for injuries since it is a common branch which is preferred by many people because of its popularity. This fact is valid for a number of countries, it is the case for Turkey as well even if there is no specific statistics. 90% of injuries are associated with lower limb regions, approximately 20% are associated with knee, and 10% are associated with tarsal and groin. While 10% of injuries are associated with limb or upper limb regions, 90% of them are related to lower regions. It is seen that defence athletes are injured more in terms of positions of injuries, which corresponds to about 40% of injuries. This figure shows the injury percentage of defence athletes only [3].

First response is very important in sports injuries. The effect of the physician who watch the game at sideline is of paramount importance. Mechanic problem causing the injury is important. Therefore, under such circumstance the fact that physician witnesses the incident may give an idea about how the injury has happened [3]. The need for first aid in the field is 26% in football and 14% in all other sports. In terms of injuries which require medical treatment, there is no difference between football and other sports; the values appear to be close to 40%. In terms of injuries which do not require medical treatment, the percentage is around 20% in football, %27-30 in other sports [3].

Sports injuries which occur as acute or chronic are divided into three categories according to the level of seriousness:

- MILD: 1<sup>st</sup> degree: not being able to participate in activities for 1-7 days.
- MODERATE: 2<sup>nd</sup> degree: not being able to participate in activities for 7-21 days.
- SEVERE: 3<sup>rd</sup> degree: not being able to participate in activities for more than 21 days or permanent injuries 1-7 days.

Chronic injuries are related to repetitive and internal traumas (such as bone stress fractures, tendonitis) on the other hand acute injuries are dependent on single and external traumas (such as hematoma, bone fracture).

In order to interpret the severity of sports injuries, some factors are required to be analysed in detail [2].

There are six important factors in order to understand the severity of sports injuries [2]:

1. Nature of sports injuries,
2. Information about treatment type and duration can ensure better and accurate determination of the severity of injury, and can provide answers for which medical equipment and treatment methods are utilized by which personnel. Then, cost of medical treatment can be calculated and efficiency of various treatments can be compared
3. Duration of break from sports: depending on the perspective of individuals, it is important to return to sports as quickly as possible after an injury. Nowadays, sports have an important place in people's lives in terms of relaxation, thus psychological health of people is also affected by sports injuries. Duration of break from sports is also an important factor from psycho-social aspect. The extension of break from sports is an indicator of the most important result of injury
4. Lost working day: lost working day is also an indicator if financial dimension of sports injuries in the society is considered as the cost of medical treatment. In addition, it should be remembered that athletic activities can reduce the incline from the work due to illness by healing workers (athletes) physically and mentally. There is a need for profit-loss analysis of positive and negative effects of athletic activities on labour. A similar analysis should be performed for costs, as well. According to Sprenson, socioeconomic negative effects of sports injuries can be ignored compared to its positive effects
5. Permanent damage, and,
6. Cost [2].

Despite benefits of sports for health, sports injuries and fear of injury are among important obstacles for participation in athletic activities. Frequency, prevalence and type of sports injuries show differences between both age groups and genders. There is a strong need for robust and effective methods to prevent sports injuries since sports injuries pose important economic burden due to their direct and indirect cost [5].

It was revealed that about 30 million teenagers participate in athletic activities in the United States of America (USA) as of 2007. It was stated that this figure corresponds to the half of the number of teenagers between 5-18 ages, and more than one third of these teenagers have been injured at least once. It was determined that four-year hospital costs due to sports injuries of athletes who are between 5-18 ages was 480 million \$ in the USA, it was stated that every year this cost increases and the highest amount of money is spent for knee injuries especially anterior cruciate alignment injuries [6].

It was found that 11,157 \$ was spent annually for anterior cruciate alignment (ACL) in New Zealand. It was emphasised that young athletes would significantly acquire health gains, and care costs would be reduced dramatically when all sports injuries are reduced even at medium level [6, 7].

## MATERIALS AND METHODS

### AIM, SCOPE AND METHOD

Sport is an increasingly growing industry as well as an important sector which a great number of people participate in and for which active participation increases gradually. It is common that not only positive but also negative sides of sports are encountered. One of negative sides is sports injury. There has been increase in the percentage of sports injuries with the fact that athletic activities become popular in large parts of the society and more people participate in such activities. Athletes have injuries in every branch of sports. These injuries are of paramount importance for both the future of athletes and medical concern. However, financial losses resulting from sports injuries should not be ignored. After sports injuries, it is initially important for athletes to get better and return to practices or games in a short time; financial factor of injuries, which is not noticed or considered at first after the injury, can reach to serious dimensions.

In this study, it was aimed to tackle sports injuries, risk factors causing injuries, and financial dimension of sports injuries. Literature review method was utilized in the study. It was aimed at studying financial dimensions of injuries by reviewing related literature. Study was comprised of four parts. In the first part, general information on sports injuries was provided, following parts were related to risk factors of injuries, prevention of injuries and financial dimension of injuries. At the end of the study, various suggestions related to the topic and solution methods for the issue were presented.

### Risk Factors in Sports Injuries

If we would like to know how sports injuries occur, we need to review causal factors. Sports injuries generally occur from the composition of these two factors and these two factors may always interact with each other. Even, it is not enough to determine the causes of sports injuries as intrinsic and extrinsic factors. Mechanisms of occurrence of injuries should be defined. Hlobil *et al.* from Netherlands came up with stress/capacity model. While stress forms extrinsic factors caused by environment, capacity is composed of individual characteristics of people, intrinsic factors which show individual abilities. Stress and capacity should be in balance. This balance should be taken into consideration while necessary preventive measures are taken. Either stress should be reduced or capacity should be increased. The risk of injury will decrease when the stress of athlete is reduced, and athlete's capacity is enhanced. This becomes possible by increasing physical aptitude. It is well known that fatigue hinders coordination of movements and pave the way for injuries. Early development of fatigue results from insufficient aerobic endurance. Therefore, by enhancing aerobic endurance of athlete, both fatigue can be delayed and risk of injury can be reduced because coordination of movements is enhanced [1].

If injuries especially associated with overuse in sports injuries are not noticed and prevented in time, it causes individuals to get distant from athletic activities. If diagnosis is provided late for cases, treatments also take long. Not only treatment of injuries associated with overuse but also prevention methods of these injuries are important. It is important to define factors which make occurrence of injuries easier, and to know the mechanisms of injuries better in order to prevent such injuries [1].

Any kind of performance sport contains risks of various injuries and traumas. According to the literature, sports accidents and injuries are generally composed of the combination of these risk factors. Preventive measures should be directed to causal factors one by one or as a whole. It should not be forgotten that these risk factors would influence each other [8].

There is a variety of factors which cause sports injuries listed as follows: the facts that people do not choose proper sports for themselves, people do very heavy and intensive practices, sports equipment which is not proper for age and physical condition of child or teenager, proper and sufficient protective gear is not used, technical tactic and skill practices are not applied accurately and properly, physical conditioning practices are not sufficient, insufficient preparedness for practices, insufficient proper monitoring, insufficient provision of game discipline, holding a match with improper opponents, inappropriate environmental conditions, choice and use of inappropriate shoes for sports, implementation of inappropriate treatment and insufficient rehabilitation, participation of athlete in games when he/she is tired and ill [8].

Football among team sports attracts much attention in terms of injuries which are encountered most frequently in sports branches. Then, it is followed by fighting sports. Taking into account that mild injuries are responsible for half of the all cases and rare cases end up with death, it will be clearer that other injuries are at moderate level. Frequencies of occurrences of injuries based on foreign literature appear to vary due to differences in methods. Differences in economic, social and medical data resources bring about methodical challenges. Proportion of frequency of injury to duration of game or practice is a commonly preferred method in order to gather comparable data. Generally, game-practice duration is considered to be 1000 hours. Age, gender and branch of sport should be evaluated separately. However, there exist no reliable data in order to compare injury rates between male and female athletes. Injuries occur more in tournament sports compared to recreational activities. Risks are higher in sports where trainer monitoring is not available. In terms of children, the situation is parallel between girls and boys until the age of 12. After the age of 12, generally less girls participate in sports. It is hard to perform relative risk comparison as in adults [2].

Risk factors in sports injuries are analysed under two titles as personal (internal-intrinsic) and external (extrinsic) factors [9, 10]:

1) Personal Factors (Intrinsic factors): these are factors related to athlete such as age, gender, body structure, level of physical condition, anatomical factors, neuromuscular injuries, which have been experienced but not well treated, psychological and social problems. Frequency of previous injuries (having higher risk of injuries related to soft tissues) and age are of significant importance since it has been shown that especially in children, the more age increases, the more the risk of injuries increases. It has been found that bone fractures are experienced more by girls during puberty. It has been revealed that while percentage of stress fractures in bones experienced by girls who do skating sports is 11%, the same percentage for boys is 8%. It has been stated that in terms of stress fractures in bones in gymnastics, the percentage is 30% for girls and 21% for boys. The incidence of knee injuries especially anterior cruciate ligament (ACL) and foot injuries is higher in girls compared to boys. It has been shown that possible reasons for this are high knee laxity, deficiency of muscular force and conditioning [11]. One of the most important factors is physical fitness-conditioning level of adolescent athlete. It has been stated that the fact that physical conditioning level is not sufficient thus there exists force differences between muscle groups, is one of the major reasons of injuries. The enhancement of physical fitness should be ensured by setting training programs specific to sport (such as cardiovascular endurance, flexibility, force and strength development, knee stability, development of biomechanics and balance). Psychological and social factors are also considered causes of injuries among adolescent athletes. In various studies, it has been shown that there is a dose-response relationship between low level of socio-economic structure of the athlete and high risk of injury. Besides, researchers have found that there is a strong correlation between sports injuries and emotional changes in this group of athletes, namely adolescents, such as weakness, over-fatigue, and over-training, stressful life conditions [12, 13]. Anatomical factors such as pes planus, pes cavus, increased Q-angle in knees, over foot pronation, leg-length difference, over knee hyper-mobility are among the causes of injuries, and they should be determined and necessary treatment should be taken during the physical examination for sports licence [6, 14].

Risk factors can be listed briefly as follows;

- Physical characteristics (age, height, weight, the body fat percentage),
- Gender,
- Anatomical factors; pes planus, pes cavus, over pronation, genu varum, genu valgum, femoral neck anteversion, pelvis width, tibial torsion, leg-length differences,
- Physical deficiencies (imbalance in muscles, deficiency of flexibility in muscles),
- Starting doing sports early after an injury, sequellae remaining after experienced diseases,
- Sleep deprivation, insufficient and imbalanced nourishment, infectious diseases,
- Lack of physical fitness (strength, speed, endurance, agility),
- Lack of athletic skills (coordination),
- Psychological factors (concentration, acceptance of risk) [1].

2) Extrinsic factors: Not only are sports a means of free time occupation or a way of developing health and wellness, but also sports have become a dynamic sector which has increasing economic, political and cultural dimensions. The problem of quality and sufficiency of sport-related services has become a frequently-encountered one. While planning a sports facility, points such as finance, environment, transportation opportunities, feature of the floor, health and architectural aesthetic are of significant factors, in terms of health, there are some points which should be taken into account such as whether the facility is hygienic or not, lighting of the facility, air conditioning, slipperiness of the floor, entrance and exit ways for ambulance, evacuation capacity of spectators in case of an emergency, health care room, existence of risk factors under the conditions which can lead to traumas [15].

There are some risk regarding whether the playground is outdoor or indoor. In outdoor ones, weather condition-related situations form risks. In indoor ones, on the other hand, insufficient heating of the sports hall will pave the way for some health problems for athletes, it may also lead to injury risk and decrease in performance. Even though they seem simple, such risk factors are of paramount importance in terms of health of athletes [16].

The floor of sport hall also pave the way for injuries. Floors which have lost their smoothness lead to injuries for athletes. In many outdoor sports facilities, floor becomes a dangerous one because they lose their smoothness due to intensive athletic activities, weather conditions and lack of maintenance. A variety of problems which could occur on the floor, may become cause of decrease in the performance of athlete, higher risk of injury, and even a life-threatening factor [17].

Type and appropriateness of sport, preference of proper equipment, protective sports gear, game rules, and floors of sports facilities, education of athletes and coaches, accurate and appropriate training programs are of significant importance. Whether sport is an individual one or contact sport, game level of athlete, in other words whether athlete is an elite one or recreational one, game position, air and environment conditions, whether it is in season or out, time of the day, rules of the game, physical conditions of game's floor, use of protective gear, features of clothes for sports especially shoes can be considered as extrinsic factors.

Protective Gears: could be listed as helmet and protective caps, safety goggles, eye shield, mouth guard, protective pads, shin guards. Protective gears prevent injuries by providing additional mechanical support, increasing proprioception, spreading crash energy into a larger area, keeping crash energy away from original body region [6, 12, 18].

We can briefly list risk factors as follows:

- Practice mistakes: little warm-up, insufficient stretching, long practices, frequency of practice, severity of practice, fatigue ,
- Bad practice technique,
- Sport-related factors (type of sport (contact-noncontact), duration of athletic activity, role of opponent and teammate),
- Place where sports are done (situation of floor, lighting, enough distance for slowing and warm-up),
- Equipment that are used (shoe, shin guard, racket, cap, clothes, gloves, etc. specific to the sport),
- Climate conditions (heat, humidity, wind),
- Trainer-Coach,
- Game management (rules of game, referees).

### **Prevention of Sports Injuries**

It has been stated that prevention of sports injuries is a whole of many factors including choice of proper sport for athlete, regular check of athlete health exams, warming up prior to sport and cooling down exercises after sport, stretching exercises, not being able to participate in sports not until the completion of treatment and rehabilitation of injury, arrangement of game rules and sport fields according to adolescent athletes, use of protective gear and training adolescent athletes about health rules [12]. It has been shown that injuries decrease significantly if prevention of sport injuries programs re organized and implemented in accordance with passive prevention strategies and active prevention strategies protocols, and athletes, trainers and parents adapt to the program well [6, 10].

- *Health examinations*: the main objective of athlete health examinations is to ensure that athletes do sports in a healthy and safe way, and they participate in practices and games. Athlete health examinations are carried out to detect present or possible diseases in advance, to take necessary measures, to ensure their treatments, even sometimes to change athletic activity. Injured athlete who is not able to participate in games, leads to financial losses both for himself and the club. Treatment of injured athletes cause a huge amount of money. Therefore, sports injuries could be prevented as much as possible if athletes are subject to regular health checks, their conditioning



levels are measured regularly, and present lacking points are determined related to injuries [1]. Health examinations should be carried out by physicians while starting doing sport, and at least once a year while continuing doing sports. Sports physicians shoulder huge responsibility in preventing sports injuries. Under the circumstance in which a sport physician is present, injuries and traumas decrease, thus financial saving is achieved [4]. Team physicians could prevent occurrence of injuries with some protective measures, also they take active role in treatment of present injury and returning of athlete back to sports. Team physicians perform preventive, therapeutic and rehabilitative medical services at the same time. The attitude of team physicians is important regarding returning of athlete to normal activities since diagnosis and treatment of sports injuries require multidisciplinary approach. Furthermore, high level of collaboration of team physician with Health Board and group of Consultant Physicians, which have been established within the knowledge of team physician, is of utmost importance for the team which have an expectation from the athlete as well since it enables early treatment of injured athlete [1].

- *Warming up, cooling down and stretching exercises in preparation for sport:* the objective of warming up exercises is to prepare body and muscle heat, to ensure increase in blood flow; and to prepare the organs which will be involved in the activity. While warming up exercises prior to practice and competition contributes to performance for athletes, it also reduces the risk of injury. Besides, cooling down exercises after practice or competition are important in terms of removing lactic acid which has been accumulated in the muscles, from the area. It accelerates recovering of athletes after the activity [1]. Such activities should be carried out properly and sufficiently. Warming up should include controlled movements which work large muscle groups at the level of easy to moderate [13]. It is known that warming up increases athletic performance, decreases speed and level of injuries. Cooling down are regarded as mild exercises following the competition or practice (such as jogging, walking, etc.). It has been revealed that warming up period for 20 minutes before practices reduces anterior cruciate alignment (ACL) injuries significantly in female football players. Stretching exercises should be done before each practice and after warming up. Stretching exercises should be repeated at least three times a week [6]. Stretching exercises include activities targeting increasing the joints' range of motion. Following warming up prior to practice, body's range of motion should be prepared for the activity. Stretching exercises are of significant importance in terms of quick recovery of muscles and ligaments following activities after completing practice, and reducing injury risks. Stretching exercises target whole body but specific muscle groups which will work during the exercise should be focused, as well [1].

- *Rules of Game:* The primary objective of game rules is to prevent acts which will harm the athlete. Defects in the sport fields' floors pave the way for injuries. Floor for gymnastics, karate, wrestling and boxing is required to have a certain level of elasticity, not to move during activity, not to form heat in friction, and be easy to clean [6]. Rules of games should not only target enabling athletes to compete under equal conditions but also should aim at prohibiting actions which will hurt opponents during activities [1].

- *Features of sport equipment:* Sports equipment should protect certain parts of the body against injuries, prevent wearing out of previously injures parts, protect healing parts, and should not break the body functioning and should not damage other parts of the body; and its maintenance should be easy [3, 14].

- *Sport equipment:* the fact that sports equipment and protective gears have proper structures which are unique to sport's type, is one of the important factors to be considered in order to get protected from sports injuries. In every branch of sports, special protective gear against possible sports injuries [1]. Equipment utilized for preventing injuries should have protective features. First thing to do in order to avoid injuries is to get a physical examination, and to determine any kind of problems such as possible problems and injury risks in joints, anatomical problems, sequellae of previous injuries, if there is a problem, taking necessary measures against them will be sufficient. In addition, risks of sports injuries could be reduced by using proper equipment for each branch of sports including classical equipment, special shoes, gloves, knee guard, elbow protector, helmets, and eyewear. In this context, extra cost will be prevented in terms of economic dimension [4]. There is a need for special equipment for preventing injuries in every type of sport. In contact sports such as football and hockey, weak areas which are open to impact should be protected [3]. Vital areas which are open to injuries (head, eyes, neck, kidneys, and genital organs) should be protected primarily. Sports shoes are important parts of sport equipment. In skiing, there is a huge variety of shoes. In tennis, racket should be chosen according to the player.

- *Health Knowledge and Training:* Telling the causes of sport injuries to athletes in a detailed way is an effective method in prevention of sport injuries. The fact that athlete learns he has to do warming up and stretching exercises before practice and competition, and cooling down and stretching exercises after practice and competition will reduce the risk of injury. Athletes should be informed about use of proper and protective equipment specific for sports in order to avoid injuries. Athletes should be trained on issues such as living professionally as athletes, regular practice, sufficient sleep, sufficient and balanced nourishment. Athletes should be informed about the importance of liquid consumption and properties of liquid which should be consumed before and during practice [1]. Causes of

injuries, importance of warming up, cooling down and stretching exercises in prevention of injuries, importance of protective equipment, nourishment, consumption of water and salt, and the fact that law conditioning will increase injuries, and importance of resting should be told to athletes, their families, and especially trainers [12].

- *Bandaging*: Bandaging has an important part in avoiding injuries. Team physician should make sure that areas which have the risk of injury are bandaged before practice or tournament. Moreover, in case of contusion, strain, sprain during an activity, area must be immediately bandaged [1].

- *Rehabilitation*: Rehabilitation has an important role in injured and not-fully healed athletes' re-starting athletic activities as fully healed in a short period of time after an injury. After injury, athletes' aerobic and anaerobic capacities before participating in sports are required to be at sufficient level. While the injury is being treated, extremities rather than the injured one are worked so that losses in capacity of cardiovascular system could be reduced. Before athletes participate in competitions, shortcoming points should be determined by running conditioning tests, and these shortcoming points should be enhanced to the highest level by fixing them with appropriate exercise programs [1].

- *Practise and Competition Areas*: Defects in the quality of sport fields' floors pave the way for injuries. Therefore, floors of sports fields are of paramount importance and they should be according to the activity. Floors are required to have a certain level of elasticity, not to move during activity, not to form too much heat in friction, and be easy to clean, these all will reduce the risk of injuries [1].

### **Financial Dimension of Injuries**

Any health related problem has physical, psychological and economic consequences. Most of the time, only practice and competition losses are thought of after a sport injury. However, price that is paid is much more than that considering athletes themselves, their families, trainers, citizens of the country they live in and even world sport public opinion. For example, the fact that an athlete is not able to participate in Olympic Games or World Champions due to an injury, will reduce the view percentage of games. At the same time, various health related costs and economic losses will emerge or athletes will have lower performance for a long period of time because of lack of proper psychological support [15].

Sport injury is the collective name for any kind of damage occurring during athletic activities. Individual and environmental factors could be at play for occurrence of injuries. Most of the injuries are solved within the team, thus they are not included in statistics. An athlete who has lost his health during an athletic activity, has to be able to do athletic activities again in order to be considered as fully recovered athlete. We can analyse financial dimension of sports injuries based on two items: a) Direct costs, b) Indirect costs [5, 19].

- Direct costs (treatment of injury); For example cost of medical treatment (such as diagnosis, examination fees, x-ray expenses, medicine expenses) [2].

Jiri Dvorak stated in his study which he carried out in 2000 that cost of medical treatment of an injury in football was about 150 dollars. When the socio-economic dimension of football injuries in Switzerland was reviewed, it was found that there were 220 thousand active players, and approximately 400 thousand people who do it as a hobby. It was stated that 40 thousand injuries occur in a year regarding this number of people, which results in 500 thousand working day loss. According to the data of national insurance companies of 2003, financial dimension of this is 20 million Swiss franc which is approximately 87 million US dollars [20].

- Indirect costs (social losses) [1]; range from production to increasing rate of working day losses due to illnesses and injuries (death or injury dependent causes). Another measuring method of cost is social cost which can or cannot be calculated. Costs which can be calculated include insurance and legal expenses. Costs which cannot be calculated, on the other hand, include adverse effects of sport injuries on individuals' or their parents' psycho-social lives. Becoming economically dependent, loss of social status and social position or isolation could be examples. Such kind of expenses could only be calculated as long as quality of life can be calculated to a certain degree. [2].

### **DISCUSSION**

Risks in sports which can possibly occur especially during practice or competition but which can only be noticed when they lead to lower performance and injury or traumas are various. It gets too late when such similar risks are noticed as risk factors, thus athletes encounter lower performance or injury [21].

Unfortunately, in Turkey, there are no reliable statistical data regarding economic losses which stem from sports injuries. In 1980 in Netherlands, 1 million 73 thousand working days were lost due to sports injuries, which reflected on insurant as a loss amounting to 50 million dollars. There are two types of losses stemming from sports injuries. First one is financial loss due to medical expenses. The second one is indirect financial loss because of loss of working day. Considering this classification, again in terms of Netherlands example, it was revealed that in 1987 cost of sports injuries was 225 million dollars, and about 65 million of this cost resulted from football injuries [4].

In studies carried out worldwide, it has been found that sports injuries decrease physical activity, and increase workforce loss and health related costs. Sports injuries cause over 1 billion dollars health related costs around the world. Even though there are no clear statistical data in Turkey, it is clear that sports injuries lead to significant losses in terms of physical and labour force as well as health related costs. According United Nations' data, it is known that there are 3-5 million sports injuries in a year. It is observed that football clubs encounter great losses from success-related and financial aspects when players, for whom great amount of money has been paid, get injured [22].

In addition to the fact that cost of medical treatment due to sports injuries is regarded as financial loss, time spent away from sport, thus lost working day, constitute financial dimension of injuries, as well. Number of lost working day is an indicator of financial consequences of injuries for the society [2]. Financial loss resulting from the fact that injured players could not participate in practices and matches in 1998/1999 season in England was about 40 million Euros [23].

In a study which was carried out in Switzerland between 1990 and 1993, it was stated that sports injuries occurred three times more than traffic accidents [24].

In Italy, every year 6 million athletes are examined prior to sports (10% of population of Italy) [25]. 3.1% of them were disqualified because 1.8% of problems were heart-circulation system related [26]. 0.25% of athletes who were evaluated in pre-sport examinations in Uludağ University Department of Sports Medicine in the last decade were disqualified due to heart problems [27]. Heath examinations prior to sports will initially ensure that future situations can be partially prevented through information and measures which will be taken in case of possibility of future injury or illness

In general, while cost is calculated, the total of first item; cost of diagnosis and health care services in case of injuries, and the second item; cost of preparation for preventing injuries, is calculated. In order to calculate the cost in this way, data related to the utilization of health care services are required. This depends on duration of hospital admission time, and equipment that is used [28]. On the other hand, for indirect costs, reflection of the facts of absence at work or loss of production onto the economy can be considered. Human capital approach is commonly used to calculate indirect costs. For this method, loss meter of production is utilized [28]. In this method, cost of loss of production can be exaggerated, option of switching workers can be ignored, since in short term, other workers can compensate for injured worker. Therefore, this method is criticized because of these aspects [6, 28].

Facility and sports field, equipment, game, practice, environmental factors, habits are regarded as social risk factors. These are quite effective factors in sports injuries. Understanding the risk factors which could be effective in sports injuries well, and minimizing risk factors by ensuring necessary standards, will mean decrease in spending for prevention, treatment and rehabilitation of injuries.

### **Suggestions**

- State should develop policies and prioritize them in order to prevent costs of injuries.
- Resource allocation should be done to prevent injuries. Otherwise, sports injuries could lead to the most expensive economic loss.
- This situation, which is known as financial opportunity, is an important concept related to economy. It provides societal benefit.
- External factors, which are included in risk factors effective in occurrence of sports injuries, should be evaluated accurately.
- Within this context, prevention of injuries through health economics has an important role from societal aspect.
- Preventive strategies should be developed to evaluate cost and benefits of injuries [5, 28].
- Sports injuries which occur suddenly and require first aid, trainer at school or sports club, who is related to disease or accidents, physical education teacher, first aid knowledge of health care providers, sufficient ad scientific medical action plan regarding emergency situations which has been prepared beforehand, are all closely associated with short and long term consequences of such incidents. Therefore, importance should be attached to this issue [21]. In this way, it can be possible that athletes can return to sports as soon as possible after injuries, treatment process can



be shortened, unfavourable consequences can be prevented with proper and accurate first response, and thus costs can be reduced.

### CONCLUSION

In conclusion, taking into account the fact that spending on sports injuries increases every year, it should be ensured that necessary measures related to this issue should be determined in a short period of time, risk factors should be reviewed, standardized and implemented. Furthermore, periodic health scanning of athletes should not be ignored in order to detect sports injuries in time and prevent them.

### REFERENCES

- [1] Ünal M, Spor sakatlıklarının önlenmesi ve tekrar sportif aktiviteye dönüşte takım doktorlarının görevleri (Duties of Team Physicians in Preventing Sports Injuries and in Returning to Athletic Activities), Retrieved March 22, **2014**, <http://www.ortospor.com/images/spacer.gif>
- [2] Koz M, Frequency and Severity of Injuries, and Factors affecting Injuries, Retrieved March 22, **2014**, from <http://80.251.40.59/sports.ankara.edu.tr/koz/spor.sak/siklik.siddet.pdf>
- [3] Hostetler SG, Xiang H, Smith GA, Characteristics of Ice Hockey-Related Injuries Treated in US Emergency Departments, 2001-2002. *Paediatrics*. **2004**, 114, e661-e6.
- [4] Ntv sağlık raporu, (n.d.) Retrieved from <http://arsiv.ntvmsnbc.com/news/158135.asp>
- [5] Öztürk S, What is the economic burden of sports injuries? *Related Surgery Controversial Issues*, **2013**, 24(2), 108-111.
- [6] Yıldız Safinaz A, *Turkish Paediatrics Research*. Special Issue, **2011**, 46-48.
- [7] Stephens MB, Beutler A, *Am Fam Physician*, **2007**, 75, 1620.
- [8] Ergün S, Elit taekwondocularında ayak bileğine uygulanan bandajın kuvvete etkisi (Force Effect of Bandaging applied on Ankles of Elite Taekwondo Athletes). MA Thesis, Konya: Selçuk University, **2008**.
- [9] Emery C, *Clin J Sport Med*, **2003**, 13, 256-68.
- [10] Frisch A, Croisier JL, Urhausen A, Seil R, Theisen R, *Br Med Bull*, **2009**, 92, 95-121.
- [11] Soligard T, Myklebust G, Steffen K, Holme I, Silvers H, Bizzini M, Junge A, Dvorak J, Bahr R, Andersen TA, Comprehensive warm- up programme to prevent injuries in young female foot ballers: cluster randomised controlled trial. *BMJ*, **2008**, 337, a2469.
- [12] Almquist J, Valovich McLeod TC, Cavanna A, Jenkinson D, Lincoln AE, Loud K, Peterson BC, Portwood C, Reynolds J, Woods TS, *J Athl Train*, **2008**, 43, 416-27.
- [13] Parkin PC, Howard AW, *Current Opinion Pediatr*, **2008**, 20, 719-23.
- [14] Lars P, Per R, Risk to children and adolescents. in: William AG (ed). *Sport Injuries: Their prevention and treatment*. London: Mosby Year Book, **1986**, 405-19.
- [15] Ergen E, Spor yaralanmalarından korunma, retrieved February 22, 2014 from <http://eminergen.com/bilgi10.html>, **2011**.
- [16] T.C. Anadolu Üniversitesi yayını, retrieved January 26, 2014 from <http://eogrenme.anadolu.edu.tr/eKitap/SYT204U.pdf>, **2013**.
- [17] Kuter M, Öztürk F, Sporda risk faktörleri (Risk Factors in Sports). Bursa: Özsan Publications, Retrieved March 22, 2014, <http://www.sporbilim.com>, **1998**.
- [18] Safran MR, DP McKeag M, Van Camp S, *Manual of Sports Medicine*. New-York: *Lippincott-Raven Publishers*, **1998**, 121-9.
- [19] Rice DP, *Inj Prev*, **2000**, 6, 177-9.
- [20] Türkiye Futbol Federasyonu, Retrieved February 26, 2014 from <http://www.tff.org/default.aspx?pageID=283&ftxtID=249>, **2006**.
- [21] Aydın G, Yanardağ M, Erkan M, Yalız D, *Anadolu University Publication*, **2013**, no: 2884, p. 79.
- [22] Medimagazin (n.d.) Retrieved March 04, **2014**, from <http://www.medimagazin.com.tr/hekim/universiteler/tr-gata-spor-yaralanmalarinda-farkli-tedavi-yontemleri-uygulaniyor-2-15-25726.html>
- [23] Gustafsson R, Hodson A, Football medicine in the team. In: *Football Medicine*. Ekstrand J, Karlsson J, Hodson A eds. Revised ed. **2003**, 11-39.
- [24] Ülkemizde ve Dünyada spor travmatolojisi, (n.a.) retrieved March 08, **2014**, from <http://www.guresdosyasi.com/sporsaktedavi.html>
- [25] Pelliccia A, Maron BJ, *Am J Cardiol*, **1995**, 75, 827-829.
- [26] Corrado D, Basso C, Rizzoli G, Schiavon M, Thiene G, *J Am Coll Cardiol*, **2003**, 42, 1959-1963
- [27] Gür, H. (n.d.) sporcu sağlığı, Retrieved March, 02, **2014**, from <http://www.sporhekimligi.com/spordaaniolum.php>
- [28] Currie G, Kerfoot KD, Donaldson C, Macarthur C, *Inj Prev*, **2000**, 6,175-6.