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**Camp Sports Injuries: Analysis of Causes, Modes and Frequencies**

**Panagiota Papageorgiou, George Mavrommatis, George Costa**

Department of Physical Education and Sport Science, Democritus University of Thrace

**Correspondence with:**

**Panagiota Papageorgiou**

[ppapageo@phyed.duth.gr](mailto:ppapageo@phyed.duth.gr)

Democritus University of Thrace,  
Department of Physical Education and Sport Science  
Campus, 69100 Komotini Greece

*International Journal of Sport Management Recreation & Tourism*, Vol.2, pp.14-25, 2008

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**To link to this article: <http://dx.doi.org/>**

**DOI: 10.5199/ijsmart-1791-874X-2b**

### **Camp Sports Injuries: Analysis of Causes, Modes and Frequencies**

#### **Abstract**

The purpose of this study was the description of sports injuries sustained by campers at summer camps, aged 7-15 years. A sample of 8 camps from the Greek camp population participated in this sport injury surveillance study. Doctors and camp directors completed reports detailing the number of sports injuries events sustained and provided specific information about each event. During the period of the study, 337 sport injury reports were completed. A total of 237 (70.3%) boys and 100 (29.7%) girls reported having a sport injury. Age of campers sustaining a sport injury was 10-12 years old (60.8%). The frequency of sports injuries was highest during the first camp season. The leading causes of sports injuries in children's were: falls, crushed by object, collision with other person and slips. Cut/scratch injuries were the most common diagnoses (38.9%). Football, basketball and volleyball were the most frequent sport activities for injuries. Reports based surveillance systems can be successfully used to conducts sport injury surveillance among children attending summer camps. Data collected via such systems can be used to calculate sports injury rates, to describe patterns of sport injury and to identify risk factors for camper – related sport injuries. The results provide necessary information to develop prevention interventions to decrease the number of youth whose camp experiences are negatively affected by sport injury.

Keywords: sports injuries, children, summer camp

## **Camp Sports Injuries: Analysis of Causes, Modes and Frequencies**

### **Introduction**

Summer camp is an extremely popular activity for children. For 140 years parents have been sending their children to rural settings to provide for a break from their familiar routine (American Camp Association, 2002)). Attending summer camp has been a tradition in the contemporary Greek society. Thousands of children every year participate in the Greek summer camps (Afthinos, 1998)). At summer camp, they are involved in many physical and sports activities which ultimately play a significant role in the well-being of a child. A well-designed exercise program enhances the immediate physical, psychomotoric and intellectual attainments of child (Shephard, 1984)). As an undesired but inevitable consequence, sports-related injuries have increased significantly (American Camping Association, 1990; Shanmugam & Maffulli, 2008).

Studies of sports related injuries document their substantial public health impact nationally and internationally (Conn, Annest & Gilchrist, 2003; Mummery, Spence & Vincenten, 1998; Stephenson, Hamer, Finch, Elliot & Kresnow, 2000). During 1997 and 1998, there were an estimated 3.7 million sport injury emergency department visits annually in the US, representing about 11% of all injury related emergency department visits. The medical charges for these visits were estimated at \$500 million annually (Burt, 2001). During July 2000-June 2001, an estimated 4.3 million sports and recreation related injuries were treated in U.S. hospitals, comprising 16% of all unintentional injury-related visits (Center for Disease Control and Prevention, 2002).

In the past, summer camps faced less regulations, fewer demands, children were much easier to manage and parents who were far less opinionated and interested in control. The world has changed dramatically and the camp industry has not been exempt (Schirich, 1999). Today, creating the culture of safety demands an intelligent system of examining every expected and unexpected injury that could compromise the safety of a child at a camp (Cole & Gable, 2000; Friedman, 2001).

The health and wellness of campers is clearly one of the most important responsibilities during the camp season. Recent development research revealed that in addition to the cost of camp, physical and emotional safety was a priority for parents (American Camp Association, 2006). Meeting this obligation depends largely on starting out with a sound base of facts about the health of each person at the camp and

understanding how the influence of camp life. Monitoring trends in sports injuries occurrence and developing effective sport injury prevention strategies will help to decrease the incidence of sports injuries in camp.

However, little research has been done in this area to assess and analyze the status of sports injuries at camp environment as research focuses more at school and recreational injuries. Specifically, over the past 20 years, several large studies of school and recreational injuries have been conducted in a variety of countries and communities (Cellis & Villasenor, 2001; Laflamme & Eilert - Peterson, 1998a). The aim of the current study is the analysis of cause, modes and frequencies of the sports injuries that took place in the Greek camp environment.

## **Methodology**

### **Sample**

A convenience sample drawn from 80 summer camps was used for study participation. Information about the proposed study, including a contact for interested camps to request additional details, was distributed throughout the camping community. Summer camps expressing interest in participating were asked to complete a survey used to assign them to appropriate stratum of a sampling frame designed to reflect the diversity of Greek summer camps (resident camp). A sample of interested residential camps was selected from each sampling frame in an attempt to capture as representative a sample of summer camps as possible. Selected camps (n=8) completed 337 sports injury reports gathered over a 3 month summer camp season (June 2003 to August 2003) in Greece.

### **Questionnaire**

A standardized registration form was employed, specifically the "Students Injury and Incident Reports for Use in Swedish School" form (Laflamme *et al.*, 1998b), which it was designed in accordance with Sweden's National Board of Health and Welfare's classification of injuries (Swedish National Board of Health and Welfare, 1989), a further development of a classification and set of definitions constructed by the Nordic Medico-Statistical Committee (NOMESCO, 1990). This questionnaire adjusted in order to be used for Greek summer camps.

**Process**

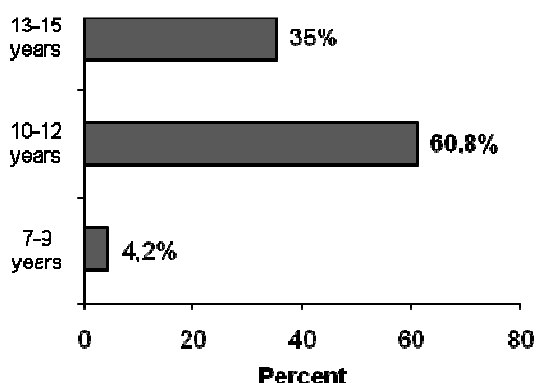
Data were collected in camp infirmary. Generally, doctors and camp directors completed the form. For each sport injury, doctors and camp directors completed a sport injury report form that compiled detailed information about the camper experiencing the sport injury event (age, gender), information about the sport injury (injury type) and information about the circumstances associated with the event (sports activities).

**Statistical Analysis**

Frequency analysis and chi-square non-parametric test was applied. Differences were considered statistically significant at  $p < 0.05$ .

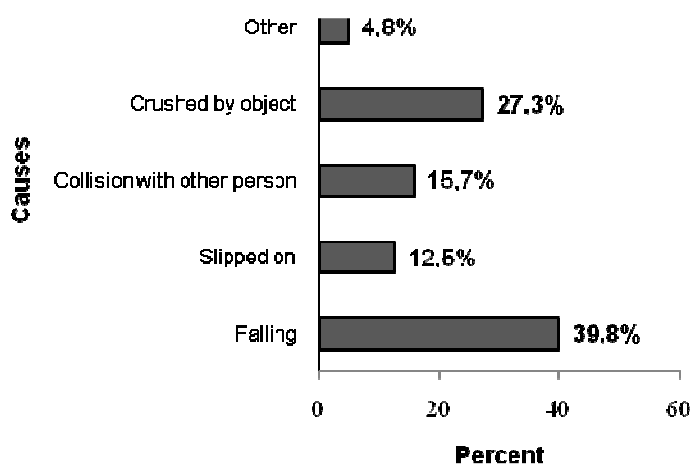
**Results**

A total of 337 sports injuries were reported over the 3 month summer periods. Of the injured children, 70.3% were boys and 29.7% were girls. The specific age group was between 10 and 15 years, with a grade distribution showing that most (60.8%) of the sports injuries occurred in 10-12 year categories ( $\chi^2=88,534$ ,  $p < 0.05$ ) (Figure 1). The frequency of sports injuries was, highest during the first camp season (47.2%).



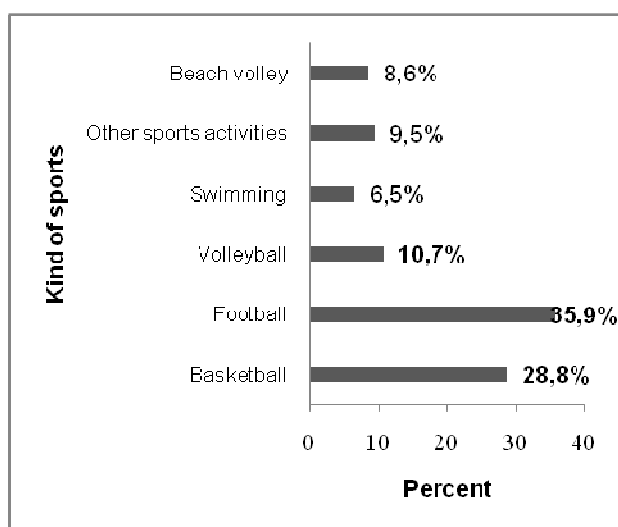
**Figure 1.** Distribution by age. Age of camp sports injuries were 10-12 years.

Falling was the leading cause of sports injuries at summer camps (39.8%). This was followed by crushed by objects (27.3%) collision with other person (15.7) and slip (12.5%) (Figure 2).



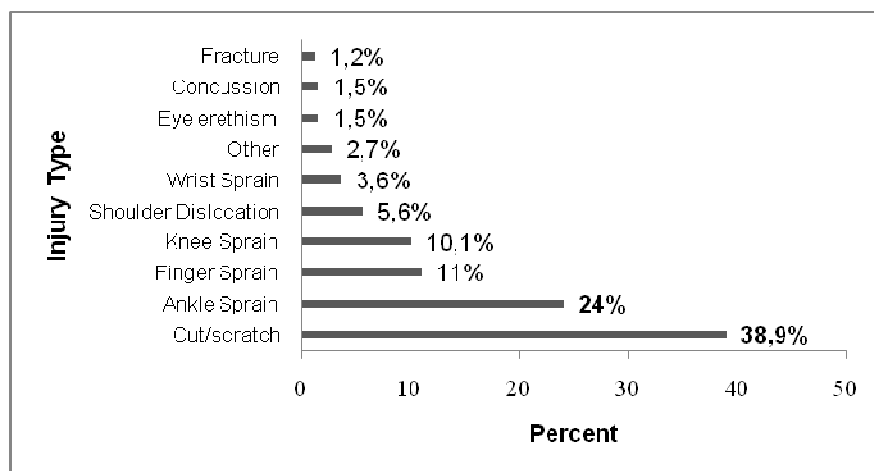
**Figure 2.** Causes of sports injuries.

Most frequent sport injuries were falling and crushed by objects. Of all sports injuries, 64.7% of the injuries happened playing the most popular games. Most of these injuries occurred while playing football (35.9%), followed by basketball, with 28.8%. Volleyball took third place with 10.7% of all sports injuries (Figure 3).



**Figure 3.** Kind of sports.

Soccer, basketball and volleyball were the most frequent causes of sports injuries. Cut/scratch injuries were the most common diagnoses (38.9%), followed by ankle sprain (24.0%), finger sprain (11.0%) and knee sprain (10.1%) (Figure 4).



**Figure 4.** Sports Injuries by types.

Most frequent sport injuries were cut/scratch and ankle sprain. Although most injured campers were treated onsite by camp doctors (82.8%). Of all of the campers sustained sport injury events 17.2% were admitted for treatment at a hospital.

### Discussion and Conclusions

Physical activity in summer camps greatly influence children's attitudes toward sports. The goal should be to motivate children to practice sport for a lifetime to prevent injuries that are caused by a deficit of sports activities. Negative experiences such as injuries during sports activities may question the achievement of this objective, so it is important to evaluate typical risk factors and causes for sport injuries in camp (Kelm, Ahlhelm, Pape, Pitsch & Engel, 2001).

Boys were more likely to have experienced a sport injury compared to girls. Greater body mass and an increased competitive aggressiveness may account for this (Cristoforidis & Kambas, 2007; Spinks, McClure, Bain & Macpherson, 2006). This finding was similar to several other studies (Chen *et al.*, 2005; Pickett *et al.*, 2006) and likely reflects gender –based differences in perception, motor ability, injury or activity patterns (Kontos, 2004).

Overall findings revealed a high rate of sport injuries among camp children aged 10-12 years. Rates of sports-related injuries have been found to be high among

adolescents (Every *et al.*, 2006; Shanmugam & Maffulli, 2008) and represented the most common form of sports injuries in the multi-country Health Behavior in School – aged Children (ages 11-15 years) survey (Pickett *et al.*, 2005). During growth, there are significant changes in the biomechanical properties of bone density which may affect the rate of sports injuries, as well as the possibility that older children are participating in more risky activities than younger children (Castiglia, 1995; Michelin, Glassman & Klein, 2000; Shanmugam & Maffulli, 2008).

The results of the current study indicate that the peak sport injury season was the first camp season, likely reflecting the fact that during the first camp season children are more likely to participate in a variety of sports activities. This finding highlights the need for heightened sport injury prevention efforts during this season, focusing on the types of sports that are offered during this season. Similar results were also found in other studies (Bienefeld, Pickett & Carr, 1997; Kelm *et al.*, 2001).

“Falls and crushed by objects” represented the leading causes of sport injuries in camps children’s followed by collision with other person, and slips. Other studies indicated that falls were the leading cause of sports injuries among children (51%) followed by being struck by objects (18%) or sustaining cutting/piercing injuries (9%) (Faelker, Pickett & Brison, 2000; Papageorgiou, Mavromatis & Kosta, 2006). The majority of injuries occur during complex game situations. Thus, it is necessary to make sure that general sport and safety skills are developed in a child before participation commences in competitive events (Kelm *et al.*, 2001).

A high number of sports injuries due to ball games was indicated. This can be explained partially by the major role team games play in camp. (Kieslich, 1992; Pospiech, 1981; Stephenson *et al.*, 2000). The complexity of the games itself causes a higher risk for sports injuries (Siewers, 1998)). The risk involved in ball games has been underrated. Inadequate reactions of other children’s combined with insufficient self-assessment and a tendency to risky maneuvers seems to increase the incidence of sports injuries (Kelm *et al.*, 2001; Spinks & McClure, 2007).

Cut/scratch and ankle, finger and knee sprains were the most common diagnoses. Epidemiologic studies demonstrated that sports injuries are located most often on the lower extremity (Steinbruck, 1999). These results are compatible with those reported in subsequent research that provide the profile of injuries specifically in sports activities (Petridou, Sibert, Dedoukou, Skalkidis & Trichopoulos, 2002).



The number of children who needed medical treatment by camp doctors was high. Children who suffer from sports injuries are more likely to have contacts and more numerous visits with a variety of health care professionals as well as overnight hospitalizations (Kohen, Soubhi & Raina, 1992; Laflamme & Menckel, 1997).

Sports injuries are a significant risk to camp children and represent an important population health concern. Recognition of the magnitude of this problem in recent years has stimulated an increasing interest in sport injury prevention. The current study identified a number of issues for children camp sports injuries that need to be addressed. Boys were more likely to have experienced a sport injury. Findings revealed a high rate of sport injury among camp children aged 10-12 years. The peak sport injuries season was the first camp season. The main causes of children's sport injury were: falls, crushed by object, collision with other person and slips. Most sport injuries occurred while playing football, basketball and volleyball. Cut/scratch and ankle, finger and knee sprains were the most common sport injury types. Most injured campers were treated onsite by camp doctors. Sport injury prevention and control strategies targeted at these areas are needed in order to reduce the rate of sports injuries among children in camp environments. This study supports the need for maintenance of sport injury surveillance systems to monitor camper sport injury events and support the development of risk – reducing strategies. Going to camp can be a wonderful, confidence-building experience and should be safe through careful prevention and safety precautions. People involved in the supervision of medical facilities at summer camps need to become familiar with safety recommendations.

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