Sports injury and the role of medical diagnostic devices

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Abstract: Objectives: Sport participation always carries the risk of injury. The aim of this paper is to investigate the incidence of sports injury, the role of medical diagnostic devices and concepts of sports injury prevention. Various medical diagnostic devices are not always helpful without any damage. The conclusion of this study gives viewpoints of clinical medicine and biomedical engineering on sports injury. Highlighting the importance of sports injury with regard to incidence rates and risk factor is also the main goal of the study [1]. Results: The study population includes patients and their family members from the outpatient department of Tzuo-Ying Armed Forces General Hospital in Kaohsiung City, Taiwan. The data demonstrates the most common sites of injuries are ankles (34.4%). Regarding the knowledge of sports injury prevention, 38.3 % believe that sports protective devices using can decrease risk of injury and 51.5 % think that enough warm-up exercise will make exercise course smoothly. Regarding actions taken by persons after the occurrence of a sports injury, more than half (54.7%) of them attempt to treat the condition themselves at the initial stage, and only 33.6% look for medical attention immediately .It warns policy makers that the high rate of people ignore the sports injury and taking no thoughts about sports injury may result in more costs of the medical service at the later stage. Conclusions: The results show that increasing population levels of the knowledge about sports injury prevention and providing realistic medical diagnostic devices are important. [Life Science Journal 2010;7(2):98-101]. (ISSN: 1097-8135).

Keywords sports injury; medical diagnostic device; X-ray radiation

1. Introduction

Sport participation always carries the risk of injury. The aim of this paper is to investigate the incidence of sports injury, the role of medical diagnostic devices and concepts of sports injury prevention. Various medical diagnostic devices are not always helpful without any damage.

The cross-section study aims to evaluate the prevalence of sports injury in general population. The incidence probability of sports injury depends on the physical condition, sports safety equipment, skill levels, the knowledge of injury prevention and etc [2]. The study results may show some ideas for the directions of promoting sports injury prevention ability of general population, preventive medicine and the efficiencies and facilities of medical diagnostic medical devices in the future [3].

2. Materials and methods

The study is a cross-sectional designed by the application of questionnaire in sample survey about sport –related injuries between Mar 2009 and June 2009 for people and their family members visiting Tzuo-Ying Armed Forces General Hospital. There is only one questionnaire used in the study. The questionnaire includes information about persons participated in the study as follows: age, gender, height , weight, frequency of taking exercise, education level, medical and injury history , coping strategies attitudes in injuries, and knowledge about sports injury [4][5]. The research team consults the orthopedic specialists in order to develop expert validity and content validity of the questionnaire.

Structured questionnaires are sent to patients and their family members at the waiting room . A total of 136 questionnaires are returned, a valid questionnaire response rate is 47%. Because of the characteristics of armed forces general hospital service, most cases of our study are soldiers in active service. Descriptive statistics and inferential statistics are performed using Student's t tests and Chi-square analysis. Spearman correlation is used to determine the relationships between different parameters. SPSS version 12.0 (SPSS Inc, Chicago, IL, USA) is used to analyze the data.

3. Results

From the 136 questionnaires sent out, there is a valid questionnaire response rate of 47%. There seems to be no significant difference in age, height, body weight, BMI (body mass index), education level, history and frequency of exercise between people participated in the study. There is a deemed homogeneous sample for participants who belong to the same subculture or have similar characteristics. A total of 64 persons participate voluntarily in this study (57 males and 7 females). During the survey, most people have experiences of sport injury in the past. The common sites of injuries are ankles (34.4%), thigh (25.0%), and knees (12.5%) in the study. A muscle strain is a common problem among many individuals who are physically active (59.4 %). A sprain is an injury to a ligament caused by excessive stretching and also it happens when there's an injury to the tendon or muscle (26.6%) (Fig.1).

Sports injuries are common especially in economical and competitive sports such as ball exercise, swimming and running. 45.3% have experiences of sport injuries associated with playing ball games. 28.1% sustain a foot injury when running [6] (Fig.2). Regarding the knowledge of sports injury prevention, 38.3 % believe that using sport protective devices during exercise can decrease risk of injury and 51.5 % think that enough warm-up exercise will make exercise course smoothly.

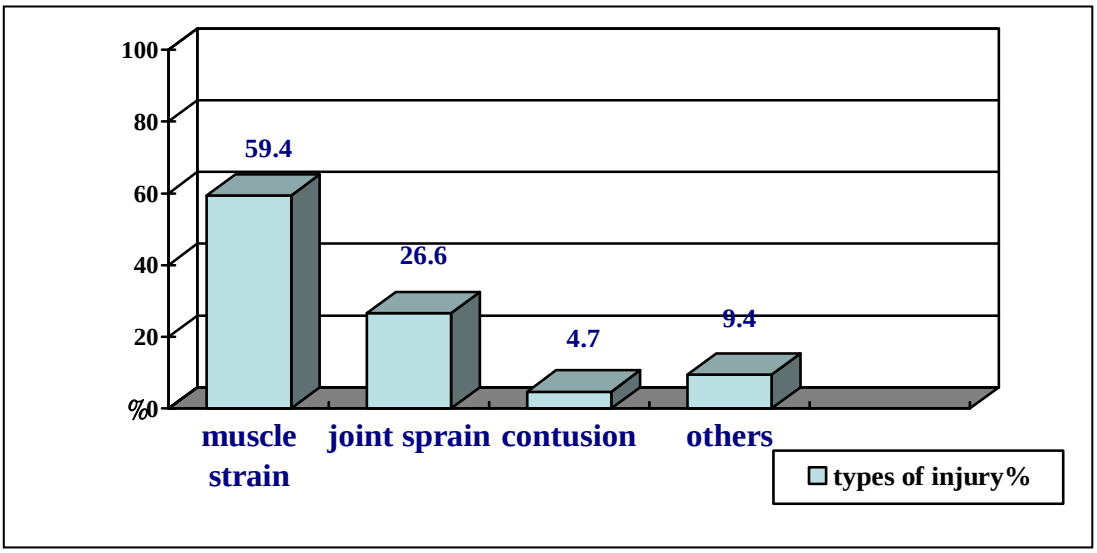

Figure1. Different types of sporty injury: The common sites of injuries are ankles (34.4%), thigh (25.0%), and knees (12.5%) in the study.

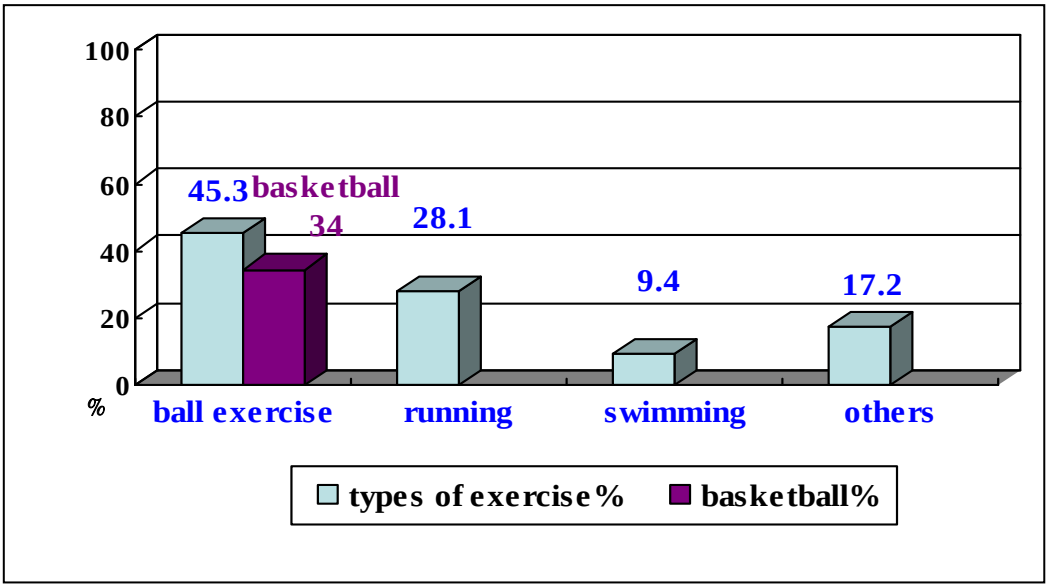

Figure 2. Sports - related injuries at different categories.

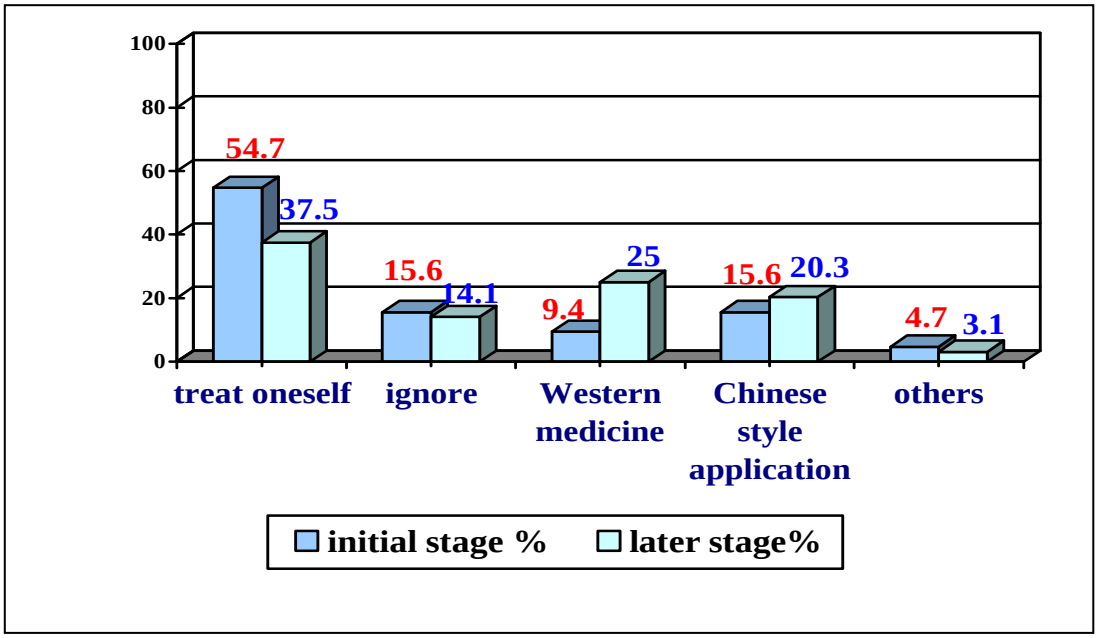

Figure 3. Different coping strategies in sports injury injuries

Regarding actions taken by persons after the occurrence of sports injury, 54.7% of them attempt to treat the condition themselves at the initial stage, and only 33.6% look for medical attention immediately at the initial stage.15.6 % and 20.3% select Chinese style application at the initial stage and later stage. Chinese style application includes the herb patch, massage, cupping, acupuncture therapy and other associated alternative medicine treatments. Post the occurrence of acute sport injury, 40.6% have no idea that RICE principles of rest, ice, compression, and elevation are the first steps in sports injury treatment. It warns policy makers that more than half of people attempt to treat the condition themselves at the initial stage ,and high rate of people taking no thoughts about sports injury may result in more cost of the medical service .(Fig.3) .

4. The role of medical diagnostic devices

Joints are more prone to injury when the muscles and ligaments that support them are weak, especially after damages. Diagnostic imaging plays a key role in the evaluation of patients with illness. Specialists may use of the proper equipment to diagnose injuries such as x-rays , computed tomography (CT), and magnetic resonance imaging (MRI) by clinical symptoms of patients [7].

MRI examinations are widely utilized for soft tissues such as joints (ligaments), spinal cord, blood vessels, and etc. Computed tomography (CT) is practical and functional in assessing the condition of the tissues in avulsion injury. MRI and CT scans cost $1000 to $2500 per examination in USA or other countries where most people can not afford it without healthy insurance. X-ray films should be regarded as the first-line diagnostic imaging technique of musculoskeletal diseases for its convenience, function, and cheaper cost.

X-rays exposure can be dangerous and cause mental stress to pregnant women. The recommendations for fetal dose should be limited to 5 millisieverts (mSv) or 500 mrem [8], even not all exposures can be harmful [9]. At fetal doses above this level, the decision should be based upon the individual circumstances.

5. Discussion

X-radiation is a form of electromagnetic radiation. X-rays have a wavelength in the range of 10 to 0.01 nanometers. X-rayfilms are specially hepful in the detection of pathology of the skeletal system, but are also useful for detecting some disease processes in soft tissue.The average radiation dose of a person in USA is about 3 mSv of exposure per year from artificial causes or natural sources as followings: radioactive materials, cosmic radiation from outer space and iatrogenic event and etc.

Post receiving once radiation scan, the radiation dose of chest X ray is about 0.05-0.1 mSv and higher dose with 10 mSv in whole body scanning using Computed Tomography [11][12].

The doses of natural background vary throughout different geographic environments. An exposure of greater than 20 mSv is considered higher than acceptable range, while greater than 3 mSv to 20 mSv is considered relatively safe.

There are several limitations that need to be addressed regarding the present study. The first limitation concerns the characteristics of the study sample. In the sample people, most of them (92%) are under the age of thirty-five years. Young people who are active in many types of competitive sports and the characteristic about age of the study sample leads a high estimate for the incidence of sports injury. Small sample size is another study limitation. Other possible limitations of this study are sampling method and

geographic location.

6. Conclusion

The study puts efforts and concern on the research and techniques in medical engineering and related sciences in addition to researches in clinical medicine. At the same time supporting specialists with up-to-date medical instruments and systems are crucial and vital. Preventive medicine plays a more important role than the care medicine, rehabilitation and so-called best medical diagnostic devices.

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