

A Study of the Impact of Sepaktakraw Balls on the Head

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Abstract. Sepaktakraw is a traditional game played at international level in Asia. The game is played by using various parts of the body except the hands. Most notably the head is very often used. But unlike soccer, no study has been done on injuries caused by contact between the ball and the head. The balls are typically made of plastic. Recently new balls made of plastic impregnated with rubber was introduced. In this study a method has been developed to measure the Head Impact Power of Sepaktakraw balls. Using this method it was found that two different balls results in entirely two different outcomes. It was found that the balls made of plastic impregnated with rubber has 4 times more probability of causing mild brain traumatic injury when dropped from a height of 3.5m. The significance of this study is the importance of taking into consideration the safety of an athlete when designing sports equipment even as simple as a plastic ball.

Keywords: sepaktakraw, mild brain traumatic injury, head impact power, rubber impregnated plastic balls, etc.

1. Introduction

Sepaktakraw is a game between two teams which involves the use of mainly the head and legs and sometimes other parts of the body to maintain a ball in the air with less than three contacts. Exchanges of the ball occur at high speed and extreme acrobatic moves are often employed. The type of ball used may thus have an impact on a sepaktakraw athlete particularly in terms of its effect when in contact with the head, legs and to some extent the other parts of the body. However there has been no study up to date on the impact of a sepaktakraw ball on the head. In similar sports where the head is in contact with a ball such as soccer, it has been found that ball to head contact accounts for 12.6% cases of concussion [1]. Delaney et al [2] reported that more than 60% of college-level soccer players reported symptoms of concussion during a single season.

A concussion is a trauma-induced change in mental status, with or without unconsciousness caused by an impact to the head or upper body, or by non-contact severe motion, such as whiplash. Its symptoms ranges from a mild headache, nausea, dizziness, vertigo, heightened sensitivity to light or sound, amnesia to prolonged unconsciousness. It is also believed that a person who has had one concussion is four to six times as likely to have a second concussion as a nonconcussed player. The second concussion is often significantly more severe than the first, even if the second impact is seemingly minor, because the brain has not completely healed from the first concussion yet. This is often called the second impact syndrome (SIS).

A study on the probability of a concussion due to head clashes in American Football was conducted by Newman et al [3]. It was observed that head injury severity/probability correlates to the magnitude of the rate of change of kinetic energy that the head undergoes during an impact. Based on this a Head Impact Power (HIP) equation was derived and its relation to the probability of concussion established. In this paper a methodology is developed to measure the HIP values of two types of sepaktakraw balls impacting on the head. Recently there has been a controversy on the use of a new ball made of plastic impregnated with rubber. The study seeks to demonstrate that the design of the new ball may have significant effect on the HIP values and consequently the probability of brain injury to the player.

2. Methodology

An experiment was designed in which the balls were dropped at different heights onto a force plate. The different heights will result in different velocities on impact. Dropping from a height also allows the effect of drag forces on the balls. The experiments were conducted indoors to discount the effects of air movement. A

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