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RETROSPECTIVE ANALYSIS OF SPORTS INJURIES AMONG SLOVENIAN BADMINTON PLAYERS

RETROSPEKTIVNA ANALIZA ŠPORTNIH POŠKODB PRI IGRALCIH BADMINTONA V SLOVENIJI

ABSTRACT

The purpose of our study was to highlight sport injuries suffered by Slovenian badminton players, their frequency and possible risk factors such as previous injury, years of training, training hours and gender. Twenty-six elite Slovenian badminton players participated in the study. A questionnaire was used to indicate any injuries incurred in a one-year period. The main findings show that acute injuries of the shoulder and ankle are the most frequent problem of elite Slovenian badminton players. Gender does not seem to influence the risk of injury, but previous injury was associated with a slightly increased injury risk for shoulders. The main difference between players with and without a shoulder injury was the amount of training hours which was 1.37 times lower in the injured group.

Key words: sport injuries, badminton, gender, racquet sports

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IZVLEČEK

Namen raziskave je bil izpostaviti športne poškodbe pri slovenskih igralcih badmintonu, njihovo pogostost ter možne dejavnike tveganja, kot so predhodna poškodba, leta treniranja, ure treninga in spol. V raziskavi je sodelovalo 26 slovenskih vrhunskih igralcev badmintonu. S pomočjo vprašalnika so navedli svoje poškodbe v obdobju enega leta. Glavne ugotovitve študije kažejo, da so pri slovenskih vrhunskih igralcih badmintonu najpogostejše akutne poškodbe ramenskega sklepa in gležnja. Spol naj ne bi vplival na tveganje za poškodbo, predhodna poškodba pa je bila povezana z nekoliko povečanim tveganjem za poškodbo ramenskega sklepa. Najpomembnejša razlika med igralci s poškodbo ramenskega sklepa in brez nje je bilo število ur treninga, ki je bilo v poškodovani skupini 1.37-krat nižje.

Ključne besede: športne poškodbe, badminton, spol, igre z loparji

INTRODUCTION

Badminton is one of the most widely played racquet sports in the world. The Badminton World Federation (BWF) has 177 member associations. The BWF website states that about 150 million people play the game worldwide and that more than 2,000 players participate in international competitions (BWF, 2012). Badminton is played by people of all ages and also at all levels and, even though sports injuries are a part of life for every sportsperson, we have to consider ways to avoid injuries. It is our duty to provide research on all possible fields to prevent sportspeople receiving injuries which preclude top results in the short or long term.

Although in the past badminton was considered to be a very safe sport (Hensley & Paup, 1979) and that badminton-related injuries represent just 1.2% of all sports injuries that require emergency care (Fahlstrom, Bjornstig, & Lorentzon, 1998), some recent papers highlight that when played at the highest level it may be associated with a serious risk of injury. Analysis of injuries incurred at the London Summer Olympics shows that the risk of an athlete being injured was the highest in taekwondo, football, BMX, handball, mountain biking, athletics, weightlifting, hockey and badminton (Engbretsen et al., 2013). One possible reason for injuries in badminton is the fact that the game is very physically demanding. This fact has been confirmed by several authors (Kazuma et al., 1999; Cabello Manrique & Gonzalez, 2003). Kazuma et al. (1999) showed in their study that during a training camp badminton players had energy expenditure of 15.844 ± 2.079 kJ (3.787 ± 497 kcal) per day, which is more than twice the recommended energy allowance. Cabello Manrique and Gonzalez (2003) also confirmed the high demands made by badminton as the average maximum heart rate (190.5 beats/min) and average heart rate (173.5 beats/min) during matches was very high.

The overall incidence of injuries in badminton (regardless of gender) has been reported as 0.3 injuries per player (Jorgensen & Winge, 1987), while other studies have reported some differences in injury incidence rates among male (0.09 injuries per player per year) and female (0.14 injuries per player per year) badminton players. When considering the injury type and anatomical location of the injury, the most common injuries were strains and sprains of the lower extremities (Fahlstrom et al., 1998; Hensley & Paup, 1979; Jorgensen & Winge, 1987, 1990) accounting for almost one-third of all injuries suffered by badminton players (Goh, Mokhtar, & Mohamad Ali, 2013).

The purpose of our study was to highlight sport injuries in Slovenian badminton players, their frequency and possible risk factors such as previous injury, years of training, training hours and gender.

METHODS

For this study 26 elite Slovenian badminton players answered a questionnaire. All of them were included in the senior or junior national team (18 males and 8 females). Their main characteristics are presented in Table 1.

Table 1.

Main characteristics of the male and female badminton players

	Sex			
	Male (N=18)		Female (N=8)	
	Mean	Std. Deviation	Mean	Std. Deviation
Age (years)	22.00	4.90	21.00	5.86
Height*	179.56	5.81	170.88	3.87
Weight*	71.33	8.24	59.88	3.72
Years of training	12.00	4.89	13.63	6.07

* - significant gender-related difference $p=0.001$ for both instances

The questionnaire was about sport injuries suffered in the previous 12 months and was self-constructed. It is available from the authors upon request.

The data were processed with the Statistical Package for Social Sciences version 20.0 (SPSS Inc, Chicago, IL, USA). The basic statistical parameters were calculated (mean, standard deviation, frequency). To ascertain differences between injured and uninjured players, an analysis of variance (ANOVA) was used.

RESULTS

In a one-year period, 12/18 male and 6/8 female players were injured. The association between gender and injury status in the one-year period was evaluated using a Chi square test. There was no significant association between gender and injury occurrence in the one-year period between the male (12/18) and female (6/8) badminton players ($\chi^2(1) = 0.18$, $p=0.67$). Based on these findings, the injury data were not split during further analysis. Injury occurrence was 1.32 for the males and 1.85 for the females, which corresponds to an injury rate of 1.32 injuries per 1,000 hours for the males and 1.85 injuries per 1,000 hours for the females.

The injuries were mostly acute in nature (14/18). Among acute injuries, the most frequent anatomical location of the injury was the shoulder and ankle, with each representing 30.8%. Ligament sprains and muscle strains were the most predominant type of acute injuries, representing 46.2% and 38.5%, respectively. Overuse injuries were more evenly

distributed across anatomical locations, targeting the knee (2/4), shoulder (1/4) and lower leg (1/1).

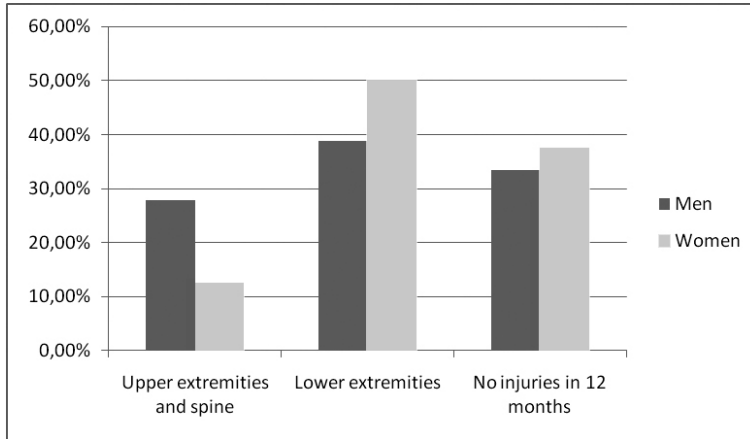


Figure 1. Comparison of injuries between upper and lower extremities and sex

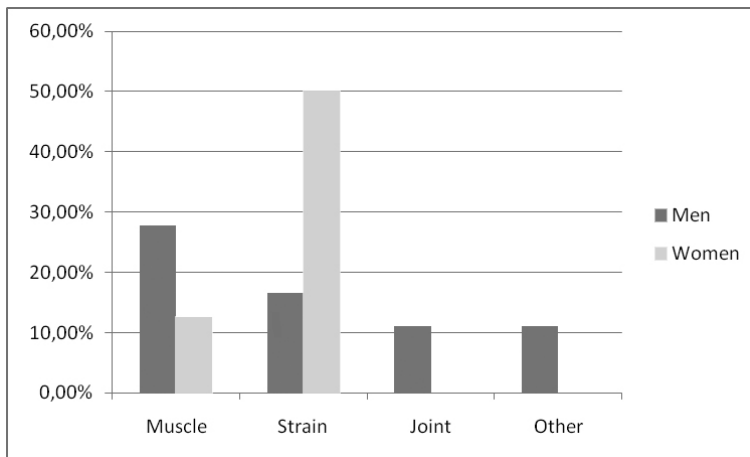


Figure 2. Comparison of injuries between sex and location of injury

For acute shoulder injuries, having had a previous injury was a significant risk factor and the odds ratio for sustaining an acute injury was 1.38 (95% confidence interval 1.07 – 1.78) times higher in the subgroup of previously injured badminton players. However, this was not true for acute ankle injuries. All acute shoulder and injuries occurred during training (technical or resistance training).

When players with an acute shoulder injury were compared to their counterparts without an acute shoulder injury in terms of their training hours, age, height, weight and years of training, only training hours differed significantly between the groups ($p < 0.05$). Players

with an acute shoulder injury trained 1.37 times less than uninjured players (652.1 hours/year vs. 891.8 hours/year).

DISCUSSION

Injuries are part of every sport so we cannot completely avoid them, but with research studies like this we can analyse them and come to conclusions that might help us reduce injury rates. This is even more important when we consider that we have very few top badminton players in Slovenia where there are just 11 male and 4 female senior players and 7 male and 4 female junior players in the national team's A programme (BZS, 2012). Our sample in this research was in fact the population of elite Slovenian badminton players.

The main findings of our study indicate that acute injuries of the shoulder and ankle are the most frequent problem of elite Slovenian badminton players. Gender does not seem to influence the injury risk, but previous injury was associated with a slightly increased injury risk for shoulder injuries. The main difference between the injured and uninjured players was the amount of training hours that was 1.24 times higher in the injured group.

Several country-specific surveys on badminton injuries have already been conducted (Shariff, George, & Ramlan, 2009; Yung, Chan, Wong, Cheuk, & Fong, 2007) that address the specificity of badminton injuries that may arise from different training approaches and training practices worldwide. Badminton's popularity is increasing in Slovenia as more and more people are playing it and the number of competitive players is also growing (Kersnik, 2010). Even though Slovenia is one of the smallest countries in the world (just 2.2 million inhabitants), because badminton is an Olympic sport there are several players who are competing at the highest level. Since 1992 (when badminton was introduced at the Olympic Games in Barcelona), two Slovenian players have qualified for participation at the summer games (Maja Pohar in Sydney in 2000 and Maja Tvrdy who participated twice, Beijing, 2008 and London, 2012). It has therefore been worthwhile addressing this issue among Slovenian players. From a practical standpoint, our data highlight the importance of including shoulder and ankle preventive training programmes in the training routine of Slovenian badminton players. We should note that the incidence of shoulder injuries was high, especially in the light of previous studies which showed that the anatomical location of an injury is the lower leg in one-third of the cases (Goh et al., 2013). However, our finding is not unique as Yung (Yung et al., 2007) also reported a high incidence of shoulder problems in badminton players while Kondric et al. (Kondric, Matkovic, Furjan-Mandic, Hadzic, & Dervisevic, 2011) reported that the shoulder girdle was the most frequent injury location in Slovenia racquet sport players, accounting for 17.27% of all injuries.

In 1999 Kluger et al. (Kluger, Stiegler, & Engel, 1999) suggested that years of playing badminton on a competitive level may be a risk factor for acute badminton injuries. They concluded that the 6th and 7th years of competitive badminton have a three times higher incidence of acute badminton injuries compared to the first year and the late years of a career as a competitive badminton player. In spite of those findings, we did not find evidence to support this contention as the difference between injured and uninjured players was only 0.59 of a year (years of playing badminton 12.00 vs. 12.59 for injured vs. uninjured players, respectively).

Regarding gender specificity, several studies have found no gender-related differences in overall injury rates (Kluger et al., 1999; Shariff et al., 2009), while other studies have concluded that men have a higher injury risk than women when exposure is taken into account (Jorgensen & Winge, 1990). In our study, we did not find any association between overall injury rates and gender, and the same was true for the acute shoulder and ankle injuries that were the most common injuries, which is in line with the findings of Fahlstrom et al. (Fahlstrom, Yeap, Alfredson, & Soderman, 2006) who conclude that shoulder injury prevalence does not differ among the sexes.

Although having had a previous injury is one of the most important risk factors for re-injury in many sports, this issue has only been addressed in one study on badminton injuries (Yung et al., 2007) where the authors concluded that a previous injury experience was significantly associated with the occurrence of a new injury. We can support this finding in regard to shoulder injuries where the risk of a shoulder re-injury was 1.38 times higher among players who had been previously injured.

Finally, based on the training exposure times one can evaluate the role of the training volume in hours on the occurrence of injuries in badminton. Interestingly, this issue has not been addressed in the literature. The results show that the injured players had trained twice as much as the uninjured players. The 95% confidence interval for training hours in the uninjured group was 33-75 hours/year, implying that this training volume may be safe for the majority of badminton players. As with any other sport, some injuries are typical in badminton. To effectively prevent them it is important to understand the functional anatomy and patho-physiology of injuries of different tissues. Efforts to prevent injuries must also be based on an understanding of the importance of excessive loads and how these loads are distributed, sports-injury mechanisms, and the biochemical response of body tissues to impact and overuse (Kondrič & Furjan-Mandić, 2003). Given the extreme loads on the shoulder girdle in badminton due to the nature of the game, it can be concluded that the higher number of injuries among less trained players is a result of short, abrupt and extremely rapid movements for which they are not appropriately physically prepared.

Study limitation

The use of a questionnaire can sometimes result in the under-reporting of injuries due to recall bias, which is highly probable in retrospective studies. In addition, players may be in doubt about their true diagnosis. We were aware of this problem and sought to avoid it by testing the athletes within a short period of time. Further, there is a certain possibility that some athletes did not understand the questions properly, although one of the investigators was available during the testing if any explanations were required.

CONCLUSION

Our study highlights that shoulder and ankle injuries are the most frequent problems of Slovenian top-level badminton players. In terms of prevention, this constitutes only the first step towards the creation of appropriate preventive measures. Now that we know the magnitude of the problem, we believe that future studies should focus on the possible risk factors for shoulder and ankle injuries in badminton such as the shoulder external-internal rotator strength ratio (Ng & Lam, 2002) or different landing techniques following an overhead stroke (Kimura et al., 2012) in order to identify the modifiable risk factors that should be targeted in preventive training programmes.

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