

# Musculoskeletal injuries among Malaysian badminton players

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## ABSTRACT

**Introduction:** The purpose of this study was to investigate the pattern of musculoskeletal injuries sustained by Malaysian badminton players.

**Methods:** This is a retrospective case notes review of all badminton players who attended the National Sports Institute (NSI) Clinic, Kuala Lumpur, Malaysia, and were diagnosed with musculoskeletal injuries.

**Result:** In a two and a half year period, from January 2005 to June 2007, 469 musculoskeletal injuries were diagnosed among badminton players at the NSI Clinic. The mean age of the players who attended the clinic was 19.2 (range 13–52) years. Approximately 60 percent of the injuries occurred in players younger than 20 years of age. The majority of injuries (91.5 percent) were categorised as mild overuse injury and mostly involved the knee.

**Conclusion:** The majority of the injuries sustained by badminton players in this study were due to overuse, primarily in the knee. The majority of the injuries were diagnosed in younger players and occurred during training/practice sessions. There was no difference in terms of incidence and types of injuries between the genders.

**Keywords:** athletic injuries, badminton injuries, musculoskeletal injuries, racquet sports, sports injuries

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## INTRODUCTION

Badminton is one of the most widely-played sports in the world. The Badminton World Federation (BWF) estimated that about 150 million people play the game worldwide and that more than 2,000 players participate in international competitions.<sup>(1)</sup> It is played by people of all ages and at all levels. Badminton is a non-contact racquet sport requiring jumps, lunges, quick changes in direction and rapid arm movements from a wide variety of postural

**Table 1. Nature of injury.**

| Nature of injury | No. (%) of patients |
|------------------|---------------------|
| Overuse          | 169 (36.0)          |
| Strain           | 145 (30.9)          |
| Sprain           | 122 (26.0)          |
| Fracture         | 23 (4.9)            |
| Others           | 10 (2.1)            |

positions. Badminton has been considered to be a very safe sport.<sup>(2)</sup> Previous studies, which were mostly done in Europe, demonstrated the risk of injuries in badminton to be 1.6–2.9 injuries per 1,000 hours of play.<sup>(3)</sup>

In Malaysia, badminton is one of the most popular sports, apart from soccer and field hockey. Malaysia has six badminton players (singles and doubles) currently ranked in the top ten by the BWF.<sup>(4)</sup> Accordingly, badminton has been included as one of eight high performance core sports in the country.<sup>(5)</sup> Despite this, information regarding injuries affecting Malaysian badminton players is still lacking. Hence, this study was conducted to investigate the pattern of injuries among elite Malaysian badminton players.

## METHODS

A retrospective case notes review was conducted at the National Sports Institute (NSI) Clinic, Kuala Lumpur, Malaysia. The NSI Clinic was established in 1992 to mainly provide healthcare to athletes. The clinic caters exclusively to national athletes, both at the competitive and the developmental levels. In addition, the clinic acts as a referral centre for a nearby Bukit Jalil Sports School (BJSS). In this study, only the medical records of badminton players diagnosed with musculoskeletal injuries in the NSI Clinic from January 2005 to June 2007 were reviewed. A structured form was used to document the secondary data obtained. The secondary data included the sociodemographic profile of the players, their level of play and information related to their injuries. An injury was defined as any pain or disability sustained by a player during competition or training activities, resulting in time away from sports participation. Injuries were classified into three groups based on their severity: mild (1–7 days), moderate (8–21 days) and severe (> 21 days), requiring modified or abstinence from sports participation. An

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injury was categorised as an overuse injury if it developed gradually and could not be explained by a single trauma (thus, strain and sprain were not accepted as overuse injuries due to their acute appearance). Descriptive analysis was performed using the Statistical Package for Social Sciences version 15.0 (SPSS Inc, Chicago, IL, USA).

## RESULTS

A total of 469 musculoskeletal injuries were diagnosed from January 2005 to June 2007 in the NSI Clinic. During the study period, it was estimated that there were 120 badminton players in the national squad and 70 players in the BJSS. 216 injuries occurred in 2005, 170 occurred in 2006 and 83 occurred from January to June 2007. The mean age of the badminton players was 19.2 (range 13–52) years. There were 248 (52.9%) injured male players; however, there was no significant difference between the prevalence and types of injury sustained between genders. 276 (58.8%) injuries occurred in badminton players < 20 years of age. 277 (59.1%) injuries occurred among elite BJSS athletes and 159 (33.9%) among the national players. The majority of the injuries, (406 or 86.6%) occurred during training or practice sessions, while only eight (1.7%) occurred during a competition.

207 (44.1%) players presented to the clinic within seven days after the onset of injury. The majority of the injuries were diagnosed based on a clinical physical examination. Only 90 (19.2%) cases underwent radiological investigations (radiographs, magnetic resonance imaging, ultrasonography and nuclear imaging). The nature of the injuries diagnosed is summarised in Table I. Overuse injury was the commonest injury diagnosed in the NSI clinic. In terms of injury severity, 429 (91.5%) were mild, 7(1.5%) were moderate and 33 (7.0%) were severe. Of those diagnosed with severe injury, only ten cases (Achilles tendon ruptures, anterior cruciate ligament [ACL] tear, meniscus tears and metatarsal fractures) were referred for surgical opinion. Fig. 1 shows the musculoskeletal injuries according to the injured area. The majority of the injuries (296 or 63.1%) occurred in the lower extremities. The commonest location of these lower extremity injuries was the knee (37.1%), followed by the ankle (28.3%), thigh (13.2%), heel (11.2%), toes (5.7%), and others (4.4%). A total of 110 (37.2%) knee injuries were documented. The commonest type of knee injury was patellar tendinopathy (42.7%), followed by muscle (hamstring and quadriceps) strain (11.8%), meniscus and ligamentous injuries (10.9%), Osgood-Schlatter disease (9.1%), patellofemoral joint syndrome (7.2%) and other

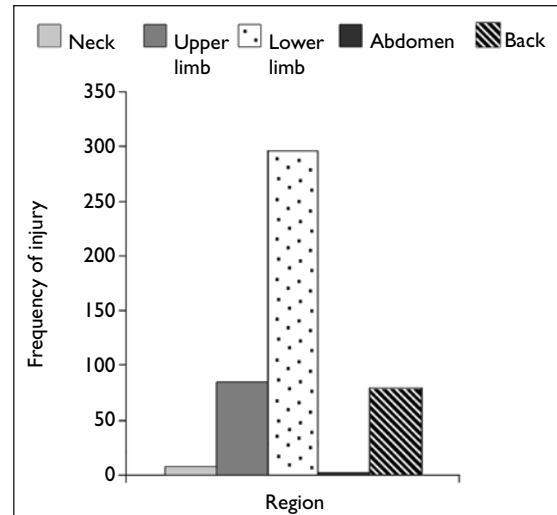


Fig. 1 Bar chart shows injury by region.

injuries including bursitis, patellar fracture, Hoffa's fat pad impingement (18.3%).

Ankle sprain (recurrent and acute) was the most frequent type of injury affecting the ankle (85.7%), followed by tendinopathy of the peroneal muscles and of the posterior tibial tendons. Quadriceps (30.9%), hamstrings (28.2%) and adductor (28.2%) muscle strains were frequently diagnosed in players who presented with thigh injury. The most frequent injury affecting the heel was plantar fasciitis (45.4%), followed by Achilles tendinopathy (33.3%), Achilles tendon tears (15.1%) and heel blisters (6.1%). Metatarsophalangeal joint sprain ranked first (58.8%) for injuries affecting the toes, followed by metatarsal fractures, blisters, corn and hypercallosity. The upper extremity was the second most injured area (18.1%), followed by the back (16.6%), neck (1.7%) and abdomen (0.4%).

Of the upper extremity injuries, the shoulder was frequently affected (36.9%), with rotator cuff tendinopathy (48.4%) being the commonest diagnosis made. Other shoulder injuries diagnosed included biceps tendinopathy, muscle strains (deltoid, trapezius and triceps) and acromioclavicular joint sprains. Elbow injuries were the second most affected area of upper extremity injuries. The commonest elbow injuries diagnosed were golfer's elbow (54.2%) and tennis elbow (12.5%). The commonest injury affecting the wrist was wrist sprain (89.1%). Back muscle strain (88.4%) was the commonest injury diagnosed in players with back symptoms, followed by lumbar vertebrae (L4,L5) fracture of the pars interarticularis (10.3%) and prolapsed intervertebral disc (1.3%).

## DISCUSSION

Badminton has been identified as one of the eight elite core sports in Malaysia. Over the past three decades, Malaysia was able to produce many world-class players.

Injuries affecting Malaysian badminton player are not fully understood. This was the first known epidemiological study to investigate badminton injuries among elite Malaysian athletes. During the study period, a total of 469 musculoskeletal injuries were documented by four experienced sports physicians from the NSI Clinic. Most of the injuries diagnosed were in the mild overuse category, requiring up to seven days of time away from sports participation. This finding was consistent with earlier studies.<sup>(6,7)</sup> Only ten (2.1%) cases were found to be severe enough to require referral to a tertiary care institution.

This current study also demonstrated that the majority (58.8%) of injuries occurred in the younger age group (< 20 years). Høy et al observed a higher injury incidence among players between 18 and 25 years of age (45 per 1,000 per year).<sup>(8)</sup> The possible explanations for this observation could be the lack of experience among younger players and possibly, a more aggressive style of play. Another interesting finding was that most of the injuries were sustained during training or practice, rather than in competition. Similar observations were also reported in earlier studies.<sup>(6)</sup> In contrast, Høy et al observed more injuries occurring during competition; however, their study included recreational badminton players with limited experience.<sup>(8)</sup> This difference in observation could be explained by the training routine of the elite athletes, where most of their time was spent preparing for competition, and training involved 3–4 sessions (including gym workouts) daily for 1–3 hours per session. Furthermore, training sessions sometimes involved more injury-producing drills, something which the recreational player would rarely undergo.<sup>(9)</sup>

Badminton is a non-contact sport that requires jumps, lunges and quick changes in direction, together with rapid arm movements from a wide variety of postural positions. Not surprisingly, the commonest area of injury was the lower limb (63.1%). Jørgensen and Winge found 58% of lower extremity injuries in their study of elite level badminton players.<sup>(3)</sup> A higher percentage of lower extremity injuries (82.9%) was observed in Krøner et al's prospective one-year study; however, these studies included only recreational badminton players.<sup>(7)</sup> Based primarily on clinical physical examination, patellar tendinopathy (42.7%) was the commonest type of lower limb injury diagnosed in the present study. An earlier prospective study using ultrasonography evaluation demonstrated a patellar tendinitis incidence of 13.8%.<sup>(9)</sup> Peers and Lysens suggested that frequent knee problems were probably related to the rapidly changing eccentric/concentric work of the quadriceps in the varying degrees of knee flexion and rotation, creating a high force load on the patellar tendon.<sup>(10)</sup> Witvrouw et al, in their two-year prospective

study, suggested that the lower flexibility of the quadriceps and hamstring muscles is significantly associated with patellar tendinitis in an athletic population.<sup>(9)</sup>

Achilles tendon injuries were diagnosed in 16 (0.03%) players, with sustained tears of the Achilles tendon occurring in only five players. A higher incidence of Achilles tendon injuries, including tendinitis and tears, was reported by Krøner et al and Høy et al, where the mean participant's age was between 29.6 and 28.2 years,<sup>(7,8)</sup> respectively, compared to the current study with lower incidences of Achilles tendon injuries, likely due to a younger group (mean age 19.2 years) of athletes involved. Older age has been suggested to predispose a person to Achilles tendon problems, including tears, as most cases of ruptures were reported in individuals aged 30–40 years.<sup>(11–13)</sup> This study provided the first data on musculoskeletal injuries sustained by Malaysian badminton players. It is hoped that such findings would provide a foundation for generating new hypotheses with regard to injuries in badminton. More prospective studies aimed toward understanding injuries and their mechanisms are essential in developing optimal injury management and prevention strategies.

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