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## Musculoskeletal problems in badminton players under 17

P Sathya and Labdhi Doshi

#### Abstract

The purpose of the study was to find the prevalence of musculoskeletal problems in Badminton players under 17.

**Methodology:** A cross sectional survey was carried out on 100 badminton players using Modified Nordic Musculoskeletal Questionnaire to find the prevalence of musculoskeletal problems in badminton players.

**Result:** Out of 100 players investigated, 46 players experienced pain in the wrist in the last 12 months. This was followed by pain in the neck in 31 players and shoulder in 30 players. Many players had bilateral joint involvement. Wrist pain was more common in Females. Other type of injury including Muscle Cramp and Muscle Catch were the two most common type of injury in 53 players.

**Conclusion:** This study concludes that majority of the players had pain in Wrist followed by Neck and Shoulder. Other type of injury which includes Muscle catch and Muscle cramp was the most common type of injury. This was followed by Strain/ Sprain. Strain was more common in Males and Sprain in Females.

**Keywords:** Musculoskeletal problems, badminton players, modified Nordic musculoskeletal questionnaire

### 1. Introduction

Badminton is the second most played sport in INDIA <sup>[1]</sup>. It is a non-contact, racquet sport which requires combination of jumps, lunges, quick changes in direction, burst actives and rapid arm movements in various awkward body postures <sup>[2]</sup>. During such movements, the body may be susceptible to various injuries. Therefore, it is common for badminton players to get different injuries during the game <sup>[3]</sup>.

An injury is defined as an episode of pain, swelling, stiffness or numbness during playing badminton or after the game <sup>[3]</sup>. Badminton injuries as a whole are predominantly sprains and strains, and not overuse in nature as widely believed <sup>[8]</sup>. But according to L.D. Hensey *et al.* Badminton is a sport of relatively low risk and that the majority of related injuries were chronic overuse injuries <sup>[4]</sup>, A Muttalib *et al.* also suggested that most of the injuries acquired by badminton players are due to overuse, primarily in the knee <sup>[3]</sup>.

The injuries in badminton can be recognized on basis of type of injuries, severity and body part <sup>[2-7]</sup>. There are many prevalence studies stating that there are more of ankle and knee injuries <sup>[2-6]</sup>.

As badminton is the second most popular sport in India <sup>[1]</sup>, it is necessary to understand the injury prevalence, so as to predict risk factors and to set up preventive measures to prevent injuries. Also to make awareness for coaches to develop a better plan for training thereby reduce risk of injury and improve training quality.

This study will provide objective data and information for physiotherapists working in India at recreational clubs, badminton institutes etc. to develop a better plan of training advice for players thereby to reduce risk of injury, which in turn will help to improve the player's performance more effectively. This study will provide important information for badminton player in India to understand more about the injury patterns and predicting their causes so as to prevent them.

### 2. Methods and Materials

**2.1 Study Design:** It is a cross-sectional survey study.

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**2.2 Study Setting**

- Kalidas Sports Complex
- Lions Sports Club

**2.3 Sample Size:** 100 Players

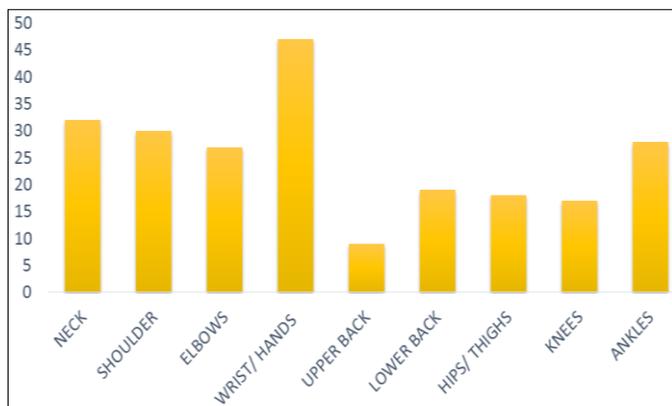
**2.4 Inclusion Criteria:** Age under 17, male and female playing experience of at least 3 years and has regular practices.

**2.5 Exclusion Criteria:** Players more than 17 years of age. Players who have an experience of less than 3 years. Players who do not practice regularly and play for leisure.

**2.6 Procedure:** 100 Players were selected considering inclusion and exclusion criteria. The players were made aware of the purpose of the study. Each component of Nordic Musculoskeletal Questionnaire were explained to each and every player. Players were asked to recall the injuries they sustained in last one year i.e February 2017 to February 2018 and, Injury Information was collected as: Anatomical site of injury (Neck, Shoulders, Elbows, Wrist, Hands, Back, Hips, Thighs, Knees, Ankles) and category of injury (Muscular pain, Sprain, Strain, Fracture, Dislocation) was noted. The information obtained from the scale was analyzed using graphs and pie charts.

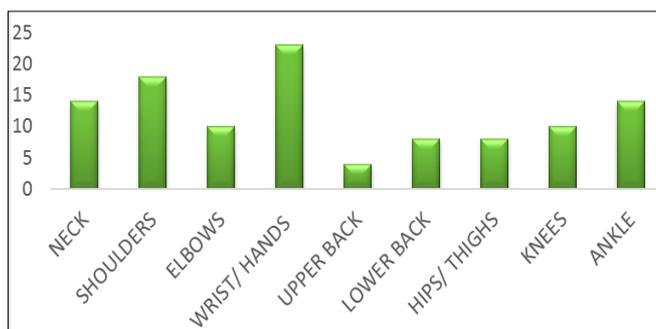
**3. Result Analysis**

**3.1 Results**



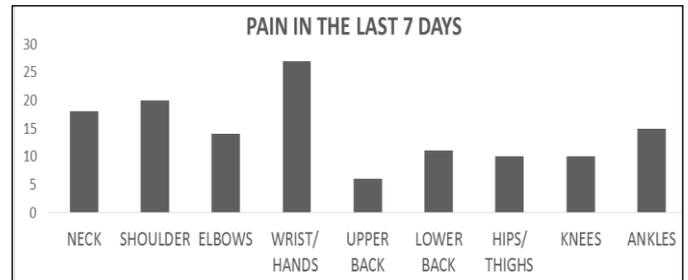
**Graph 1:** Prevalence of Musculoskeletal problems in Badminton Players in last 12 months.

**Inference:** The above graph shows prevalence of Musculoskeletal problems in Badminton players. The anatomical sites of pain seen in the players were Wrist in 46 players followed by Neck in 31, Shoulders in 30, Ankles in 28, Elbows in 27, Lower Back in 19, Hips/ Thighs in 18, knees in 17, upper back in 10 players respectively.



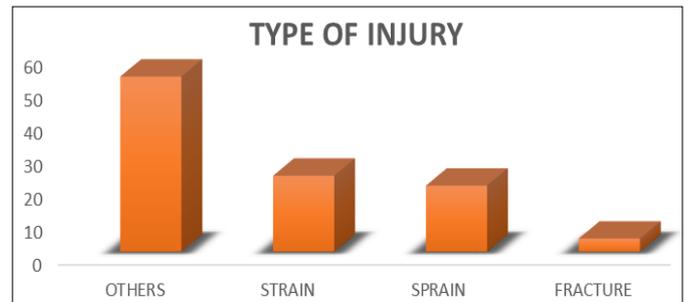
**Graph 2:** Prevention from doing normal work in last 12 months.

**Inference:** The above graph shows the count of people who were prevented from doing normal work because of playing Badminton. The anatomical sites of pain seen in the players were Wrist/ Hands in 23 players, Shoulders in 18, Neck in 14, Ankles in 14, Elbows in 10, Knees in 10, Hips/ Thighs in 8, Lower Back in 8, Upper Back in 4 players respectively.



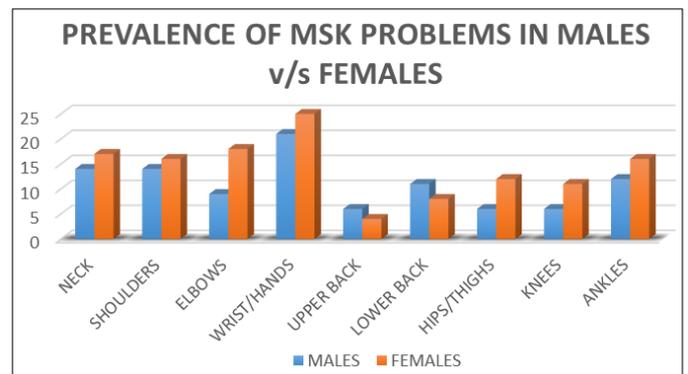
**Graph 3:** Pain in the Badminton players in the last 7 days.

**Inference:** The above graph shows the number of players having pain at the anatomical sites in the last 7 days. The sites of pain seen in the players were Wrist/ Hands in 27 players, Shoulders in 20, Neck in 18, Ankles in 15, Elbows in 14, Lower Back in 11, Hips/ Thighs in 10, Knees in 10, Upper Back in 6 players respectively.



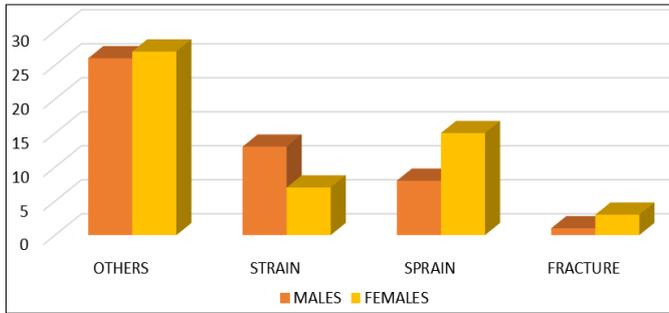
**Graph 4:** Type of Injury in Players.

**Inference:** The above graph shows prevalence of injuries according to the type of injury in badminton players. Out of 100 players, 53 had other type of injury which includes Muscle catch and Muscle Cramp, 23 had strain, 20 had sprain and 4 had fracture.



**Graph 5:** Prevalence of Musculoskeletal Players in Male vs Female Players.

**Inference:** The above graph shows prevalence of musculoskeletal players in Male v/s Female players. Pain in the Elbows, Wrist, Hips, Knees and Ankles was more commonly seen in Females. Upper Back and Lower Back pain was commonly seen in Males. Neck and Shoulder pain was same in both Male.



**Graph 6:** Type Of Injury in Male V/S Female Players

**Inference:** The above graph shows type of injury in Males v/s Females. Other type of injury was common in both males and females. Sprain was commonly seen in Females whereas Strain was seen in Males.

#### 4. Discussion

The study was done on 100 male and female badminton players of age group 10-17 years. The objectives of the study were:

(a) Prevalence of Musculoskeletal injuries in Badminton players: Out of badminton players investigated, they faced badminton-related musculoskeletal problems within the last 12 months. According to the Graph 1; Wrist, Neck and Shoulder were the 3 most common areas of problem in badminton players. Wrist pain was the most common site of injury in them. This could be due to repeated flexion extension of wrist for playing different types shots. There were many players who had bi-articular joint pain involvement. Majority of players with Wrist pain had associated Shoulder and Neck pain. Upper limb injuries were most likely to occur when the shoulder transform from the cocking phase to acceleration phase. It gives great stress to the shoulder as it transformed from external rotation to internal rotation rapidly. The researchers also supported that the angular velocity of this throwing action was the fastest in human motion and the peak rotation was about 7000 degree per second <sup>[9]</sup>. Since badminton requires over-shoulder motions very often, which abduct and external rotate the shoulder joint and repetitive flexion of the wrist which generates forceful movement within a short period of time frequently. This explained why more than half of the Badminton players had upper limb pain. Some possible causes of shoulder injury including overtraining, inadequate skill level, wrong movement, competition, lack of warm up, stiff muscle, tired, lack of recovery and muscle imbalance. Moreover, upper limb pain not just affected their badminton habit and sleeping quality, but also their daily life <sup>[10]</sup>. Knee, ankle and thigh injuries were common.

Prevented from doing normal work in the last 12 months because of the trouble: According to Graph 2, the most commonly involved site in preventing the players from doing normal work in the last 12 months because of the trouble is Wrist/ Hands in 23 players followed by Ankles/Feet in 14players and Shoulders in 18 players.

Players who had trouble at any time during the last 7 days: According to Graph 3, the most commonly affected site causing trouble in the last 7 days was Wrist/ Hands followed by Shoulders.

(b) The second objective was to find Prevalence of type of injury in badminton players. According to Graph 4, other type

of injury was the most common (53%) type of injury among Badminton players. These injuries commonly included Muscle Catch and Muscle Cramp. Strain (23%) and Sprain (20%) were other two common types of injury seen in Badminton players. Strain was most commonly seen in the Wrist. Sprain was most commonly seen in the Ankles. This was because badminton requires a lot of jumping, landing, and changing directions. All of these actions were done in a fast pace and this sudden increase of load may lead to injuries. Fracture (4%) is less common in these players. Dislocation was not seen in any of the players. Common injuries in racket sports are rotator cuff tendinitis, tennis elbow, forearm nerve entrapments, low back pain, abdominal wall sprain, tennis leg and eye injuries <sup>[11]</sup>. Generally, sports injuries can be classified as trauma and overuse injuries. Trauma injuries occur as a consequence of a specific accident or event. Such injuries are sprains and dislocations. The etiology of overuse injury is multifactorial, involving both intrinsic and extrinsic factors. Intrinsic factors are related to the athletes themselves, including anatomical, alignment, growth/age, muscle tendon imbalance, genetic endowment, general health, nutritional status and prior injury <sup>[12]</sup>. Extrinsic factors include training error, equipment inadequacy and environmental factors <sup>[13]</sup>.

(c) The third objective was to find the prevalence of Musculoskeletal problems in Males compared to Females. According to Graph 5, out of 52 Female players, 25 had pain in Wrist / Hand. According to graph 5, Wrist was affected in 25players, followed by Shoulders in 16, Elbows in 18 and Ankle in 16 payers were the four most commonly affected part in the female players.

According to Graph 5, out of 49 Male players, 21 players had pain in the Wrist. Neck was affected in 14 players followed by Shoulders in 14 and Lower Back in 11players were the other commonly affected part in the Male players. The major type of injury in males was other type of injury in 26 players. This was followed by Strain in the wrist in 13 male player, Sprain in 8 players.

According to Graph 6, the major type of injury seen in male including 26 players and female 27 players include other type of injury. This was followed by Strain in the wrist in 13males players. Sprain was less common in male players seen in 8 players. In Female players, other type of injury is followed by sprain in the ankle seen in 15players. The complex structure and function of the foot and ankle were essential for effective footwork of players. The ankle has little local muscle support, relying for its function on mechanical efficiency of its capsular and ligamentous structures; and unlike the knee, the ankle joint has no major surrounding stabilizing muscles. The lateral collateral ligaments and the medial collateral ligament, or deltoid ligament, establish the ligamentous integrity of the ankle joint, and these structures limit and stabilize the range of motion at the ankle. Because of fast lateral movements in badminton players the integrity of the foot is essential, as shoe support and orthotic devices cannot be used to modify poor foot biomechanics <sup>[14]</sup>. A high percentage of injuries of ankle and foot joints (23.69% in total) indicates that players should pay more attention in choosing appropriate footwear to avoid those injuries joint. All muscles acting to move the foot at the ankle joint arise in the leg, and so the ankle joint is susceptible to injury in the frontal plane (i.e. inversion/eversion) <sup>[15]</sup>. Also, since badminton require a lot of jumping, landing, and changing directions. All of these actions were done in a fast pace and this sudden increase of load may lead to injuries.

## 5. Conclusion

The study concludes that the prevalence of musculoskeletal problems is more in club level and school level players. Wrist/ Hands was the most commonly injured region followed by Shoulder and Neck.

The study also concludes that in the type of injury majority of players had other type of injury (53%) in the body parts which includes Muscle Catch and Muscle Cramp followed by Strain (23%) and Sprain (20%).

Strain was most commonly seen in the Wrists. Sprain was most commonly seen in the Ankles. Fracture is the least common type of injury in Badminton Players. Sprain was more commonly seen in Female players and Strain in Males players.

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