

A survey of performance, functional limitation, impairment and pain in amateur fast bowlers with upper extremity pain using Functional Arm Scale for Throwers

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Abstract

Background: Upper extremity injuries are common in cricket, and fast bowlers are especially prone to shoulder problems. However, the pain and sport-specific functional limitation of amateur fast bowlers with upper extremity pain have not been well described.

Objective: To assess upper extremity pain, throwing performance, and functional limitation in amateur fast bowlers with upper extremity pain using the Functional Arm Scale for Throwers (FAST).

Methods: This cross-sectional survey study was conducted on 122 amateur male fast bowlers aged 16-30 years from cricket academies of Navi Mumbai and Mumbai, recruited by convenience sampling. Participants had at least 2 years experience and practiced at least 2 hours a day, at least 3 days a week, with acute to sub-acute upper limb pain (up to 3 weeks) and without prior physiotherapy. They were screened by the Nordic Musculoskeletal Questionnaire and the FAST was administered by interview. Data were analysed descriptively in MS Excel.

Results: Mean age was 17.45 ± 2.27 years, and 114 participants (93%) were right-hand dominant. Mean experience was 3.54 ± 1.92 years, with practice of 2.93 ± 1.08 hours a day and 5.61 ± 0.92 days a week. Pain onset was gradual in 74 (61%) and sudden in 48 (39%), with a mean duration of 11.24 ± 5.56 days. On FAST total score, 117 (96%) had mild and 5 (4%) had moderate disability; none had severe disability. Mean domain scores were highest for throwing (35.77 ± 7.37), followed by pain (33.13 ± 8.24) and activities of daily living (25.41 ± 9.70).

Conclusion: Young amateur fast bowlers with upper extremity pain reported predominantly mild overall disability. Their symptoms were more evident during throwing than during daily activity and had a gradual onset. This group may require sport-specific assessment and early physiotherapy screening.

Keywords: Functional Arm Scale for Throwers, cricket, fast bowlers, upper extremity pain, functional limitation, performance

Introduction

In India, cricket is the most popular sport, and it's growing in popularity throughout Southeast Asia ^[1]. Fast bowling is an intense activity that requires the body to perform various rapid and dynamic movements ^[2]. During fast, medium, or slow bowling, both body tissues and footwear need to absorb significant ground reaction forces as the bowler repeatedly twists, extends, and rotates in a short period ^[2]. This repetitive motion can put stress on the shoulder joint, and continuous practice over time may lead to joint degeneration ^[2].

The bowling action can be broken down into three main phases: the run-up leading to back foot impact (BFI), the delivery stride, and the ball release. The run-up phase covers the bowler's movement from a standing start to the moment their back foot makes contact, with the ground ^[3]. The throwing action can be categorized into four distinct stages: the preparation or wind-up phase, the cocking phase, the acceleration phase, and finally, the deceleration or follow-through phase ^[4]. In the wind-up phase, the body turns so that the hips and shoulders form a 90-degree angle to the target. The lower body generates most of the force, creating a forward-directed, controlled falling motion ^[4]. During the cocking phase, the shoulder first abducts while fully extending horizontally, then moves into its maximum external rotation ^[4]. At the point of maximum external rotation, the shoulder becomes "loaded" as the anterior capsule is tightly wound into the apprehension position, allowing elastic energy to be stored ^[4]. Simultaneously, the

internal rotator muscles undergo stretching ^[4]. The acceleration phase is highly explosive, involving a quick release of two main forces: the elastic energy stored in the tightened fibrous capsule tissue and the powerful internal rotation generated by the internal rotator muscles ^[4]. This creates substantial forces at the glenohumeral joint, requiring continuous activation of the rotator cuff muscles to maintain the humeral head securely positioned within the glenoid cavity ^[4]. During the acceleration phase, significant valgus stress is exerted on the elbow, which often trails behind the shoulder as it internally rotates ^[4]. During the deceleration or follow-through phase, substantial forward-directed forces act on the glenohumeral joint after the ball is released, putting significant stress on the structures at the back of the shoulder ^[4]. The rapid internal rotation of the shoulder is slowed down by the eccentric action of the external rotators of the rotator cuff, along with the eccentric engagement of the scapular stabilizers and the posterior fibres of the deltoid ^[4].

Frequent musculoskeletal issues seen in cricket players include muscle strains, ligament sprains, stress fractures, ligament injuries, and conditions caused by repetitive use ^[5]. The shoulder, lower back, and knee are the primary anatomical areas vulnerable to injury. Medium and fast bowlers are particularly susceptible to these overuse-related conditions ^[6]. In school-level and provincial cricket, upper limb injuries make up approximately 25% and 22% of total injuries, respectively. Among these, fast bowlers experience a particularly high rate of shoulder injuries, accounting for

42% of upper extremity injuries in cricketers [7]. Certain bowling techniques increase the risk of injury more than others [3]. Fast bowlers are particularly vulnerable when they deliver too many overs in one spell or across multiple spells [3]. Regardless of pace, bowlers often suffer from skin abrasions or damage on the fingers used to grip and spin the ball, especially due to the friction caused by dragging the fingers over the seam during release (Corrigan, 1984) [3]. Corrigan also noted that repeated trauma to the joints of the middle and index fingers can lead to degenerative changes, including osteoarthritis, which in some cases becomes severe enough to limit or prevent continued participation in cricket [3].

The Functional Arm Scale for Throwers (FAST) is a patient-reported outcome (PRO) measure designed specifically for the upper extremity and tailored for athletes involved in high-demand throwing activities [8, 9]. It assesses how upper limb injuries affect performance during play and clinical outcomes, while also providing a means to track recovery for use in comparative effectiveness research [8, 9]. The Functional Arm Scale for Throwers (FAST) consists of 22 items, generating an overall score ranging from 0 to 100, where higher scores reflect greater symptoms and disability [8]. It also includes five subscales that assess specific domains: pain, throwing ability, daily activities, psychological effects, and progression or return to play [8]. It gives a performance-based measure of outcomes in this patient population and to help with the precise evaluation of these athletes following injury, treatment, and/or surgery.

Conclusion

In this cross-sectional survey of 122 amateur fast bowlers with upper extremity pain, most reported mild overall disability on the Functional Arm Scale for Throwers, and only a small proportion reported moderate disability. Symptoms showed up more during throwing than during daily activities. Gradual-onset pain was also more common than sudden-onset pain. Taken together, these findings suggest that in young amateur bowlers, the effect of upper extremity pain is felt mainly in sport-specific movement and may not be obvious when only pain intensity or general function is assessed.

This matters clinically because the participants were young, with a mean age of about 17 years, yet they trained almost three hours a day on more than five days a week. Bowlers with mild symptoms may keep training and competing without realising that something is developing. Screening that includes sport-specific measures, along with early physiotherapy assessment and education on recognising and reporting early symptoms, may help address problems before they limit performance.

These findings should be interpreted with some caution. The study was descriptive, most participants were between 16 and 20 years old, and no objective measures such as shoulder range of motion, strength, or scapular control were taken. The results therefore show how symptoms present, not why they occur. Future studies should combine patient-reported outcomes with objective physical assessment and bowling workload data. They should also include more varied age groups to identify the factors behind these limitations and to guide targeted rehabilitation and prevention.

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