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A Study on Spiked Shoes and Flat Shoes affect Ball Speed in Fast Bowlers

Rupesh Sarukte and Hitav Someshwar

Abstract

Aim: The aim of the study was to observe how spiked shoes and flat shoes affect ball speed in fast bowlers. **Materials & Method:** A randomized crossover study involved sixty (n=60) male fast bowlers, with an average age of 24.5 ± 3.1 years. Participants bowled three deliveries in each session, wearing either spiked or flat shoes on different days. The order of conditions was assigned randomly. A calibrated SUPIDO radar gun measured ball speed, while participants rated their comfort and performance satisfaction on a 5-point Likert scale. Paired-samples t-tests and Pearson correlations were used for the statistical analysis. **Results:** Spiked shoes led to a significantly higher average ball speed of 128.8 ± 2.8 km/h compared to flat shoes, which had an average of 126.3 ± 2.4 km/h. The mean difference was 2.48 km/h (95% CI: 1.79-3.18; $t_{59} = 7.16$, $p < 0.001$, Cohen's $d = 0.93$). More bowlers reported being "Very Satisfied" with spiked shoes in terms of comfort (25% compared to 13.3%) and performance (25% compared to 18.3%). However, the correlations between ball speed and subjective ratings were not statistically significant (all $p > 0.05$). **Conclusion:** When compared to flat shoes, spiked shoes significantly boost ball speed for fast bowlers in cricket. This improvement is not just in perception; it is biomechanical. Coaches and athletes who want to improve performance should consider spiked footwear while balancing comfort and injury prevention techniques.

Rupesh Sarukte (PT)

Intern

Physiotherapy School & Centre,
Topiwala National Medical College & B.Y.L.
Nair Charitable Hospital, Mumbai, India

E-mail: rsarukte1234@gmail.com

Hitav Someshwar (PT)

Assistant Professor

Physiotherapy School & Centre,
Topiwala National Medical College & B.Y.L.
Nair Charitable Hospital, Mumbai, India

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Introduction

Cricket is a global sport where fast bowling is an essential part of cricket. Ball release speed is a key factor that determines how well a player performs in competition (Ramachandran et al., 2024 ;

Glazier et al., 2000). Footwear affects force transmission and stability during the delivery stride by modulating ground interaction (Nigg & Segesser 1988). The purpose of spiked shoes is to increase traction on turf, which may increase power and stability during the delivery stride (Khan & Scott, 2014). Although they provide comfort and flexibility, flat-soled shoes may lessen traction (Barton et al., 2009). Although the importance of footwear in running and other sports has been extensively researched (Singh & Mahipal, 2016; Logan et al., 2010) there are still few direct comparisons between spiked and flat shoes in terms of fast bowling performance, with most previous research concentrating on injury prevention (Wormgoor et al., 2010). The purpose of this study was to compare spiked and flat shoes side by side among fast bowlers. The hypothesis was that spiked shoes would increase ball speed without necessarily being associated with subjective comfort or satisfaction.

Materials and Methods

Study Design: A randomized crossover comparative study took place, letting each participant act as their own control. The Departmental Review Board approved the study, and we gathered written informed consent from all the participants.

Participant: Sixty male (n=60) fast bowlers, aged 18 to 30 years, with a mean age of 24.5 ± 3.1 years were recruited from the local cricket clubs. The inclusion criteria were bowling consistently over 120 km/h and having no lower limb injury in the past six months. The exclusion criteria included a history of major orthopedic surgery or primarily being a spin bowler.

Sample Size: Based on a paired t-test ($\alpha = 0.05$, power = 80%, effect size $d = 0.5$ from pilot data), we needed 34 participants. We recruited sixty participants to boost power and prepare for possible dropouts. The post-hoc power analysis for the observed effect ($d = 0.93$) was over 99%.

Procedures: Participants were randomly assigned to two sequences - Sequence AB (Spiked Day 1, Flat Day 2) or Sequence BA (Flat Day 1, Spiked Day 2), with a washout period of at least 24 hours. Testing took place on a grass pitch under dry conditions. Participants wore their own cricket shoes, which were either spiked (metal or removable spikes) or flat (moulded rubber sole). After a standard warm-up, they bowled three maximum-effort deliveries for each condition. The average ball speed from the three deliveries was used for analysis. Ball speed was measured with a SUPIDO radar gun (ICC: 0.94–0.95) (Díez-Fernández et al., 2022). The gun was placed 10 meters behind the bowling crease at a height of 1.5 meters. Participants rated their comfort and performance satisfaction on a 5-point Likert scale immediately after each session (Joshi et al., 2015).

Outcome Measures	Scores
Ball Speed Measurement	Speed in km/h
Comfort and Performance Perception	Likert Scale (1 to 5, where 1= Very unsatisfied 5= Very Satisfied)

Statistical Analysis: SPSS version 26 was used to statistical analyses the data. The Shapiro-Wilk test was used to determine whether the data was normal ($p > 0.05$). Using paired-samples t-tests, we examined ball speed across conditions. Using Cohen's d , we determined the effect size. We provided a descriptive summary of the subjective ratings. Using Pearson correlation coefficients, we evaluated the associations between subjective evaluations and ball speed. The significance level was set at $p < 0.05$.

Results and Discussion

Table 1 shows that fast bowlers achieved statistical significantly higher ball speeds with spiked shoes compared to flat shoes.

Table 1. Comparison of Ball Speed between Spiked and Flat Shoes

Condition	N	Mean ± SD	Mean Difference (95% CI)	t-value	df	p-value	Cohen'sd
Spiked Shoes	60	128.8 ± 2.75	2.48 (1.79 to 3.18)	7.16	59	< 0.001	0.93
Flat Shoes	60	126.3 ± 2.36					

Table 2. Comfort Level Ratings

Rating	Comfort (Spiked)	Comfort (Flat)	Performance (Spiked)	Performance (Flat)
Very Satisfied (5)	15 (25%)	8 (13.3%)	15 (18.3%)	11(18.3%)
Satisfied (4)	16 (26.7%)	14 (23.3%)	14 (23.3%)	13 (21.7%)
Neutral (3)	12 (20.0%)	13 (21.7%)	13 (21.07%)	15 (25.0%)
Unsatisfied (2)	9 (15.0%)	14 (23.3%)	9 (15.0%)	11 (18.3%)
Very Unsatisfied (1)	8 (13.3%)	11 (18.3%)	9 (15.0%)	10 (16.7%)

Table 2 shows that more bowlers reported being satisfied/very satisfied with comfort in spiked shoes than in flat shoes. Performance satisfaction was higher in spiked shoes, though a substantial proportion remained neutral.

Table 3. Correlation between Ball Speed, Comfort and Satisfaction

Variable Pair	Shoe Type	Pearson's r	p-value	Interpretation
Ball Speed vs Comfort	Spiked	-0.09	0.498	No significant relationship
Ball Speed vs Satisfaction	Spiked	-0.03	0.831	No significant relationship
Ball Speed vs Comfort	Flat	0	0.998	No significant relationship
Ball Speed vs Satisfaction	Flat	-0.05	0.693	No significant relationship

Table 3 shows that ball speed did not significantly correlate with comfort or satisfaction ratings for either footwear type.

The present study investigated the effect of footwear type (spiked vs. flat shoes) on ball speed, comfort, and perceived performance satisfaction among sixty fast bowlers. Descriptive statistics indicated that the mean ball speed achieved while wearing spiked shoes was 128.8 ± 2.17 km/h, whereas the mean speed in flat shoes was 126.3 ± 2.36 km/h. A paired samples t-test revealed that this difference was statistically significant ($t(59) = 7.16, p < .001$), with a mean improvement of 2.48 km/h (95% CI: 1.79–3.18) in favor of spiked shoes. The effect size was large (Cohen's $d = 0.93$), indicating a practically meaningful advantage of spiked shoes for enhancing ball speed.

Normality testing using the Shapiro–Wilk test confirmed that the assumption of normality was met ($W = 0.965$, $p = 0.086$ for spiked shoes; $W = 0.988$, $p = 0.832$ for flat shoes). Analysis of subjective comfort ratings demonstrated that 51.7% of participants reported being satisfied or very satisfied with spiked shoes, compared to 36.6% with flat shoes. Similarly, satisfaction with performance was somewhat higher in the spiked condition (48.3% satisfied/very satisfied) compared to the flat condition (40.0%). Despite these trends, correlation analyses (Pearson's r and Spearman's ρ) showed no significant relationship between ball speed and either comfort or satisfaction in both footwear types (all $p > 0.05$), suggesting that improvements in ball velocity are largely independent of perceived comfort or performance satisfaction. Taken together, these findings indicate that spiked shoes confer a measurable and statistically robust advantage in terms of ball release speed among fast bowlers, fulfilling the primary aim of the study. Although bowlers reported marginally better comfort and performance satisfaction in spiked footwear, these subjective perceptions were not significantly associated with objective ball speed. This suggests that while footwear design contributes meaningfully to physical performance outcomes, psychological or perceptual factors may influence comfort and satisfaction independently. From a practical perspective, coaches and players may consider spiked shoes preferable for optimizing bowling velocity, though individual comfort preferences should not be overlooked in long-term performance planning.

Conclusion: When compared to flat shoes, spiked shoes significantly boost ball speed for fast bowlers in cricket. This improvement is not just in perception; it is biomechanical. Coaches and athletes who want to improve performance should consider spiked footwear while balancing comfort and injury prevention techniques.

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Conflict of Interest: None declared