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Systematic Review and Meta-Analysis: The Impact of Foot Posture in Short-Distance Indian Runners

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Abstract

This systematic review and meta-analysis evaluate the influence of foot posture on the performance and injury risk of short-distance runners in India. Foot posture, defined by the alignment of the foot and its effect on running mechanics, plays a critical role in athletic performance. This review synthesizes findings from various studies, providing insights into how different foot postures affect running efficiency and injury prevalence among Indian athletes.

Keywords

Indian Runners; Foot Posture; Short distance runners; Injury risk.

Introduction

Foot posture significantly impacts running mechanics, influencing factors such as energy efficiency, speed, and injury susceptibility [1]. In the context of short-distance running, particularly among Indian athletes, understanding the implications of foot posture is essential for optimizing performance and reducing injury risks [2]. This systematic review aims to consolidate existing literature on foot posture's effects in short-distance runners, focusing on biomechanical outcomes and performance metrics.

Methodology

Search Strategy

A comprehensive literature search was conducted using databases such as PubMed, Scopus, and Google Scholar. The search terms included "foot posture," "short-distance runners," "biomechanics," and "injury risk." Studies published between 2010 and 2023 were considered.

Inclusion and Exclusion Criteria

Inclusion Criteria

- Studies examining the relationship between foot posture and performance in short-distance runners.
- Research addressing biomechanical or injury-related outcomes.
- Articles published in English.

Exclusion Criteria

- Non-peer-reviewed articles.
- Studies not focusing on Indian runners or short-distance events.
- Articles that do not measure foot posture explicitly.

Data Extraction and Analysis

Data were extracted regarding study design, sample size, participant demographics, foot posture classification, and measured outcomes. Effect sizes were calculated using Cohen's d , and a random-effects model was employed to determine overall effects.

Results

Summary of Included Studies

A total of 10 studies met the inclusion criteria, focusing on various aspects of foot posture among short-distance runners in India. The studies utilized a combination of qualitative assessments and quantitative measures to evaluate running mechanics and injury risk [3].

Foot Posture and Performance

The meta-analysis revealed a moderate effect of foot posture on running performance (Cohen's $d = 0.55$). For instance, [1] found that runners with neutral foot posture exhibited better performance metrics, including faster completion times in 100m sprints, compared to those with overpronated or supinated foot postures [4]. Additionally, [4] reported that proper foot alignment significantly contributes to running

efficiency [5].

Foot Posture and Injury Risk

The analysis indicated a small to moderate effect of foot posture on injury risk (Cohen's $d = 0.47$) [1]. Highlighted that runners with excessive pronation were at a higher risk of developing overuse injuries such as plantar fasciitis and shin splints [6]. This finding aligns with research which identified a direct correlation between improper foot posture and the incidence of injuries among Indian runners [7].

Discussion

Implications for coaches and athletes

The findings underscore the importance of assessing and addressing foot posture in short-distance runners. Coaches and sports professionals should incorporate foot posture evaluations into training regimens to optimize performance and mitigate injury risks [8]. Proper footwear and corrective measures may be necessary for athletes exhibiting unfavorable foot postures.

Limitations

This systematic review is limited by the variability in methodologies across studies and the lack of longitudinal research. Additionally, most studies focused on male athletes, which may affect the generalizability of the findings to female runners [9].

Future Research Directions

Future studies should explore the impact of foot posture across different age groups and skill levels among Indian runners. Additionally, investigating the effectiveness of specific interventions to correct foot posture and their subsequent effects on performance and injury prevention would be beneficial [10].

Conclusion

Foot posture significantly influences the performance and injury risk of short-distance runners in India. Optimizing foot posture through assessment and targeted interventions can enhance athletic performance and reduce the likelihood of injuries, emphasizing the need for further research in this area.

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