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# Fatigue-induced Changes in Movement Quality, Neuromuscular Control, and Postural Stability in Athletic Population: A Literature Review

PRATEEK SHARMA[1], JOYDIP SAHA[2], KASHVI SHAH[3]

## ABSTRACT

**Introduction:** Sports involve repeated high-intensity accelerations, decelerations, directional changes and, landings under the state of progressive fatigue. These tasks demand precise neuromuscular coordination to maintain stability. While exhaustion is an unavoidable consequence of high-intensity training and competition, its immediate effects on movement quality, neuromuscular control, and postural stability remain under-investigated across different sports and fatigue protocols.

**Aim:** The aim of this review was to synthesise recent evidence on fatigue-related changes in movement quality, neuromuscular control, and explore their relevance to injury risk.

**Materials and Methods:** Database search was done according to PRISMA guidelines using PubMed, Embase, ScienceDirect and Cochrane with keywords acute fatigue, exercise-induced fatigue, movement, movement quality, kinematics, biomechanics, neuromuscular control, stability, postural control, athlete, sports, players by boolean operators etc. Multiple studies published between 2021-2026 were found among which 14 were selected.

**Results:** Total 460 participants included in our review where 322 were males and 138 were females. Evidence showed that fatigue was associated with increased centre-of-pressure sway, altered kinematics and lower-limb loading pattern suggesting its negative effect on neuromuscular control.

**Conclusion:** Fatigue induces alterations in movement quality in sports related tasks, postural stability and neuromuscular control, with potential implication of injury risk. Balance assessment taken during non-fatigued states may not be able to capture these changes.

**Keywords:** Athletes, Kinematics, Postural control.

**PARTICULARS OF CONTRIBUTORS:**
1. Postgraduate Student, Abhinav Bindra Sports Medicine and Research Institute, Bhubaneswar, Odisha, India.
2. Associate Professor, Department of Movement Science, Abhinav Bindra Sports Medicine and Research Institute, Bhubaneswar, Odisha, India.
3. Postgraduate Student, Abhinav Bindra Sports Medicine and Research Institute, Bhubaneswar, Odisha, India.

**NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:**
Prateek Sharma,
Postgraduate Student, Abhinav Bindra Sports Medicine and Research Institute, Bhubaneswar-751024, Odisha, India.
Email: shrm6417@gmail.com