

ABSTRACT

Background: PNF is widely used in physiotherapy to enhance coordinated movement through diagonal and spiral patterns. Insufficient evidence is present regarding the exact degree of joint movement involved in PNF patterns and the safe range within which these movements should be performed for effective and injury-free execution. A biomechanical perspective is necessitated by this lack of standardized kinematic data to analyze joint alignment and movement coordination.

Methodology: Upper- and lower-limb PNF patterns (D1 and D2, flexion and extension) are to be biomechanically analyzed in the AP view to evaluate joint alignment, movement, and coordination, and to inform the identification of safe and standardized movement parameters for clinical application.

Results: The biomechanical analysis demonstrated that participants could perform simultaneous upper- and lower-limb PNF patterns rhythmically, maintaining overall symmetry and controlled joint alignment in the AP view. No significant deviations or loss of balance were noted, indicating that synchronized multi-limb PNF execution at 60 beats/minute can be performed safely and efficiently when proper technique is followed.

Conclusion: The study concludes that simultaneous and rhythmic execution of upper and lower limb PNF D1 and D2 patterns in the AP view results in coordinated biomechanically efficient movement. Even with the functional involvement of trunk and neck through visual tracking, participants maintained stable alignment and controlled joint motion within safe limits.

Keywords: *PNF, Biomechanical Analysis, D1 and D2 Patterns, Simultaneous Limb Movement, Trunk Involvement, Neck Movement,*

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