

THE ROLE OF PERIPHERAL VISION IN ENHANCING BALANCE AND POSTURAL STABILITY: INSIGHTS FROM CENTRAL VISION OBSTRUCTION

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ABSTRACT

This study examines the role of peripheral vision in maintaining postural stability, particularly when central vision is obstructed, using Sensory Organization Testing (SOT) with computer dynamic posturography. Ten participants (5 males, 5 females, aged 21–34 years) were tested under three conditions: full vision, full occlusion, and central vision obstruction allowing only peripheral vision access. Results revealed significantly better balance performance in the peripheral vision condition during somatosensory perturbations (Condition 4), with equilibrium scores higher than in the full vision condition ($p = 0.02$). Similarly, visual preference (VIS) scores, indicating reliance on visual input, were significantly elevated under peripheral vision conditions ($p = 0.03$).

These findings highlight peripheral vision's critical role in improving postural sway and maintaining balance when central vision is impaired, as seen in conditions such as age-related macular degeneration (AMD). While central vision is vital for daily tasks requiring focused attention, peripheral vision provides crucial environmental cues for balance and stability. This research underscores the need for targeted interventions and balance training programs to mitigate fall risks in individuals with central vision loss. Future studies will explore these effects in populations with visual impairments to enhance clinical relevance and applicability of central vision on balance.

Keywords: Peripheral vision, central vision, postural stability, Age-related Macular Degeneration (AMD)

INTRODUCTION

Balance is an essential component of human movement and activity, encompassing tasks ranging from simple postures such as standing to complex athletic maneuvers. Several physiological systems contribute to an individual's ability to maintain balance, with the vestibular system, visual input, and proprioceptive feedback being the three primary sensory mechanisms. Disruptions to any of these systems can impact balance performance. By systematically manipulating these sensory inputs and examining how they interact, researchers can better understand the extent to which individuals rely on specific senses for postural control, particularly the role of vision in maintaining balance.

Evidence suggests that visual input plays a crucial role in the balance control system[1]. Among the visual components, peripheral vision is particularly important for processing environmental cues to maintaining postural sway, making it a critical factor in stabilizing during standing[2]. While the visual system provides essential sensory input for upright posture, its contribution can be diminished under certain conditions, necessitating