

Age-Related Differences in Swallowing Biomechanics, Postural Alignment, and Tongue Strength: A Preliminary Cross-Sectional Study

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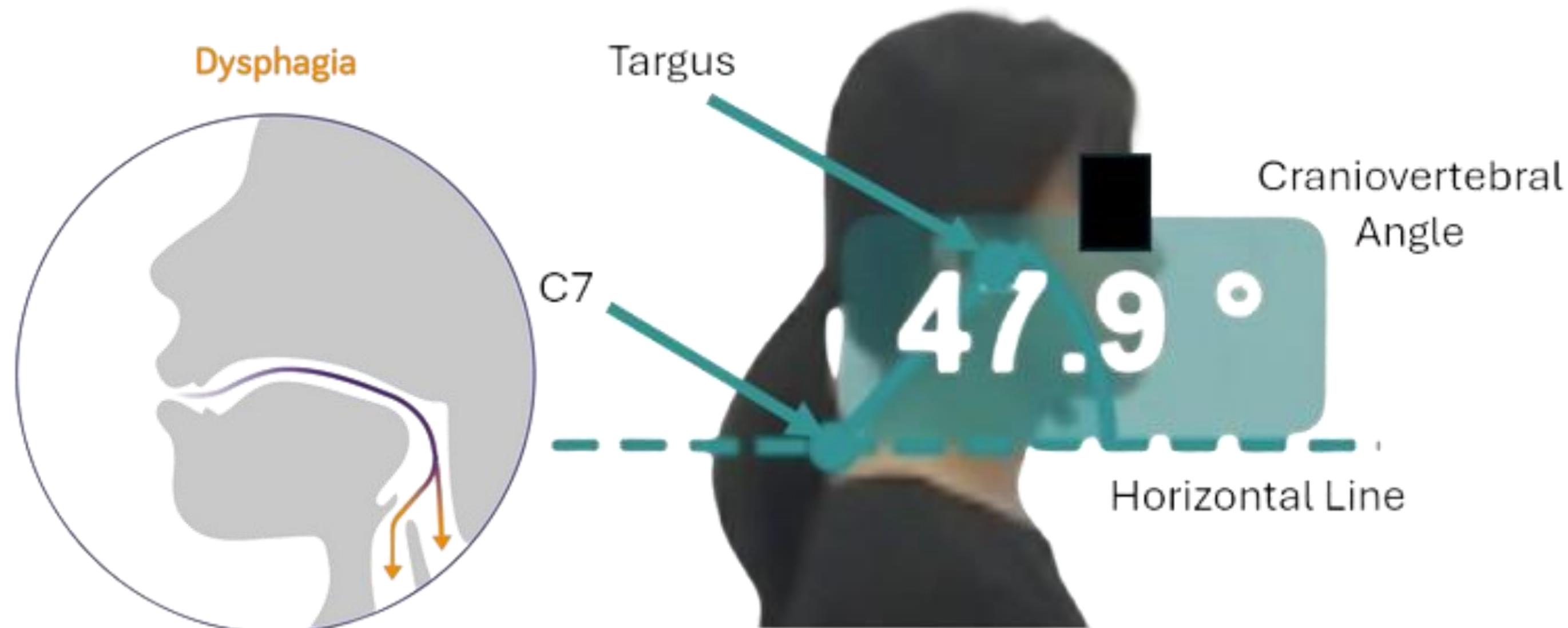
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Introduction

Dysphagia and presbyphagia in older adults are linked to sarcopenia, postural decline, and neuromuscular deterioration.



Forward head posture (FHP), quantified by the craniovertebral angle (CVA), places the suprahyoid muscles in kinematically disadvantageous positions, compromising swallowing efficiency. This study characterised differences in postural alignment, tongue strength and endurance and swallowing efficiency between younger and older adults.

Methodology

A cross-sectional pilot study recruited 25 community-dwelling adults: 13 younger (29.46 ± 5.27 years) and 12 older (69.92 ± 4.81 years).

Young Adults
(n = 13)

Older Adults
(n = 12)

KINOVEA CVA

1. Test of Mastication and Swallowing Solids (TOMASS)
2. Timed Water Swallow Test (TWST)

Tongue Pressure & Endurance
with Iowa Oral Performance
Instrument (IOPI)

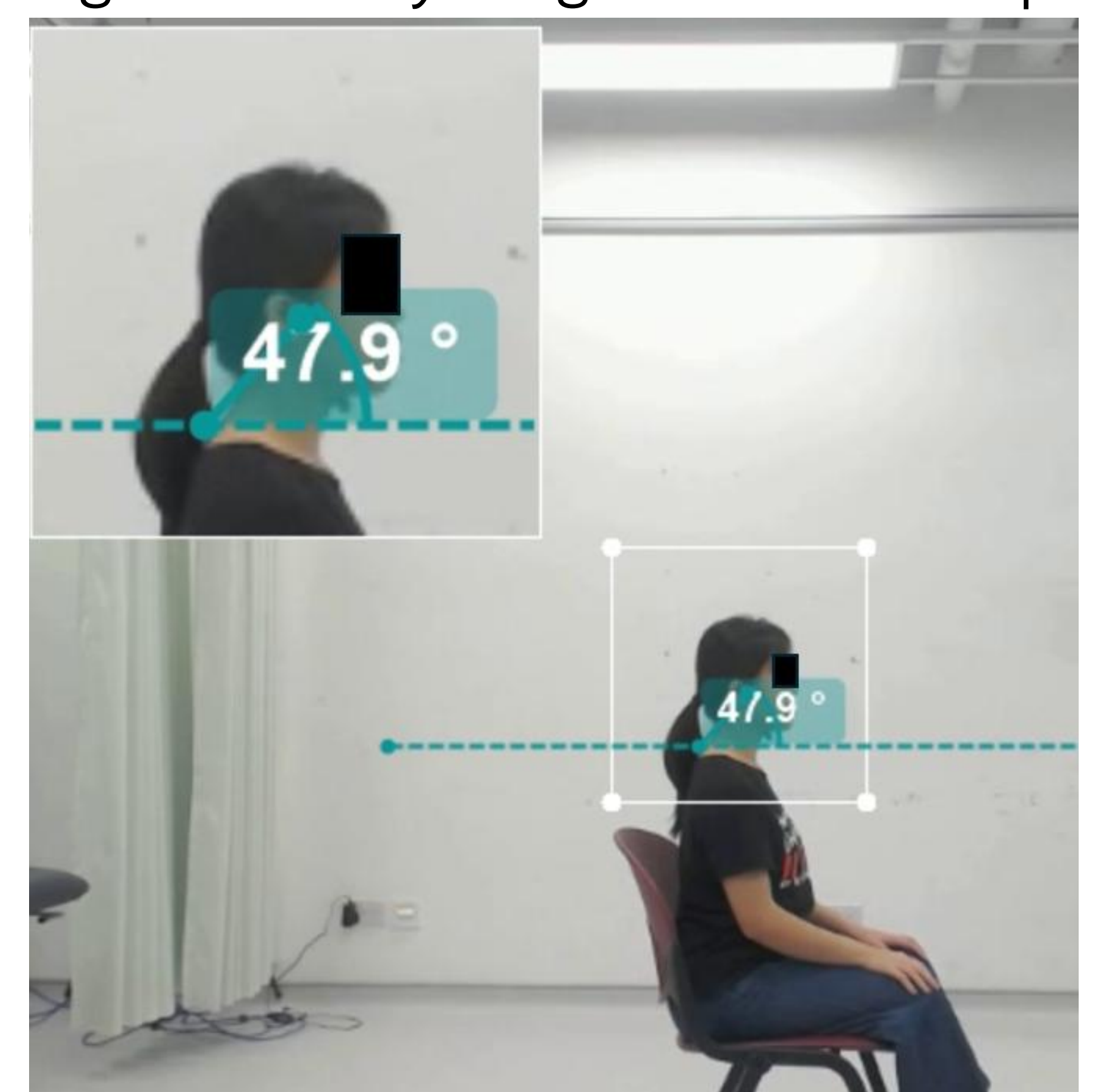


Results

Older adults had a significantly smaller resting CVA ($p = 0.030$) and lower minimum CVA during TOMASS ($p = 0.014$) and TWST ($p = 0.022$). Swallowing efficiency was reduced, with more bites, cycles, and longer durations on TOMASS ($p = 0.001$) and TWST ($p = 0.006$). Maximal tongue pressure was lower in older adults ($p = 0.047$); endurance did not differ. Balance confidence (difference: 2.06, $p = 0.004$). CVA was negatively correlated with tongue strength in both younger ($r = -0.558$, $p = 0.047$) and older ($r = -0.593$, $p = 0.042$) adults.

	Young Adults	Older Adults	P value
Resting CVA (deg)	50.54 ± 5.95	44.52 ± 7.08	0.030*
Max tongue pressure (kPa)	55.08 ± 5.28	46.50 ± 13.68	0.047*
Tongue endurance (sec)	36.29 ± 42.53	24.87 ± 16.83	0.394
TOMASS min CVA	39.67 ± 8.97	31.69 ± 8.97	0.014*
TWST min CVA	39.26 ± 6.91	33.37 ± 4.91	0.023*
Balance Recovery Confidence Scale (Total)	164.54 ± 23.71	125.33 ± 36.37	0.004*

$P \leq 0.05$; CVA: Craniovertebral angle; TOMASS: Test of Mastication and Swallowing Solids; TWST: Timed Water Swallow Test



Conclusion

Age-related declines in CVA, tongue strength, and swallowing efficiency support a mechanistic link between FHP and swallowing dysfunction. The CVA-tongue strength correlation suggests FHP may serve as a compensatory biomechanical mechanism, with important implications for postural and swallowing rehabilitation design in older adults.

Acknowledgement

This project was funded by the Institutional Development Scheme (IDS) Research Infrastructure Grant through the Research Grants Council (RGC) [UGC/IDS(R)16/23]

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