

Prophylactic pharyngeal strengthening program in healthy older adults: Preliminary findings

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INTRODUCTION

Sarcopenia is the age-related loss of muscle strength and function. Our recent research has established that pharyngeal sarcopenia is associated with reductions in pharyngeal constriction and increases in pharyngeal residue and therefore may increase the risk for developing age-related dysphagia¹. Yet, the previous literature on establishing the utility of swallowing exercise regimens for pharyngeal swallowing outcomes is scant². Past research focuses on young healthy volunteers, lacks a control group, and often features short treatment durations and small sample sizes.

The aim of this pilot study was to explore the impact of an 8-week prophylactic pharyngeal strengthening program on various swallowing parameters.

Hypothesis: Our pharyngeal strengthening protocol will:

- improve swallow pressure generation,
- result in hypertrophy in the pharyngeal lumen,
- improve pharyngeal constriction and
- reduce post-swallow residue

METHODS

Participants: This study was IRB-approved. Five healthy older women (mean age 78.2, range 72-86) completed 8 weeks of pharyngeal exercises. Participants with a history of dysphagia or neurological conditions were excluded.

Outcome measures:

1. Tongue pressure generation (anterior maximum, posterior maximum, saliva swallow) using the Iowa Oral Performance Instrument;
2. Pharyngeal lumen volume from acoustic pharyngometry (representing pharyngeal sarcopenia)³;
3. Videofluoroscopic parameters hypothesized to be related to pharyngeal sarcopenia: max pharyngeal constriction area (MPCAn)¹ and normalized residue ratio scale (NRRS)⁴ on two cup sips of thin liquid (IDDSI 0). Raters were blind to time-point and rated in a random order.

Statistical Analysis: For single pre- vs post measures (tongue pressures and pharyngeal volume), paired t-tests were conducted. For repeated measures (2x cup sip on VF measures), linear mixed effects regression models were run. Given the pilot nature of this work and small sample size, trending results were reported.

EXERCISE PROTOCOL:

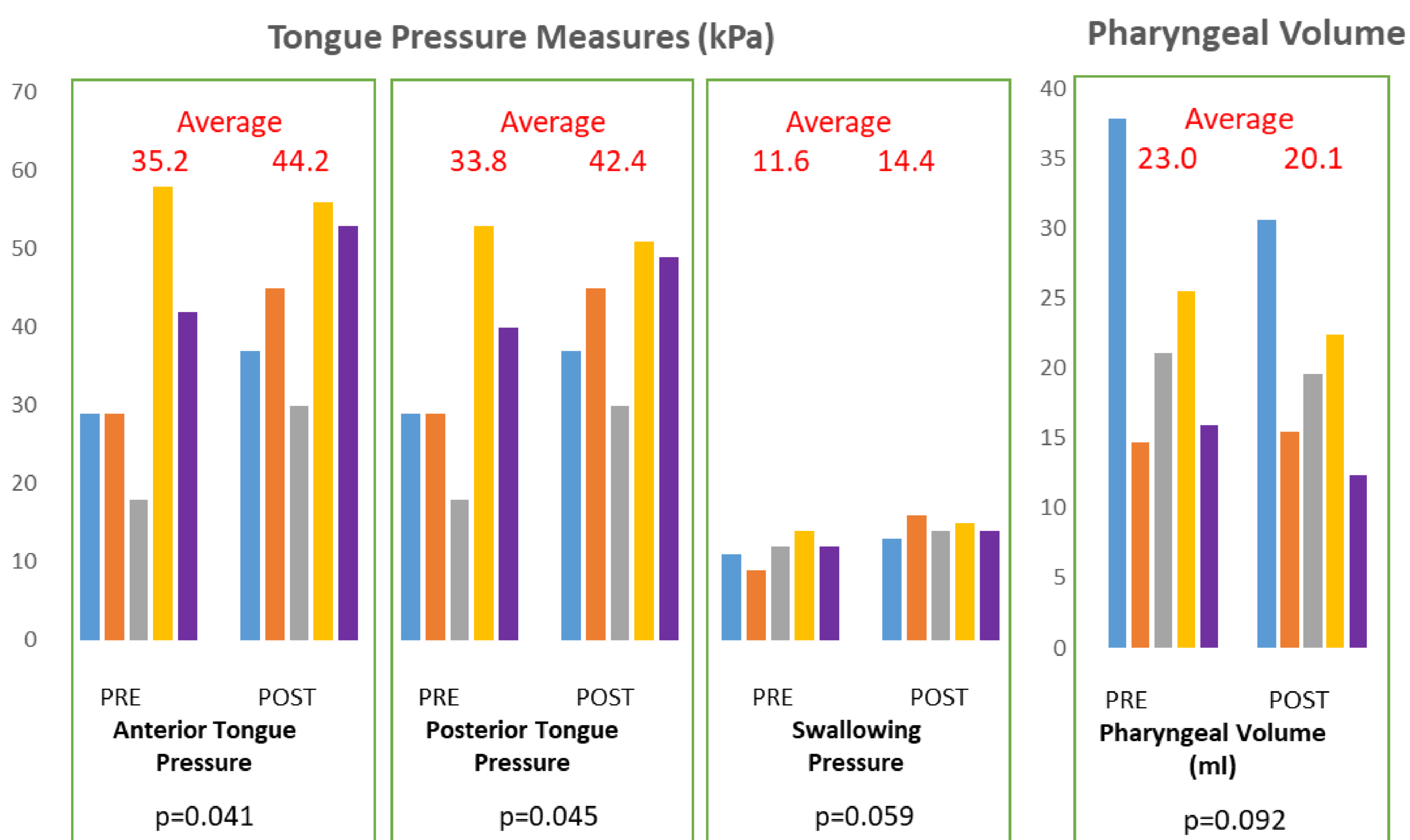
EXERCISES: effortful swallows, tongue hold swallows, effortful pitch glides and maximal posterior tongue presses.

REPS/SETS: 10 repetitions of each exercise per set. Sets increased from 2 in week 1, to 3 in week 2 and 4 in weeks 3-8, with an additional 3 days per week home practice.

FREQUENCY/DURATION: 2x per week with SLP (in person), additional 3x per week home practice. 8 weeks total.

ADHERENCE: Homework was tracked using weekly paper logs.

RESULTS:



Videofluoroscopic Outcomes

Participant	Val Residue (NRRSv)		PS Residue (NRRSp)		Pharynx Constrict (MPCAn)	
	Pre	Post	Pre	Post	Pre	Post
72 F	0.12	0.06	0.00	0.00	4.4	3.6
76 F	0.00	0.00	0.00	0.08	3.5	3.1
85 F	0.04	0.01	0.01	0.00	3.1	2.4
72 F	0.02	0.01	0.00	0.00	3.2	4.5
86 F	0.01	0.00	0.00	0.01	2.3	0.6
MEAN	0.04	0.02	0.00	0.02	3.30	2.84
p	0.025		0.201		0.419	

DISCUSSION POINTS

- These exercises were chosen for their known and/or hypothesized activation of pharyngeal muscles. We chose a combination of exercises to maximize participant engagement and to mirror real world clinical practice.
- Our 8-week prophylactic pharyngeal exercise program is feasible and safe.
- The exercise protocol appears to be effective in improving various parameters of swallowing function: tongue pressure generation (including untrained saliva swallows) and reduced vallecular residue. We are encouraged by trending support for other parameters.

LIMITATIONS & FUTURE DIRECTIONS

- Testing four exercises in combination limits our ability to tease apart the effectiveness of each component.
- Small pilot sample, limited to women only.
- None of our participants had measureable pyriform sinus residue at baseline, thus limiting our ability to draw conclusions for that parameter.

We are encouraged by the changes observed in a series of healthy older individuals with functional swallowing. Our future goal is to initiate a larger-scale trial with control conditions to definitively confirm the findings of this prophylactic exercise regimen. Ultimately, we would like to confirm its applicability in both aging populations and in individuals with dysphagia including degenerative disease.

REFERENCES

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