

Introduction

- Mealtime eating is noted to induce lingual fatigue in older healthy adults (Kays et al., 2010).
- Although bulbar muscle weakness is common in people with Amyotrophic Lateral Sclerosis (PwALS) and Parkinson Disease (PwPD), it is unclear whether reduced lingual physiologic capacity places PwALS and PwPD at higher risk of developing mealtime lingual fatigue.

Objective

- **Aim:** To determine if lingual pressure generation capacity becomes reduced in PwALS and PwPD as a result of completing an assessment involving 21 swallowing tasks.
- **Hypothesis:** Post-assessment measures of lingual pressure will be lower than pre-assessment measures, suggesting fatigue.

Participants

Table 1. Participant demographics.

	PwALS (n = 17)	PwPD (n = 20)
Median age (IQR)	71 (50-72)	71 (55-87)
Sex (male)	10	16
Mean time since initial onset (months)	37 (5-96)	64 (14-230)
Mean Hoehn and Yahr Scale score	N/A	2
Mean ALS Functional Rating Scale - Revised	3	N/A

PwALS = People with ALS; PwPD = People with Parkinson Disease; IQR = interquartile range.

Methods

- Participants completed a videofluoroscopy (VFSS) comprising 21 boluses of 20% w/v barium of different consistencies.

0	3 sips of thin liquid
1	6* sips of slightly thick liquid
2	3 sips of mildly thick liquid
3	6* teaspoons of moderately thick liquid
4	3 teaspoons of extremely thick liquid

*Half prepared with a xanthan-gum thickener and half with a starch-based thickener.

Pre- and post-VFSS measures of tongue pressure were collected using the Iowa Oral Performance Instrument (3 reps/task)

Outcomes:

- Maximum anterior isometric pressures (MAIP)
- Maximum posterior isometric pressures (MPIP)
- Regular effort saliva swallow pressures (RESS)
- Lingual functional reserve (LFR: MAIP-RESS).
- Between groups analyses of variance were performed with factors of cohort and sex, and a *p*-value of 0.05.

Results

Table 2. Descriptive statistics pre- and post-VFSS, by cohort (in kPa). *Negative change values reflect higher pressures post-VFSS.

Cohort	Parameter	Pre-VFSS		Post-VFSS		Pre- to Post-VFSS Change	
		Mean (SD)	[Minimum to Maximum]	Mean (SD)	[Minimum to Maximum]	Mean (SD)	[Minimum to Maximum]
PwALS	MAIP (1RM)	32 (19)	[5 to 60]	31 (19)	[6 to 61]	1 (5)	[-4 to 17]
	MPIP (1RM)	29 (20)	[1 to 57]	28 (20)	[1 to 60]	1 (3)	[-4 to 9]
	RESS (Mean)	19 (12)	[4 to 43]	20 (12)	[3 to 43]	-1 (6)	[14 to 9]
	LFR (Mean)	14 (11)	[0 to 36]	12 (11)	[-9 to 37]	2 (7)	[-16 to 15]
PwPD	MAIP (1RM)	55 (17)	[26 to 85]	51 (21)	[11 to 90]	0 (6)	[-8 to 21]
	MPIP (1RM)	51 (19)	[4 to 91]	51 (17)	[7 to 87]	0 (8)	[-25 to 14]
	RESS (Mean)	17 (8)	[9 to 47]	15 (8)	[6 to 43]	2 (3)	[-4 to 11]
	LFR (Mean)	37 (15)	[10 to 70]	40 (15)	[10 to 76]	-3 (7)	[-15 to 16]

VFSS = Videofluoroscopic Swallowing Study; kPa = kiloPascals; PwALS = People with ALS; PwPD = People with Parkinson Disease; MAIP = Maximum Anterior Isometric Pressure; MPIP = Maximum Posterior Isometric Pressure; RESS = Regular Effort Saliva Swallow; LFR = Lingual Function Reserve; 1RM = One repetition maximum; SD = Standard deviation.

Results: Pre-Post VFSS Comparisons

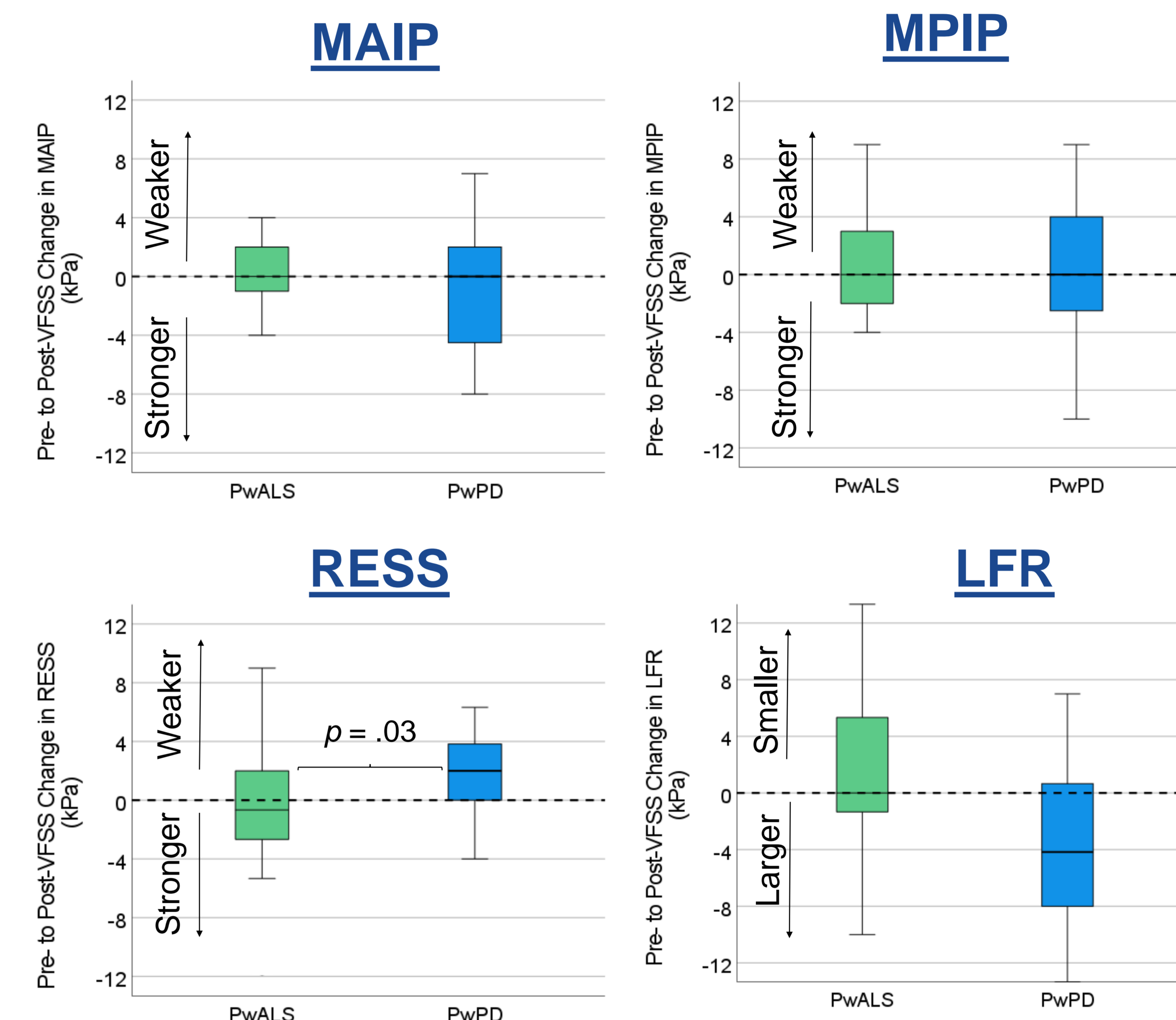


Figure 1. Pre- to Post- VFSS changes in tongue pressure measures in kilopascals by Cohort

Conclusions

- In this study, PwALS and PwPD did not show evidence of lingual fatigue after a 21-item VFSS with boluses of varying consistencies.
- Research is needed to identify protocols that reliably reveal tongue or swallowing-related fatigue in healthy adults so that the impact of neurodegenerative disease on fatigability can be better understood.

References:

1) Kays, S. A., Hind, J. A., Gangnon, R. E., & Robbins, J. (2010). Effects of dining on tongue endurance and swallowing-related outcomes. *Journal of Speech, Language, and Hearing Research*.