Prognosis of chemosensory function recovery among Long COVID-19 patients—objective assessment at 3-, 6- and 12-month follow-ups

Lauren Gastineau[1], Shivani I Patel[1], Veronica Formanek[1], Ahmad Odeh[1], Nidhi Jha[1], Christopher Simons[2], and Kai Zhao[1], PhD.

Department of Otolaryngology, The Ohio State University[1]
Department of Food Science and Technology, The Ohio State University[2]

Introduction

Chemosensory loss is a hallmark symptom of COVID-19 infection, with many patients continuing to experience smell and taste symptoms well beyond initial infection. This ongoing study aims to capture the timeline in chemosensory recovery following post-acute sequelae of SARS-CoV-2 infection (PASC).

Objectives

To apply multidisciplinary methodologies to extensively capture and quantify the full impact of COVID-19 on broad sensory functions (smell, taste, chemesthesis).

Methods

Inclusion Criteria: Adults with a previous COVID-19 diagnosis and persistent (>90 days) complaints of sensory dysfunctions.

Exclusion Criteria: Sensory losses not due to COVID-19 and pre-existing sensory losses before COVID-19 infection.

1) Olfaction: 9-Item NIH toolbox odor identification, odor detection threshold (ODT) to phenyl-ethyl alcohol (PEA) <8, and retro-nasal flavor identification (candy) <=4.
2) Taste: modified NIH toolbox taste test (1mM sucralose, 0.1M NaCl, 8mM citrate, 1mM quinone, 5ppm capsaicin).
3) Chemesthesis: menthol lateralization detection thresholds (LDT) in binary dilution series <7.

Results

Sample size: n=27 (30-74 years old, median: 56).

- Contracted COVID-19 from 3/2020 to 11/2023. 8-53 months (median: 32) post dx.
- n=8 reporting 2 infections, n=1 reporting 3 infections, n=8 hospitalized, n=13 vaccinated prior to dx.
- All completed a 3-month follow-up.
- 15 completed a 6-month follow-up, 5 to be scheduled (not yet 6-months), 7 dropped out.
- 9 completed a 12-month follow-up, 6 to be scheduled (not yet 12-months) 0 dropped out.
- All patients will be included in the follow-up regardless of their self-perceived improvement.

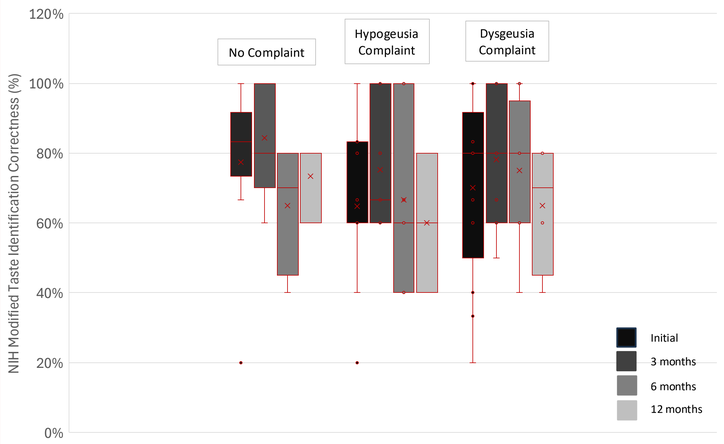


Figure 1: Plot of NIH modified taste solution scores.

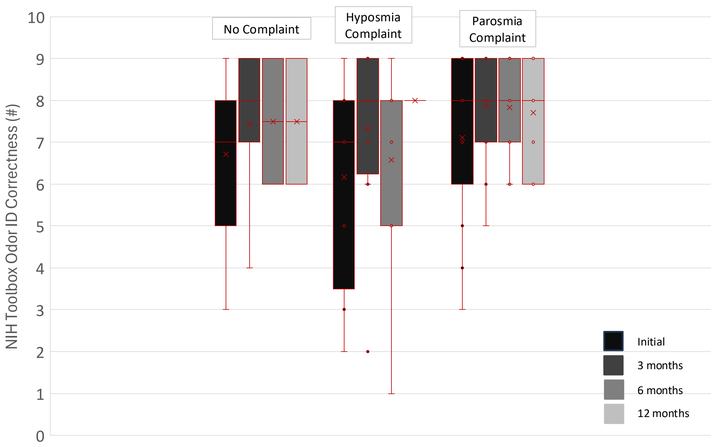


Figure 2: Plot NIH Toolbox Odor ID scores (0 to 9).

Results

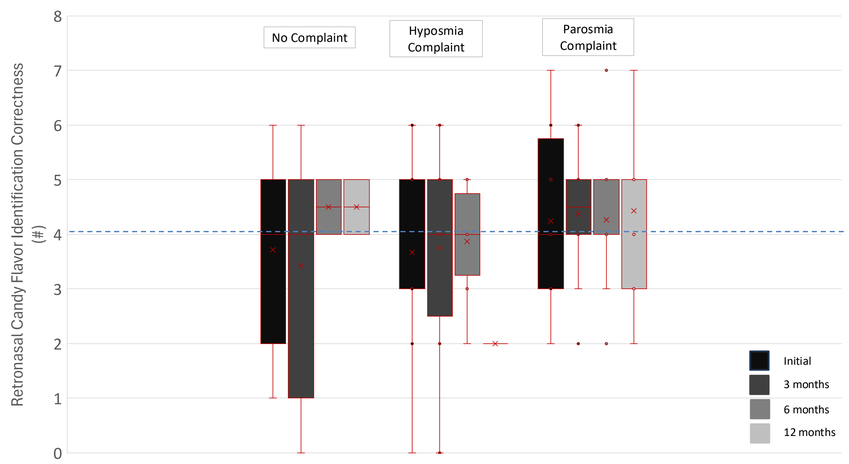


Figure 3: Plot of retronasal candy flavor scores (0 to 7).

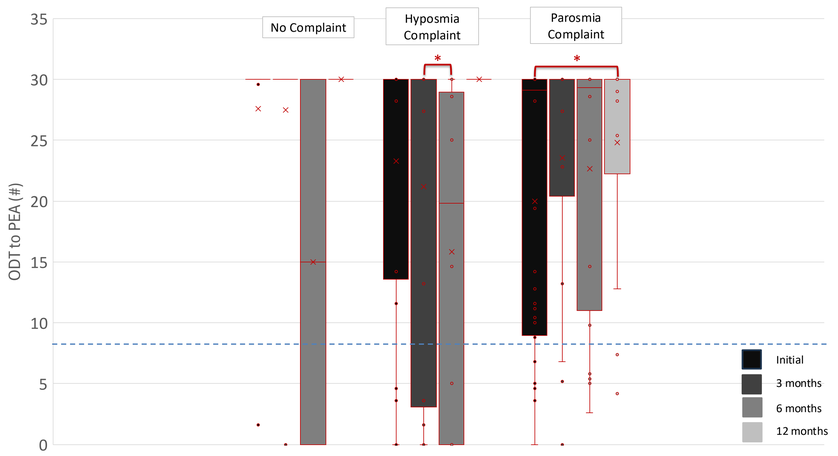


Figure 4: Plot of odor detection threshold to PEA (0 to 30).

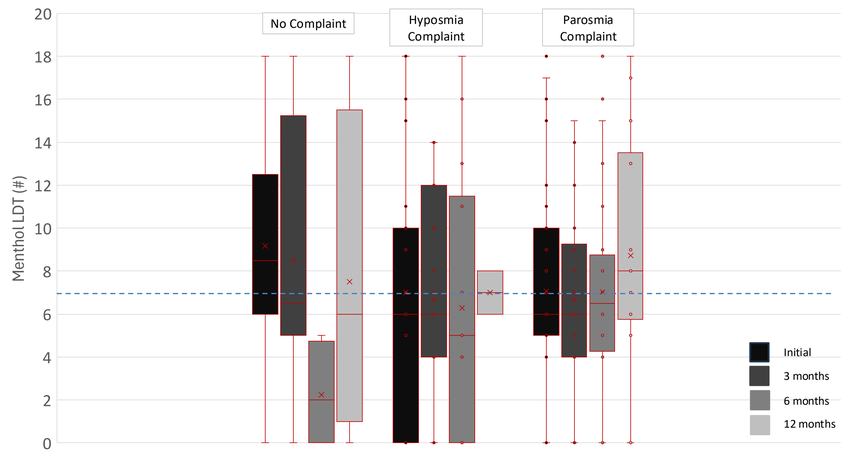
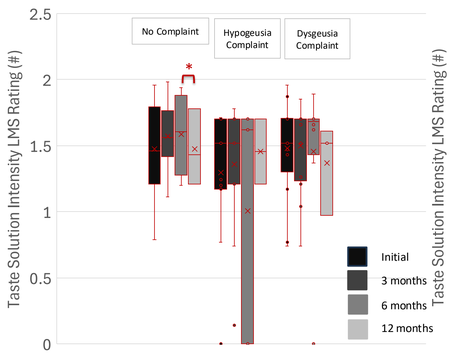


Figure 5: Plot of menthol lateralization detection threshold (0 to 18).



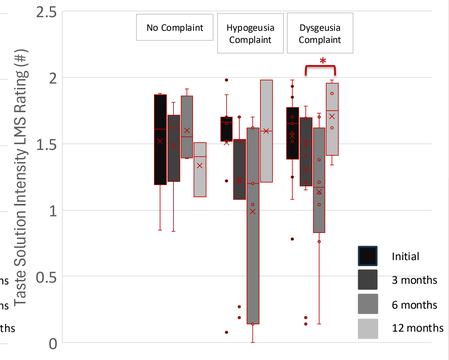


Figure 6: Plot of sweet taste solution intensity Labeled Magnitude Scale (LMS) ratings.

Figure 7: Plot of salty taste solution intensity Labeled Magnitude Scale (LMS) ratings.

Results

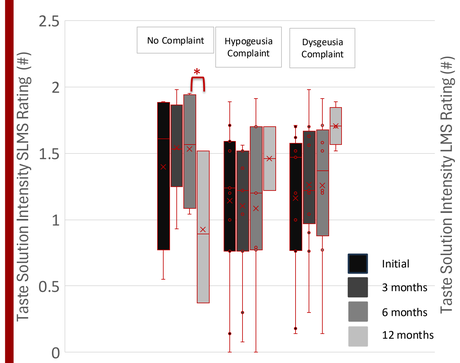


Figure 8: Plot of sour taste solution intensity Labeled Magnitude Scale (LMS) ratings.

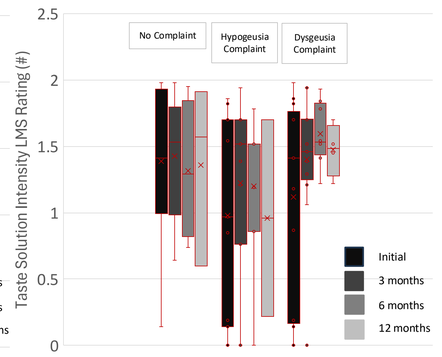


Figure 9: Plot of bitter taste solution intensity Labeled Magnitude Scale (LMS) ratings.

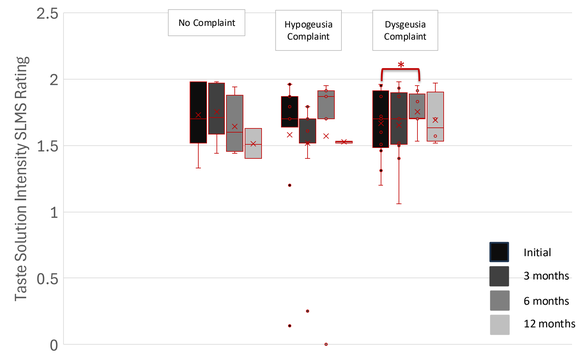


Figure 10: Plot of spicy taste solution intensity Labeled Magnitude Scale (LMS) ratings.

Conclusions

- **At initial visit:**
  - 78% self-reported smell loss (44% hyposmia/anosmia, 63% parosmia/phantosmia, 33% both).
  - 67% self-reported taste loss (41% hypogeusia, 48% dysgeusia, 22% both).
  - 76% confirmed objective smell loss.
  - 22% confirmed objective taste loss.
- **At 3-month follow-up:**
  - 77% self-reported smell loss (59% hyposmia/anosmia, 63% parosmia/phantosmia, 44% both).
  - 66% self-reported taste loss (63% hypogeusia, 30% dysgeusia, 30% both).
  - 48% had objective smell loss (22% hyposmia, 26% parosmia/phantosmia).
  - 15% had objective taste loss (11% hypogeusia, 7% dysgeusia).
  - Improve in objective smell (Odor ID, p=0.011).
- **At 6-month follow-up:**
  - 87% self-reported smell loss (66% hyposmia/anosmia, 80% parosmia/phantosmia, 60% both).
  - 73% self-reported taste loss (73% hypogeusia, 33% dysgeusia, 33% both).
  - 40% had objective smell loss (15% hyposmia, 19% parosmia/phantosmia).
  - 40% had objective taste loss (19% hypogeusia, 4% dysgeusia).
  - Improve in objective smell (Odor ID, p=0.048) from 3-month follow-up.
  - Increase in bitter taste solution intensity (p=0.049) from initial visit.
- **At 12-month follow-up:**
  - 56% self-reported smell loss (44% hyposmia/anosmia, 56% parosmia/phantosmia, 44% both).
  - 56% self-reported taste loss (44% hypogeusia, 44% dysgeusia, 33% both).
  - 67% had objective smell loss, 11% had objective taste loss.
  - Improve in ODT (PEA, p=0.044) from initial visit.
  - Decline in sweet taste solution intensity (p = 0.031) from 6-month follow-up.
  - Decline in sour taste solution intensity (p=0.031) from 3-month follow-up.
  - Decline in spicy taste solution intensity (p=0.012) from 6-month follow-up.
- Throughout all visits, all patients identified the spicy taste solution correctly.

These findings suggest significant fluctuations in chemosensory function following COVID-19 infection, with prognosis prolonged and uncertain, and self-report being unreliable, especially for taste loss. Future work will continue to evaluate smell and taste for a larger sample size.

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