Olfactory Identification Predicts Cognitive Impairment in Pediatric Onset Multiple Sclerosis (POMS)

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Objective

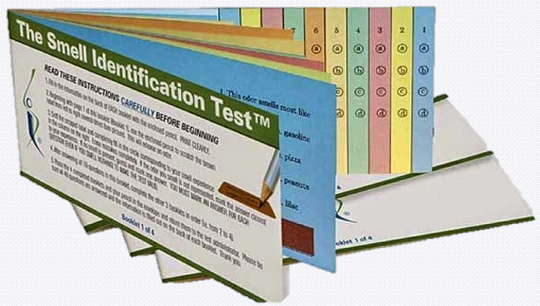
To test whether olfactory identification is linked to cognitive functioning in pediatric-onset multiple sclerosis (POMS).

Background

Impaired olfactory function has been linked to cognitive decline in many neurodegenerative diseases including Alzheimer's Disease, Parkinson's disease as well as adult multiple sclerosis (MS). Pediatric onset MS refers to those patients with onset before the age of 18 years and represents a rare subpopulation of the youngest affected with MS. Cognitive impairment occurs in more than half of all adults with MS and occurs in at least one-third of POMS patients. It is important to have sensitive measures of cognitive impairment that can be easily administered in a clinical setting.

Methods

Participants were consecutively-recruited POMS patients recruited during routine outpatient clinic visits compared to community-recruited and age-matched healthy controls (HCs). All participants completed demographic forms, smoking history, and were administered the Symbol Digit Modalities Test (SDMT), the Wide Range Achievement Test, third edition (WRAT-3), and the University of Pennsylvania Smell Identification Test (UPSIT), a 40-item "scratch and sniff" test of olfactory identification.



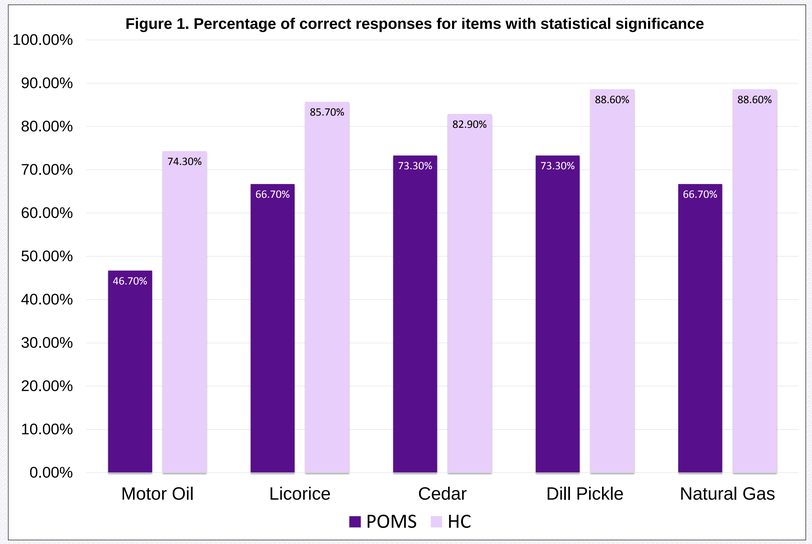
Results

Consecutively-recruited POMS participants (n=15) were compared to HCs (n=35). For the POMS group, median Expanded Disability Status Scale (EDSS) score was 1.0 and mean disease duration was 3.95 ± 0.96 years. The POMS group and the HC group were matched according to age (18.0±2.7 vs. 19.8±4.0 years, p=0.07), gender (53.3% female and 65.6% female, respectively) and reading level (standard score of 106 vs. 110, p=0.18). Using age- and gender-referenced normative data, the POMS group trended towards poorer UPSIT performance than the HC group (mean percentile of 14.9±14.9 vs. 24.6±23.4, p=0.09), while the groups did not differ in SDMT scores (mean z-score of 0.19±1.45 vs. -0.29±0.81, p=0.26) (Table 1). Among the POMS group, UPSIT percentile score correlated with SDMT z-score, r=0.65, p=0.004, suggesting a link between olfaction and cognition in this group. Test results were also analyzed item by item, revealing significant differences between POMS participants and HCs in 5 odors. These odors include item #5: Motor oil (p=.002), item #13: Licorice (p=.007), item #18: Cedar (p=.037), item #25: Dill Pickle (p=.014), and item #38: Natural Gas (p=.003) as shown in Figure 1.

Table 1. Summary of Study Measures

Measure	POMS (n=15) (mean ± SD)	HC (n=35) (mean ± SD)	p value
WRAT standard score	106 ± 9.99	110 ± 7.89	0.18
SDMT z-score	0.19 ± 1.45	-0.29 ± 0.81	0.26
UPSIT percentile	14.9 ± 14.9	24.6 ± 23.4	0.09

Figure 1. Percentage of correct responses for items with statistical significance



Conclusion

- Olfactory identification is an easily-administered clinical tool that may identify pediatric onset MS patients most at risk for cognitive involvement
- The UPSIT better identified the POMS vs. HC groups than the SDMT
- With further study in larger sample sizes, the UPSIT has the potential to become a diagnostic tool for POMS and other neurological diseases

References

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