Clinical correlates of hyposmia in a multi-ethnic cohort of idiopathic Parkinson's disease

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Objective

To explore clinical and ethnic correlates of hyposmia in idiopathic Parkinson's disease (PD).

Background

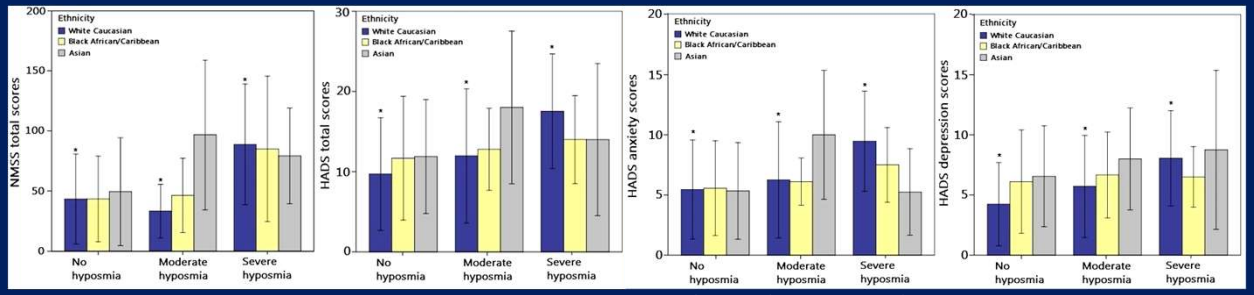
- Hyposmia is one of the main non-motor symptoms (NMS) of PD, being present in a majority of patients many years before onset of motor symptoms [1].
- Evidence suggests that ethnicity may play a role in this heterogenous condition by modifying the risk of developing PD and its clinical phenotypical expression. Several factors may be involved, including pharmacogenetics, environmental exposures and sociocultural aspects [2].
- Among the non-motor spectrum of PD, olfactory dysfunction differs in different ethnic groups [3].
- Whether differences in olfactory function are related to other specific NMS remains unclear.

Methods

- Cross-sectional analysis of 173 participants enrolled in the Non-motor Longitudinal International Study (NILS; UKCRN No: 10084) for whom ethnicity (White Caucasian (WC), Black African and Caribbean (BAC), and Asian (A)) was recorded and who also underwent a dopamine transporter scan (DaTscan).
- Hyposmia scores on question 28 of the Non-Motor Symptom Scale (NMSS) were used to stratify participants based on hyposmia severity: absent 0 (n= 105; 50 WC, 37 BAC, 18 A), moderate 1-7 (n = 41; 28 WC, 9 BAC,4 A), and severe 8-12 points (n= 27; 19 WC, 4 BAC, 4 A).
- Differences in non-motor and motor scores, and DaTscan results were assessed by Kruskal-Wallis test.

Results

- No differences were observed for age, disease duration, Levodopa equivalent daily dose across the different groups as defined by item 28 of NMSS ($p \geq 0.13$).
- Within the WC group we observed significant group differences in sleep-fatigue, mood-cognition, attention-memory ($p \leq 0.008$), in the NMSS total score ($p<0.001$), Hospital Anxiety and Depression Scale (HADS) scores (both anxiety and depression; $p \leq 0.003$).
- In the BAC group, we observed no group differences in any of the NMS, but there were significant differences for DaTscan outcome measures ($p \leq 0.019$) with most pronounced differences in the bilateral putamen and left striatum.
- In the A group, we found no group differences in any of the NMS or DaTscan outcome measures.



Abbreviations: HADS, Hospital anxiety and depression scale; NMSS, Non-motor symptom scale, * p<0.005 (Kruskal-Wallis test)

		Age	Hy	Duration	LEDD	SCOPA A	SCOPA B	SCOPA C	NMSS total	HADS A	HADS D	HADS total	PDSS	Striatum R	Striatum L	Putamen R	Putamen L	Caudate R	Caudate L
White Caucasian																			
No hyposmia (n=50)	Mean	60.9	2.1	3.8	653.3	10.5	5.0	1.8	43.4	5.5	4.2	9.7	110.0	1.4	1.3	1.1	1.1	1.7	1.6
	SD	12.5	0.8	3.7	727.1	5.9	3.8	2.6	37.4	4.1	3.5	7.0	26.9	0.4	0.4	0.4	0.4	0.4	0.4
Moderate hyposmia (n=28)	Mean	62.5	2.0	5.5	588.6	8.4	4.9	1.5	33.3	6.3	5.7	12.0	109.5	1.3	1.3	1.0	1.0	1.6	1.5
	SD	13.8	0.9	5.7	598.6	4.4	4.0	2.6	22.3	4.8	4.3	8.4	32.3	0.4	0.3	0.4	0.3	0.5	0.4
Severe hyposmia (n=19)	Mean	61.4	2.3	6.7	721.5	9.6	6.7	2.4	88.8	9.5	8.1	17.5	94.6	1.1	1.5	0.7	1.2	1.4	1.8
	SD	11.4	1.1	5.8	588.1	4.0	3.6	3.2	50.1	4.2	4.0	7.2	22.5	0.3	0.5	0.2	0.4	0.4	0.7
P-value (Kruskal-Wallis)		0.89	0.61	0.13	0.68	0.23	0.20	0.47	**<0.001**	**0.003**	**0.002**	**0.001**	**0.049**	0.34	0.78	0.11	0.85	0.48	0.67
Black African Caribbean																			
No hyposmia (n=37)	Mean	65.5	2.0	6.1	643.8	9.5	6.1	1.6	43.4	5.6	6.1	11.7	106.6	1.2	1.4	0.9	1.1	1.5	1.6
	SD	10.2	0.8	11.3	518.4	4.7	4.2	2.0	35.7	3.9	4.3	7.7	28.8	0.4	0.4	0.4	0.4	0.4	0.4
Moderate hyposmia (n=9)	Mean	64.6	2.4	5.7	824.8	11.3	7.0	3.0	46.3	6.1	6.7	12.8	101.0	0.7	0.8	0.5	0.6	0.9	1.1
	SD	11.1	0.7	5.6	521.3	4.7	1.9	2.6	30.9	2.0	3.6	5.1	31.5	0.3	0.3	0.2	0.1	0.5	0.5
Severe hyposmia (n=4)	Mean	57.8	2.5	4.3	631.8	16.5	8.5	2.5	85.0	7.5	6.5	14.0	80.8	0.9	0.8	0.7	0.6	1.1	1.1
	SD	6.8	0.6	4.4	1015.1	4.5	5.3	1.9	60.4	3.1	2.5	5.5	21.5	0.2	0.2	0.1	0.1	0.3	0.2
P-value (Kruskal-Wallis)		0.29	0.08	0.75	0.41	**0.041**	0.45	0.14	0.30	0.43	0.82	0.57	0.22	**0.016**	**0.004**	**0.009**	**0.001**	**0.018**	**0.019**
Asian																			
No hyposmia (n=18)	Mean	66.9	2.3	6.9	695.0	9.1	7.7	1.9	49.5	5.3	6.6	11.9	100.2	1.4	1.2	1.1	0.9	1.7	1.5
	SD	7.9	0.9	4.2	546.5	4.6	5.2	2.6	44.9	4.0	4.2	7.1	30.3	0.4	0.2	0.4	0.2	0.5	0.3
Moderate hyposmia (n=4)	Mean	63.5	3.0	4.5	914.3	15.8	12.5	1.5	96.3	10.0	8.0	18.0	86.8	1.0	1.1	0.7	0.9	1.4	1.3
	SD	17.0	1.8	3.7	689.1	11.3	9.0	1.9	61.9	5.4	4.2	9.5	37.1	0.2	0.5	0.2	0.4	0.3	0.6
Severe hyposmia (n=4)	Mean	67.9	2.5	8.1	703.9	12.0	9.8	3.3	79.3	5.3	8.8	14.0	88.3	1.0	0.9	0.7	0.7	1.3	1.1
	SD	8.5	0.6	5.8	488.9	3.7	4.9	2.2	39.8	3.6	6.6	9.5	39.7	0.6	0.4	0.4	0.3	0.6	0.3
P-value (Kruskal-Wallis)		0.96	0.67	0.43	0.69	0.24	0.34	0.96	0.07	0.22	0.55	0.52	0.75	0.23	0.28	0.23	0.59	0.26	0.30

Abbreviations: HADS, Hospital anxiety (A) and depression (D) scale; Hy, Hoehn and Yahr scale; L, left; LEDD, levodopa equivalent daily dose; NMSS, Non-motor symptom scale; PDSS, Parkinson's disease sleep scale; R, right; SCOPA, SCales for Outcomes in Parkinson's disease.

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Conclusions

PD patients with hyposmia appeared to have a specific non-motor profile consisting of sleep disturbances, mood and cognitive problems. This was only true in the White population. In the Black African and Caribbean population, on the other hand, hyposmia severity correlated with putaminal dopamine binding ratios. These results underscore the ethnic differences in PD which need to be considered, not only for hyposmia.