

Olfactory Dysfunction in Persian patients suffering from Parkinson's disease

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Keywords

Parkinson disease, olfactory dysfunction, UPDRS, Iran

Abstract

Background: Looking in literature reveals that aging is accompanied by olfactory dysfunction, and hyposmia/anosmia is a common manifestation in some neurodegenerative disorders. Olfactory dysfunction is regarded as non-motor manifestations of Parkinson disease (PD). The main goal of this study was to examine the extent of olfactory dysfunction in Persian PD patients.

Methods: We used seven types of odors including rosewater, mint, lemon, garlic which were produced by Barij Essence Company in Iran. Additionally, coffee and vinegar were used. Subjects had to distinguish and name between seven previously named odors, stimuli were administered to each nostril separately.

Results: Totally, 92 patients and 40 controls were recruited. The mean (standard deviation) (SD) age patients was 64.88 (11.30) versus 61.05 (7.93) in controls. The male: female ratio in patients was 50:42 versus 22:18 in control group. Also, mean UPDRS score (SD) in patients was 24.42 (5.08) and the disease duration (SD) was 3.72 (3.53). Regarding the number of truly detected odors, there were a significant higher number of correct identified odors in control group in comparison with the PD patients. Furthermore, there was a

significant negative correlation between number of correct diagnosed smells and UPDRS (Pearson Correlation= -0.27, P=0.009); conversely, no significant correlation between the duration of Parkinson disease and number of correct diagnosed smells (P>0.05).

Conclusion: smelling dysfunction is a major problem in Persian PD patients and it requires vigilant investigation for the cause of olfactory dysfunction exclusively in elder group and looking for possible PD disease.

Introduction

Looking in literature reveals that aging is accompanied by olfactory dysfunction and hyposmia/anosmia is a common manifestation in some neurodegenerative disorders [1]. Olfactory dysfunction is regarded as non-motor manifestations of Parkinson disease (PD) [2], and has been attributed to initial pathological deposition of Lewy bodies and Lewy neurites in primary olfactory centers [2,4]; also, it seems to be one of the most frequent symptoms in idiopathic parkinsonian syndrome [5]. Proper odor identification depends on higher order structures, such as the hippocampus, for olfactory cognitive or memory processing [4]. This manifestation is so important that can differentiate disorders like PD and Alzheimer disease from related disorders with akin clinical presentations [6]. The main goal of this study was to examine the extent of olfactory dysfunction in Persian PD patients.

Materials and Methods

Subjects Selection: The patients with the history of Parkinson disease were recruited from movement disorders clinic of Shariati hospital affiliated to Tehran University of medical Sciences. One neurologist (H.N.) visited the patients before the test and UPDRS was calculated by predesigned forms. The study was approved by the ethical committee of Tehran University of Medical Sciences. The patients with minimal status score below 28 were excluded. Correspondingly, 40 healthy subjects with age over 45 from associates of referred patients other than Parkinson disease were recruited as control group.

The patients with the history of head trauma, active rhinosinusitis, and surgery on nasal cavity or non-patent nasal cavity in rhinoscopy were excluded.

Unified Parkinson's disease Rating Scale (UPDRS): The scale itself has five components, mainly resulting from preexisting scales that were reviewed and adapted by an association of movement disorders specialists. It principally includes: (Part I, Mentation, Behavior and Mood; Part II, Activities of Daily Living; Part III, Motor; Part IV, Complications). The original concept of the scale was to provide a core assessment tool that could be accompanied by additional measures to focus on global impairment or specific elements in more detail. Herein, we only included motor division of the score for recording the patients' disability.

Testing olfactory status: Usually, the University of Pennsylvania Smell Identification Test (UPSIT) which uses microencapsulated odorants released by scratching is used for testing smells; however, we used odors more familiar for Persian patients. Before starting the test, both nasal cavities of subjects were examined by rhinoscope to ensure patency and providing that the foramen was not open, the patient was excluded. We used seven types of odors including rosewater, mint, lemon, garlic which were produced by Barij Essence Company in Iran. Additionally, coffee and vinegar were used.

Subjects had to distinguish and name between seven previously named odors, stimuli were administered to each nostril separately.

All the materials were used as solutions in plastic tubes packed completely to prevent smell dissemination before opening of the lid. All the tubes were in the same size (diameter 4 mm) with the same shape and colour.

Before doing the test, we explained the details of test for the subjects. The patient was requested to close each nostril separately as well as his or her eyes and after that, randomly the odors were presented. The name of odor and the timing from smell presentation to answer the correct name (measured by chronometer) were recorded.

Statistical analysis: Pearson correlation was used to show the degree of correlation between UPDRS and number of correct diagnosed odors.

Results

Totally, 92 patients and 40 controls were recruited. The mean (standard deviation) (SD) age of patients was 64.88 (11.30) versus 61.05 (7.93) in controls. The male: female ratio in patients was 50:42 versus 22:18 in control group. Likewise, mean UPDRS score (SD) in patients was 24.42 (5.08) and the disease duration (SD) was 3.72 (3.53).

Regarding the number of truly detected odors, there was a significant higher number of correct identified odors in control group in comparison with the PD patients; the details of truly diagnosed odors and odds ratios are summarized in table 1. It is significant that there was no significant in mint diagnosis between two groups. Furthermore, there was a significant negative correlation between number of accurate diagnosed odors and UPDRS (Pearson Correlation= -0.27, P=0.009) (figure 1); conversely, no significant correlation between the duration of Parkinson disease and number of correct diagnosed smells was detected (P>0.05). The mean (SD) latency for the diagnosis of odors (in the case group who identified the odors) is summarized in figure 1. The maximum latency was for vinegar and the minimum was for lemon.

According to the best performance point on the ROC curve, cutoff value for number of accurate diagnosed odors was calculated as 4 odors for differentiating PD patients from controls (sensitivity = 0.87, specificity = 0.50); in addition, the

Table 1. The number of truly diagnosed odors in each group

Odor	Odor Diagnosis	Patients	Control	Odds Ratio	P-value
Rosewater	Not diagnosed	38	1	27.44	0.000
	Diagnosed	54	39		
Garlic	Not diagnosed	43	7	4.14	0.001
	Diagnosed	49	33		
Vinegar	Not diagnosed	33	2	10.63	0.000
	Diagnosed	59	38		
Lemon	Not diagnosed	52	13	2.70	0.014
	Diagnosed	40	27		
Mint	Not diagnosed	50	16	1.78	>0.05
	Diagnosed	42	24		
Coffee	Not diagnosed	53	16	3.47	0.047
	Diagnosed	39	24		

area under ROC curve was 0.762 (figure 3).

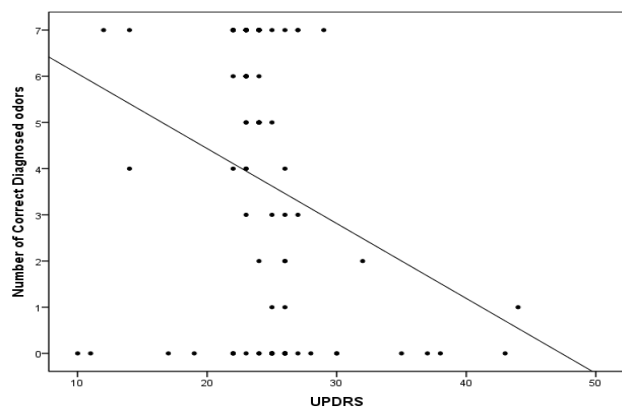


Figure 1. UPDRS against number of accurate diagnosed odors

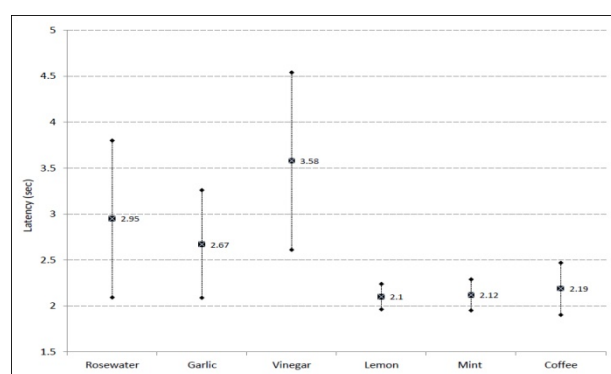


Figure 2. Latency of odor discrimination in PD patients

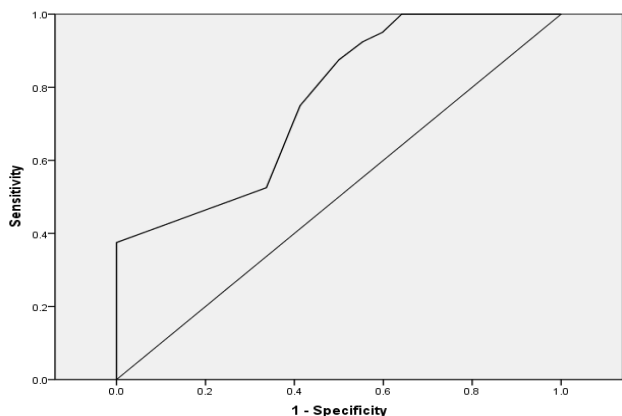


Figure 3. ROC curve of number of accurate diagnosed odors (PD patients versus control)

Discussion

Olfactory dysfunction is well-known as early deficit in PD patients; however, in our study no correlation between

disease duration and the severity of smell dysfunction was detected. Besides, there was a significant negative correlation between UPDRS score and number of truly diagnosed odors.

Olfactory deficits do not always deteriorate over time despite progression of the disease, raising the possibility of additional pathobiological mechanisms contributing to olfactory dysfunctions in PD, such as changes in olfactory neurotransmitter functions [4]. In a study by Double et al [7], abnormal olfactory function was present in around 80% of patients compared with 23% of controls; however, the ability of patients to detect some odors was unaffected compared with that of controls [7]. In other study [5], in all three subtests including odor identification, odor detection threshold, and odor discrimination, the control group scored significantly better than the PD group, yielding a specificity and sensitivity of 90% each. It has been indicated that PD patients were less efficient with the left nostril in the matching task, supporting the premise of a larger compromise in the nostril contralateral to the side of the body more disturbed by the disease [8].

In one study [9], around two thirds of PD patients had impaired odor identification and 43% had an impaired discrimination.

Interestingly, two patients with pleasant olfactory hallucinations for several years before demonstrating Parkinson disease have been described. The authors suggested that phantosmia ought to be more judiciously inspected in the prodromal phase of Parkinson disease [3].

Comparing the prevalence of idiopathic rhinorrhea in PD patients as opposed to controls, it was demonstrated that 24% of Parkinson disease against 6% of controls had rhinorrhea; concluding that Rhinorrhea is much more in Parkinson disease patients compared to controls [11].

It is significant that a recent American Academy of Neurology practice parameter showed that olfactory testing was "probably useful" for separating idiopathic Parkinson disease from other diseases with features of Parkinsonism or Akinetic-rigid syndromes [10].

In conclusion, smelling dysfunction is a major problem in Persian PD patients and it requires vigilant investigation for the cause of olfactory dysfunction exclusively in elder group and looking for possible PD disease and it seems that Rosewater (Golab) is the favorable odor for checking PD patients' smelling dysfunction.

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