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OLFACTORY DYSFUNCTION IN VARIOUS SUBTYPES OF PARKINSONISM-A PROSPECTIVE STUDY

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ABSTRACT Eventhough olfactory dysfunction occurs in various diseases, its association with various types of parkinsonism and Alzhiemer dementia is very significant.Olfactory function testing is very helpful in pre clinical detection of Parkinson disease.Aim of this study is to assess the presence and the extent of olfactory impairments in various types of parkinsonism.This study was conducted among 70 patients with various types of parkinsonism in Madras institute of neurology.All patients are subjected to odour identification test,odour discrimination test and odour threshold test with commonly used 12 Odourous substances in our daily household practice.We found significant olfactory dysfunction in idiopathic Parkinson disease eventhough certain other types of parkinsonism patients also had olfactory dysfunction.

KEYWORDS :

LITERATURE REVIEW

Olfactory dysfunction is among the earliest nonmotor features of Parkinson disease (PD). Such dysfunction is present in approximately 90% of early-stage PD cases and can precede the onset of motor symptoms by years. The mechanisms responsible for olfactory dysfunction are currently unknown. As equivalent deficits are observed in Alzheimer disease, Down syndrome, and the Parkinson-dementia complex of Guam, a common pathological substrate may be involved. Given that olfactory loss occurs to a lesser extent or is absent in disorders such as multiple system atrophy, corticobasal degeneration, and progressive supranuclear palsy, olfactory testing can be useful in differential diagnosis. The olfactory dysfunction in PD and a number of related diseases with smell loss correlates with decreased numbers of neurons in structures such as the locus coeruleus, the raphe nuclei, and the nucleus basalis of Meynart. These neuroanatomical findings, together with evidence for involvement of the autonomic nervous system in numerous PD-related symptoms, suggest that deficits in cholinergic, noradrenergic and serotonergic function may contribute to the olfactory loss. Severe olfactory dysfunction has been associated with faster disease progression and higher risk of cognitive decline in patients with PD.

In humans, different methods have been developed to assess distinct aspects of olfactory function, such as odour identification, threshold detection, and odor recognition memory.A commonly used test is the University of Pennsylvania Smell Identification Test (UPSIT), developed by Doty et al.Olfactory dysfunction has been clearly demonstrated in sporadic PD. Olfactory dysfunction in this disorder includes impairment in odor identification, threshold detection, and odour recognition memory. It has been shown that olfactory dysfunction is present early in the disease process and appears to remain stable as the disease progresses. Studies have attempted to correlate olfactory dysfunction disease parameters such as disease stage, duration, subtype, cognitive dysfunction, and therapy.Interestingly, olfactory dysfunction appears to be independent of disease stage and disease duration. In contrast, olfactory dysfunction appears to be dependent on disease subtype, suggesting that disease subtype confers the specificity of the olfactory impairment. In a study by Stern et al., olfactory function was assessed in different PD subtypes. Olfactory function was more impaired in advanced PD (Hoehn and Yahr stage III or greater) than earlyPD (Hoehn and Yahr stage II or less forfour or more years). Both postural instability-gait disorder (PIGD) predominant PD (defined as UPDRS mean tremor score/ mean PIGD score<1.0) and tremor-predominant PD (defined as UPDRS mean tremor score/mean PIGD score<1.0) and tremor-predominant PD (defined as UPDRS mean tremor score/mean PIGD score >1.5) subtypes exhibited olfactory impairment, but the impairment was more severe in the PIGD form than in the tremor-predominant form of PD. It is conceivable that the differences in the degree of olfactory impairment between the disease subtypes may reflect different pathophysiological processes in the two disease subtypes.

The olfactory deficits associated with PD appear to be independent of the cognitive dysfunction associated with the disease. Olfactory dysfunction in PD is bilateral and does not respond to antiparkinsonian therapy.Olfactory impairment in PD has been attributed to the pathological changes,including neuronal loss and the presence of Lowy bodies identified in the olfactory cortex and the amygdala. Interestingly, sniffing impairment appears to contribute to the olfactory impairment in PD.

OLFACTORY FUNCTION IN NEURODEGENERATIVE DISEASES

Disease	olfactory function
Parkinson's disease	Impaired
Lewy body disease	Impaired
Familial Parkinson's disease	Impaired
Progressive supranuclear palsy	Preserved
Multiple system atrophy	Mildly Impaired
Corticobasal ganglionic degeneration	Preserved
Parkinsonism-dementia of Guam	Impaired
MPTP-induced Parkinsonism	Preserved
Essential tremor	Mildly-moderately impaired
Alzheimer's disease	Impaired
Motor neuron disease	impaired/preserved
Huntington's disease	Impaired

MATERIALS&METHODS

A total number of 70 patients with various types of parkinsonism in the age group of 40-75yrs coming to our movement disorder clinic,Madras medical college in the 3 year period from 2005 to 2008 were selected for this study.Very old patients and patients with severe cognitive impairment and upper respiratory tract infection were excluded. All patients are evaluated by UPDRS scoring to assess the disease severity and subjected to odour identification test,odour discrimination test and odour threshold test with commonly used 12 Odourous substances like coffee,tea powder,camphor, Asafoetida, pepper, coriander leaves etc.Scoring was given based on the number of substances and the threshold value at which they identified.

RESULTS

Out of 70 patients tested in this study,52 are males,18 are females.51 patients are idiopathic parkinsonism(74%),5patients are MSA(8%),4 patients are PSP(6%),6 patients are vascular parkinsonism(9%),2 patients are familial parkinsonism,2patients are SCA(3%)

Out of 51 Idiopathic parkinsonism patients,34 patients are having mild disease as per UPDRS scoring,13 patients are having moderate disease and 4 patients are having severe disease.

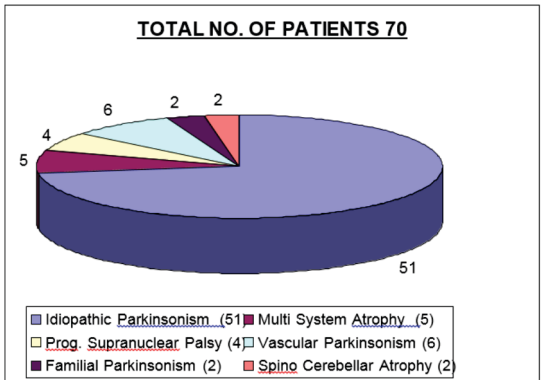
Olfactory function test results in 51 idio.parkinsonism patients showed 28 patients had moderate olfactory dysfunction,23 patients had severe olfactory dysfunction and all 51 patients had impaired odour discrimination and elevated odour threshold.Moderate to severe olfactory dysfunction is noted in patients who presented in first one or two years from the onset of disease.Severity of olfactory dysfunction

increases in patients with severe UPDRS scoring in idiopathic parkinsonism patients.

In 5 MSA patients,2 patients had mild olfactory dysfunction.

2 familial parkinsonism patients had mild to moderate olfactory dysfunction.

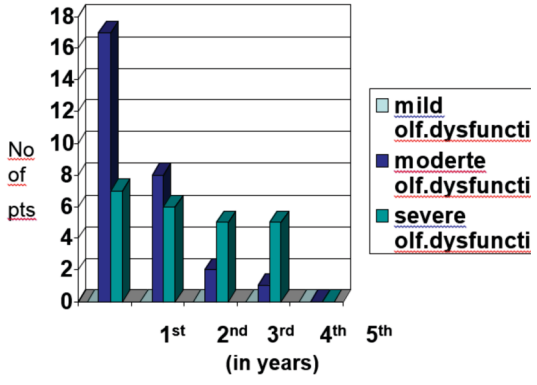
In all 4 cases of PSP,6 cases of Vascular parkinsonism and 2 cases of SCA cases,None had olfactory dysfunction.



Net results of olfactory function tests in various types of parkinsonism patients

	Types of Parkinsonism	Total number of cases	Patients with olfactory dysfunction			%
			Odour Identificatin impairment	Odour discriminatin impairment	Odour threshold elevation	
1	Idiopathic parkinsonism	51	51	51	51	100%
2	Multisystem atrophy	5	2	2	0	40%
3	Prog.supranuclear palsy	4	0	0	0	0%
4	Familial parkinsonism	2	2	2	2	100%
5	Vascular parkinsonism	6	0	0	0	0%
6	SCA	2	0	0	0	0%

Severity of olfactory dysfunction in Idio.parkinsonism pts at various duration of Illness



Gross results of olfactory function tests in various types of parkinsonism patients

	Olfactory tests	I.P	MSA	PSP	V.P	F.P	SCA
1	Odour identification	severely Impaired	Mildly impaired	Normal	Normal	Moderately Impaired	Normal
2	Odour discrimination	severely Impaired	Mildly impaired	Normal	Normal	Moderately Impaired	Normal
3	Odour threshold	elevated	normal	Normal	Normal	elevated	Normal

I.P-Idiopathic Parkinsonism,MSA-Multisystem atrophy,PSP-Progressive supranuclear palsy,V.P-Vascular parkinsonism,F.P-Familial parkinsonism,SCA-Spinocerebellar ataxia

DISCUSSION

All patients with idiopathic parkinsonism had moderate to severe olfactory dysfunction in all 3 forms of odour identification ,discrimination and elevated odour threshold and does exist in the very early course of the disease.

The study results showed that olfactory impairment is more severe in the later stages of parkinsonism(UPDRS score 63-176) but not depending on the duration of illness.Presence of olfactory impairment in all 51 idio.parkinsonism patients denotes that this is as a very common sign as a pill rolling rest tremor.Irrespective of unilateral or bilateral symptoms,all had bilateral olfactory dysfunction.

In 2 cases of familial parkinsonism,both had moderate olfactory dysfunction.

In 5 MSA cases,only 2 patients had mild olfactory dysfunction that too occurring in the later stages of illness.None of the PSP,Vascular parkinsonism and SCA with parkinsonism had olfactory dysfunction.

CONCLUSIONS

1) Significant olfactory dysfunction is present in early stages of idiopathic parkinsonism
2) Olfactory impairment is severe in later stages of parkinsonism.
3) The severity of olfactory impairment is not dependent on the duration of illness but dependent on the disease severity9UPDRS scoring)
4) Presence of significant olfactory impairment in the early parkinsonism suggests the possibility of idiopathic parkinsonism.
5) In familial parkinsonism,olfactory functions are impaired
6) In MSA,olfactory functions are impaired mildly in late stages of illness.
7) In PSP,Vascular parkinsonism and SCA with parkinsonism,olfactory functions are not impaired.
8) Olfactory function tests can be utilised as an easy bedside clinical tool in the ealy diagnosis of idiopathic parkinsonism.

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