SHORT REPORT

Frequency of orthostatic hypotension in a community based cohort of patients with Parkinson's disease

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The frequency of orthostatic hypotension (OH) in cohorts of patients recruited through hospital Parkinson's disease (PD) clinics ranges from 16% to 58%. However, hospital based cohorts may be subject to ascertainment bias. The aim of this study was to determine the frequency of OH in a community based population of PD patients and to determine the demographic features of patients with and without OH.
Forty two (47%) of patients met the criteria for OH. Subjects with OH were older than those without OH, but there was no difference in PD disease duration or severity, MMSE or depression rating between the groups.

The clinical relevance of orthostatic hypotension (OH) for people with Parkinson's disease (PD) is poorly understood.

Two conflicting studies have included OH in a risk factor analysis for falls in PD. Wood *et al* studied 101 patients with PD and found no difference in the frequency of OH between fallers and non-fallers.[1] Gray *et al* studied 118 patients with PD and demonstrated a significant difference in fall frequency between those with OH and those without OH.[2]

OH may also be a risk factor for cognitive impairment in elderly people.[3 4] The role of OH as a risk factor for cognitive impairment in PD has not been studied.

Previous studies have suggested that between 43% and 58% of patients with PD have OH.[1 5] Differences in the definition of OH, the methods used to measure postural blood pressure changes and variations in timing of recordings may all have contributed to disparity in prevalence estimates. Studies to date have concentrated on cohorts of patients recruited through hospital PD clinics. This may introduce ascertainment bias and make the findings less relevant to the PD community as a whole.

The aim of this study was to determine the frequency and demographic associations of OH in a community based population of patients with PD.

METHODS

General practices (GPs) in the Sunderland area (County Durham, UK) were invited to take part in the study. A nurse specialist screened records for READ coded key diagnostic terms such as ''Parkinson's disease'' or ''parkinsonism'', or for medications used to treat PD. Patients with probable primary degenerative parkinsonism were invited through their own GP to attend for assessment. Only those patients meeting the United Kingdom Parkinson's Disease Society (UKPDS) Brain Bank Criteria for PD were recruited.

All subjects were assessed in the morning, in a fasting state, and having not taken any medications since the night before. Assessment included grading of severity of PD with the Hoehn and Yahr scale[6] and the motor subsection of the Unified Parkinson's Disease Rating Scale (UPDRS),[7] Mini Mental State Examination (MMSE),[8] Geriatric Depression Score (GDS),[9] and the Montgomery and Åsberg Depression Rating Scale (MADRS).[10]

A list of medications taken by each subject was recorded. Doses of dopamine agonists and controlled release preparations of levodopa were converted to equivalent doses of levodopa (mg) using previously suggested scales,[11 12] allowing direct comparison of dopaminergic medication between groups. β-Blockers, calcium antagonists, angiotensin converting enzyme inhibitors, angiotensin II receptor antagonists, nitrates, α-adrenoceptor blocking agents, and thiazide diuretics were defined as hypotension inducing medications.

Blood pressure was measured using a validated digital blood pressure monitor (A & D UA-767; PMS (Instruments) Ltd, Berkshire, UK).[13] We followed the American College of Neurologists guidelines for measuring OH, which require a three minute stand following a 10 minute supine rest period. Readings were taken at one and two minutes as local experience has demonstrated that blood pressure falls after two minutes are unlikely to occur. OH was defined as a drop in systolic blood pressure after standing greater than or equal to 20 mm Hg or to less than 90 mm Hg.[14] Postural blood pressure changes were recorded on two separate occassions for each patient.

The study had ethical approval from the Sunderland Local Research Ethics Committee. Population data for each of the screened practices was provided by the Primary Care Trust.

Statistics

Data are presented as mean and standard deviation, and median values. Non-parametric continuous data were analysed using the Mann–Whitney U test. Ordinal and categorical data, such as the Hoehn and Yahr score and the number of additional medications were compared with the χ^2 test.

RESULTS

Forty one practices took part in the study, covering a population of 237 564. A total of 270 patients were identified by the screening of whom 104 (38.5%) agreed to take part in the study. Out of these 89 patients met the UKPDS Brain Bank Criteria for PD and were recruited.

A comparison of patients who consented to take part and those who withheld consent is given in table 1. The subjects recruited were younger and less dependent than their non-consenting counterparts.

Forty two (47%) of patients met the criteria for OH on at least one occasion.

Patients with OH were older (mean (SD) age 72.6 (8.1) years) than those without OH (68.2 (9.6) years), $p = 0.02$. Those patients with OH were taking more hypotension inducing medications in addition to levodopa than those without, but the difference did not reach statistical significance ($p = 0.08$).

Abbreviations: OH, orthostatic hypotension; PD, Parkinson's disease

Table 1 Comparison of patients agreeing to take part in the study and those not consenting to further assessment

	Participants (n = 89)	Non-participants (n = 166)	p
Age			
Mean	70.2	77.0	<0.001*
Median	71.8	77.7	
SD	9.21	8.83	
Sex (male:female)	51:38	75:91	0.06†
Own home	88	131	<0.001†
Residential care	1	21	
Nursing home	0	14	

*Mann–Whitney U test.
†χ^2 test.

Of 60 patients taking only levodopa as antiparkinsonian therapy 33 (55%) had OH. Only seven patients were taking dopamine agonists without levodopa, of whom two (28.5%) had OH. The dose of levodopa in the levodopa-only treated patients was significantly higher than the levodopa equivalent dose calculated for patients treated with agonists alone (levodopa group 441.3 mg per day *v* agonist group 251.4 mg per day, p = 0.007) making it impossible to attribute any difference in proportion with OH to a class effect of different antiparkinsonian medications.

There was no difference in disease duration or severity between those with OH and those without. Similarly, cognitive function and rating of depression did not differ between the groups.

DISCUSSION

Door-to-door surveys are the gold standard for recruitment of community based PD cohorts, but can only cover a small population base. Population screening by review of GP records is an accepted method to cover a wider population base and hence was the method chosen for the present study.[15]

Previous studies of patients with PD recruited from hospital clinics have shown that up to 58% may have OH.[1 5] We had anticipated that a community based cohort of patients might be older and more frail than those attending hospital clinics, and that the prevalence of OH might be somewhat higher in this group. The finding of a prevalence figure for OH similar to those in hospital based studies may in part be a reflection of difficulties with recruitment of older, more frail, patients from the community (see table 1) but may also relate to decreased sensitivity for detection of OH with intermittent blood pressure recording as compared to continuous beat-to-beat monitoring.[16]

Age was the only factor that was significantly higher in the OH group than in those without OH. Neurocardiovascular instability is associated with ageing,[17] and it is possible that the findings demonstrated in our study are a reflection of age related vascular changes occurring independently of PD related pathology.

In contrast with previous reports,[5 18] our study did not demonstrate any association with disease severity or duration. Recent studies have, however, documented that OH can occur even in early PD,[19] while reduced tracer uptake on cardiac meta-iodobenzylguanidine (MIBG) scanning does not correlate with disease duration, although it is correlated with disease severity.[20] It may be, therefore, that a subgroup of PD patients may have a more aggressive disease course and that OH might be a marker for these patients. Prospective longitudinal follow up of our study cohort will establish the rate of progression of motor disability and cognitive decline in patients with and without OH, and may help to address this hypothesis.

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REFERENCES

1 **Wood BH**, Bilclough JA, Bowron A, *et al.* Incidence and prediction of falls in Parkinson's disease: a prospective multidisciplinary study. *J Neurol Neurosurg Psychiatry* 2002;**72**:721–5.
2 **Gray P**, Hildebrand K. Fall risk factors in Parkinson's disease. *J Neurosci Nurs* 2000;**32**:222–8.
3 **Stout NR**, Galloway S, Ayre G, *et al.* Cognitive function is impaired in elderly patients with orthostatic hypotension. *J Am Geriatr Soc* 1999;**47**:s20.
4 **Viramo P**, Luukinen H, Koski K, *et al.* Orthostatic hypotension and cognitive decline in older people. *J Am Geriatr Soc* 1999;**47**:600–4.
5 **Senard JM**, Rai S, Lapeyre-Mestre M, *et al.* Prevalence of orthostatic hypotension in Parkinson's disease. *J Neurol Neurosurg Psychiatry* 1997;**63**:584–9.
6 **Hoehn MH**, Yahr MD. Parkinsonism. Onset, progression and mortality. *Neurology* 1967;**17**:427–42.
7 **Fahn S**, Elton RL, members of the UPDRS Development Committee. Unified Parkinson's Disease Rating Scale. In: Fahn S, Calne DB, Lieberman A, eds. *Recent developments in Parkinson's disease.* Florham Park, NJ: Macmillan Health Care Information, 1987:153–63.
8 **Folstein MF**, Folstein SE, McHugh PR. ''Mini-mental state''. A practical method for grading the cognitive state of patients for the clinician. *J Psychiatr Res* 1975;**12**:189–98.
9 **Yesavage JA**, Brink TL, Rose TL, *et al.* Development and validation of a geriatric depression screening scale: a preliminary report. *J Psychiatr Res* 1982;**17**:37–49.
10 **Montgomery SA**, Asberg M. A new depression scale designed to be sensitive to change. *Br J Psychiatry* 1979;**134**:382–9.
11 **Hobson DE**, Pourcher E, Martin WR. Ropinirole and pramipexole, the new agonists. *Can J Neurol Sci* 1999;**26**(suppl 2):S27–33.
12 **The Deep Brain Stimulation for Parkinson's disease Study Group**. Deep brain stimulation of the subthalamic nucleus or the pars interna of the globus pallidus in Parkinson's disease. *N Engl J Med* 2001;**345**:956–63.
13 **Rogoza AN**, Pavlova TS, Sergeeva MV. Validation of A&D UA-767 device for the self-measurement of blood pressure. *Blood Press Monit* 2000;**5**:227–31.
14 **Kaufmann H**. Consensus statement on the definition of orthostatic hypotension, pure autonomic failure and multiple system atrophy. *Clin Auton Res* 1996;**6**:125–6.
15 **Schrag A**, Ben-Schlomo S, Quinn NP. Cross sectional prevalence survey of idiopathic Parkinson's disease and parkinsonism in London. *BMJ* 2000;**321**:21–2.
16 **Shaw FE**, Wears R, Gammage MD. Is continuous blood pressure measurement necessary for cardiovascular investigation in older patients? *Age Ageing* 2002;**31**(suppl 2):21.
17 **Masaki KH**, Schatz IJ, Burchfiel CM, *et al.* Orthostatic hypotension predicts mortality in elderly men: the Honolulu Heart Program. *Circulation* 1998;**98**:2290–5.
18 **Meco G**, Pratesi L, Bonifati V. Cardiovascular reflexes and autonomic dysfunction in Parkinson's disease. *J Neurol* 1991;**238**:195–9.
19 **Bonuccelli U**, Lucetti C, Del Dotto P, *et al.* Orthostatic hypotension in de novo Parkinson disease. *Arch Neurol* 2003;**60**:1400–4.
20 **Hamada K**, Hirayama M, Watanabe H, *et al.* Onset age and severity of motor impairment are associated with reduction of myocardial 123I-MIBG uptake in Parkinson's disease. *J Neurol Neurosurg Psychiatry* 2003;**74**:423–6.