

# Postural Hypotension In Elderly Family Practice Patients

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**Abstract:** Postural hypotension (PH) was investigated in 100 ambulatory patients aged 65 years or older, who were seen in a university family practice clinic. Thirty-one percent had a decrease in systolic blood pressure of 20 mmHg or more, while 16 percent had a diastolic drop of 10 mmHg or more. Twelve percent had a significant drop in both systolic and diastolic blood pressure upon standing. Patients with both systolic and diastolic PH were more likely to have had a fall during the year prior to evaluation and decreased functional ability compared with those without PH. The group with systolic PH was more likely to have symptoms on standing and a history of weakness, but dizziness and lightheadedness were not correlated with PH. Postural hypotension occurred in only 13 percent of patients without risk factors for PH and in 35 percent of patients with risk factors. However, this difference was not statistically significant. Demographics and functional ability were similar between the risk factor groups. Thus, PH occurred frequently in our patients, could not be reliably predicted on the basis of risk factors or symptoms, and was correlated with a history of a recent fall and decreased functional ability. (J Am Bd Fam Pract 1989; 2:234-7.)

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Historically, physicians have presumed that postural hypotension (PH) is a common and debilitating condition in the elderly. Recent work,<sup>1</sup> however, has questioned the frequency of PH and reexamined its relation to risk factors, symptoms, and associated outcomes.

The number of patients with PH has varied from 6 to 30 percent depending on the population evaluated. Mader, et al. found 6.4 percent in community-dwelling elderly without risk factors, which included hypertension, diabetes mellitus, and varicosities.<sup>1</sup> On the other hand, Palmer found a 20-mmHg postural drop in systolic blood pressure in 33.1 percent of patients aged 60 years and greater who were referred to a geriatric ward.<sup>2</sup>

While cerebrovascular disease, hypertension, peripheral neuropathy, and medications such as diuretics have been associated with PH, data are conflicting.<sup>1,2</sup> For example, Meyers, et al. found no relation between PH and diuretic therapy in their elderly population.<sup>3</sup> PH also is alleged to predispose to morbidity and even mortality. While physicians ascribe symptoms such as lightheadedness, faintness, dizziness, and unstead-

iness on standing to PH, some investigators question the specificity of this association.<sup>2,4</sup> Moreover, I am unaware of any study that correlates PH with functional impairment.

In Lipsitz's prospective study of 97 institutionalized elderly patients, PH and other related causes of hypotension accounted for over 30 percent of syncopal episodes.<sup>5</sup> Indeed, diabetic hypertensives with PH in the Hypertension Detection and Follow-Up Program experienced an increased mortality rate.<sup>6</sup> Yet, no study has comprehensively evaluated the impact of PH on morbidity and mortality. This study was designed to investigate the frequency of PH, its association with risk factors, symptoms, functional impairment, and outcome in elderly patients presenting to a family practice clinic.

## Methods

One hundred ambulatory family practice patients aged 65 years or older presenting to a university clinic were studied. Patients unable to comply with the protocol or who refused to participate in the study were excluded. Obtained on each patient were blood pressure measurements, a standardized history, and a pulse rate, using a protocol patterned after Mader, et al.<sup>1</sup> Two supine blood pressures were obtained after a 5-minute rest period. Blood pressures were taken at 1 and 2 minutes after

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**Table 1. Risk Factors Associated with Postural Hypotension.\***

Pharmacologic
Antiarrhythmics
Antihypertensives
Antidepressants
Antiparkinsonian
Anxiolytics
Major tranquilizers
Narcotics
Recent alcohol use
Nonpharmacologic
Addison disease
Alcoholism
Amyloidosis
Arrhythmia
Burns (significant)
Dehydration
Diabetes mellitus
Hypertension
Neurologic disease including stroke, parkinsonism, peripheral neuropathy, tumor, Wernicke disease, sympathectomy, syringomyelia
Multisystem atrophy
Pernicious anemia
Porphyria
Venous disease

\*Modified after Mader.<sup>1</sup>

standing. The intraobserver reliability of the blood pressure values was  $\pm 6$  mmHg in a sample of 10 patients. Patients were classified as having PH if there was at least a 20 mmHg systolic or 10 mmHg diastolic drop in blood pressure between the average baseline blood pressure and readings at either 1 or 2 minutes after standing.

A history of patient symptoms and characteristics during the past year was obtained (Tables 1 and 2). The Physical Ability Battery taken from the Health Insurance Study (HIS) Functional

Status Index was administered also.<sup>7</sup> This battery is a self-administered measure of activities of daily living and instrumental activities of daily living that has been validated previously in a variety of settings.<sup>8</sup> A functional status score ranging from 10 (most impaired) to 33 (functionally intact) was calculated in a manner similar with Parkerson, et al.<sup>7</sup> Data were collected by trained registered nurses and physicians blinded to the subsequent analysis and determination of PH. The principal investigator reviewed chart and data forms on a regular basis. Patients were divided into two groups based on Mader's categories: those with risk factors for PH (including such problems as diabetes mellitus, hypertension, parkinsonism, and peripheral neuropathy) and those without risk factors for PH (Table 1).<sup>1</sup> Notably, height and weight have not been implicated as risk factors for PH.

We compared differences between the groups with and without PH with regard to risk factors, symptoms, functional impairment, and medical problems during the past year (Tables 2 and 3), using the chi-square test at the 0.05 percent confidence level. In addition, the t-test was used to compare time since last alcohol and caffeine use, time since last meal, and other continuous data in those patients with and without PH (Table 3).

### Results

One hundred consecutive patients were enrolled in our study during a 4-month period. Ten patients were excluded because of severe intercurrent illness (such as unstable angina, or ventilatory failure), inability to comply with our protocol, or refusal to participate. The demographics

**Table 2. Association between Symptoms and Systolic Postural Hypotension.**

Symptom	Without PH (n = 69)*			With PH (n = 31)*			$\chi^2$
	1	2	3	1	2	3	
Fall	89.9	5.8	4.3	80.6	16.1	3.2	2.8
Blackout	97.1	2.9	0.0	93.5	6.5	0.0	0.08
Dizziness	55.1	39.1	5.8	38.7	54.8	6.5	2.3
Lightheaded	68.1	29.0	2.9	45.2	48.4	6.5	4.8
Faintness	88.4	10.1	1.4	93.5	3.2	3.2	1.7
Weakness	88.2	13.0	5.8	51.6	22.6	25.8	10.9†
Urinary incontinence	75.4	17.4	7.2	80.6	12.9	6.5	0.04
Fecal incontinence	95.7	4.3	0.0	100.0	0.0	0.0	0.3

\*1 = Rarely/Never, 2 = Sometimes, 3 = Always/Frequently.

† $P < 0.005$ .

**Table 3. Characteristics of Patients with and without Systolic Postural Hypotension.**

Factor (% yes unless noted otherwise)	Without PH (n = 69)	With PH (n = 31)	$\chi^2$ * (df = 1)	P ( $< 0.05$ )
Age (mean years)	72.9	74.5	—	ns
Sex (% women)	65.2	54.8	0.6	ns
Race (% white)	72.1	67.1	4.3†	ns
Functional score (mean)	27.5	26.0	—	ns
Presence of risk factor	78.0	94.0	4.3	ns
Alcohol use	10.1	0.0	—	ns
Caffeine use	72.5	74.2	—	ns
Hours since last meal (mean)	4.9	5.5	—	ns
Syncopal episode	7.2	12.9	0.3	ns
CVA/TIA	2.9	3.2	3.9	ns
Broken bone	2.9	0.0	0.03	ns
Fall	10.1	19.4	0.9	ns
Hospitalization	23.2	32.3	0.5	ns
Arrhythmia	10.1	35.5	7.7	$< 0.01$
Postural symptoms on standing	24.6	61.3	10.9	$< 0.01$
Presence of hypertension (Systolic BP $> 160$ mmHg or diastolic $> 90$ mmHg)	24.6	61.3	10.9	$< 0.01$

\* $\chi^2$  used for analysis of nominal data. See text for details of other statistical techniques.

†df = 4.

of the excluded patients were not significantly different from the population as a whole. The patients' mean age was 73 years (range = 65–90). Forty-nine percent were aged 75 years and more, and 62 percent were women. Functional ability scores ranged from 15 to 33 (mean = 27), indicating a high level of function in our population.

Thirty-one percent had a decrease in systolic blood pressure, 16 percent had decrease in diastolic blood pressure, and 12 percent had a drop in both diastolic and systolic blood pressure. The only symptom that was clearly associated with systolic PH was weakness (Table 2). The characteristics of patients with and without systolic PH are summarized in Table 3. Systolic PH was associated with postural symptoms on standing and

a history or presence of hypertension or of an arrhythmia.

Patients with both diastolic and systolic PH were more likely to have had a fall in the year before the examination ( $\chi^2 = 9.91$ , df = 1,  $P < 0.005$ ) (Table 4) and decreased functional ability ( $t = 64$ , df = 198,  $P < 0.0001$ ) compared with those patients without combined PH. The resting pulse rate and change in pulse rate upon standing were not significantly different in those with and without PH.

Eighty-four patients had at least one risk factor for postural hypotension, while 16 did not. The demographics and functional scores of the patients with and without risk factors did not differ significantly. While only 13 percent of the patients without risk factors had systolic PH compared with 35 percent of the patients with risk factors, this difference was not statistically significant.

### Comment

In comparison with other studies, there was a high occurrence of postural hypotension in our population. This may reflect an intrinsically sicker population or may be representative of the occurrence of PH in a university family practice setting. Only a history of weakness or hypertension reliably correlated with systolic PH. Also,

**Table 4. Association of Combined Postural Hypotension and Falls.\***

	Postural Hypotension (Combined Systolic and Diastolic)	
	No	Yes
Fall (during past year)		
No	80	7
Yes	8	5

\*Chi-square with one degree of freedom = 9.91. ( $P < 0.005$ ).

symptoms on standing were significantly more frequent in the patients with systolic PH. As Mader and Rodstein suggest, screening for PH, therefore, needs to be based on physical findings and not symptoms.<sup>1,4</sup> In our study, like Mader's study, PH occurred more frequently in those patients with risk factors for PH, but our findings did not attain statistical significance. Mader's population included a large number of patients aged less than 65 years who were without risk factors, and this might account for the difference in results.<sup>1</sup> Also, the trend toward PH in those with risk factors might have become significant with a greater sample size. The occurrence of systolic PH was not influenced by food, alcohol, or caffeine ingestion, although investigators such as Lipsitz have reported a postprandial blood pressure reduction.<sup>9</sup>

An important finding was that patients with both systolic and diastolic PH were more likely to have had a fall during the past year and to have decreased functional ability. Patients with systolic PH were more likely to be hypertensive or have an arrhythmia. Whether PH is simply a marker for a high-risk group or truly influences outcome remains to be investigated in prospective studies controlling for confounding variables.

Several limitations about this investigation bear noting. This study's primary weakness is the small sample, which might have particular importance in evaluating the occurrence of PH with respect to risk factors. Blood pressure measurements are subject to bias,<sup>10</sup> although the standardized protocol strove to prevent systematized errors. Moreover, postural hypotension itself might be variable as found in Lipsitz's study of 19 elderly residents of a long-term care facility.<sup>11</sup>

The self-reporting of function and recall of past symptoms and events might be unreliable.<sup>12</sup> However, care was taken to corroborate data whenever possible, and patient perception of function may be more important than observed ability in an artificial setting.<sup>12</sup> Finally, no conclusions can be made about cause and effect based on these retrospective data.

Despite these shortcomings, the data show strong relations between postural hypotension and falls, functional ability, and arrhythmias.

Further prospective studies using large samples will be needed to assess the role of PH in the elderly person.

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