

## Symptom prevalence in hypertensive patients

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*The influence of blood pressure levels on the prevalence of symptoms was studied in a group of 1771 untreated hypertensive patients referred to the Saint-Joseph Hypertension Clinic in Paris. Information on symptoms was obtained from a standardized physician-conducted interview during the patient's first visit at the outpatient clinic. The most frequent symptoms were headache (40.5%), palpitation (28.5%), nocturia (20.4%), dizziness (20.8%) and tinnitus (13.8%). Except for nocturia, symptom prevalence was higher in females than in males. In males as well as in females, no correlation was found between blood pressure levels and the presence of headaches, dizziness, palpitation and tinnitus when results were adjusted for age. In contrast, the relationship between two behavioural characteristics, anxiety and lack of regular physical activity, and symptom prevalence was more pronounced than the relationship with the blood pressure level itself. Moreover, the symptom prevalence reported differed significantly between the five permanent physicians of the clinic; comparison of results obtained by physician-conducted interview and self-administered questionnaire indicated that differences between physicians were not due to differences in patient's characteristics but to differences in physician behaviour.*

The symptoms of high blood pressure and its cardiovascular and renal complications were first described a long time ago. Bright reported headaches and Janeway described them in 1913<sup>(1)</sup>. Before the present systematic detection of hypertension<sup>(2)</sup>, these symptoms had great practical interest because they led the patient to consult his physician. Nowadays, an attempt is usually made to detect symptoms of hypertension by questioning the patient, even if those symptoms are less often than formerly the reason for the consultation. Consciously or unconsciously, the physician and the patient associate the presence of such symptoms with an intensification of the illness, and conversely their disappearance could constitute a criterion of therapeutic efficiency. In practice, the epidemiological basis on which this apparently logical approach rests is questionable, and it was long ago pointed out that the manifestations of symptoms could depend on many factors other than blood pressure<sup>(3,4)</sup>. In this work, we studied the influence of blood pressure levels on the prevalence of 12 functional symptoms, from information registered in the standardized medical records of 1771 patients referred to a hypertension clinic. We also investigated

the relationship between the prevalence of these symptoms and certain physical, social and psychological characteristics of the subjects studied.

### Patients and methods

#### PATIENTS

The series comprised 1771 patients (992 males and 779 females). All patients had been referred to the Saint-Joseph Hospital Hypertension Clinic in Paris between January 1976 and December 1978 and exhibited blood pressure values  $\geq 160$  mm Hg for systolic or  $\geq 95$  mm Hg for diastolic at least once in their medical history. No patient was being treated for hypertension at the first visit.

Mean patient age  $\pm$  s.d. was  $44.4 \pm 15.1$ , supine systolic blood pressure  $\pm$  s.d.  $159 \pm 28$  mm Hg and diastolic blood pressure  $94 \pm 16$  mm Hg. Mean duration of the disease  $\pm$  s.d. was  $7.0 \pm 8.1$  years and maximum systolic blood pressure obtained from patient's interview was  $196 \pm 28$  mm Hg.

#### DATA COLLECTION

Information on symptoms was obtained from patients in a 45 min interview during their first visit to the hypertension clinic. Questions concerned 12 symptoms: of these, three were cardiovascular

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Table 1 Age, sex and symptom prevalence

Symptoms	Males					Females				
	< 35 years (n = 330)	35-54 years (n = 414)	≥ 55 years (n = 248)	P†	Total ‡ (n = 992)	< 35 years (n = 220)	35-54 years (n = 316)	≥ 55 years (n = 243)	P†	Total ‡ (n = 779)
<b>Cardiovascular</b>										
Dyspnoea (%)	5.8	8.0	17.3	***	9.6	17.3	27.3	32.2	***	26.1***
Chest pain (%)	13.9	16.6	11.3	NS	14.4	14.1	17.5	18.8	NS	16.9 NS
Palpitation (%)	30.9	25.3	11.3	***	23.7	36.4	38.1	28.8	< 0.10	34.7***
<b>Neurosensorial</b>										
Headaches (%)	35.5	34.3	31.5	NS	34.0	44.1	54.9	45.5	NS	48.8***
Dizziness (%)	12.4	14.4	14.1	NS	13.6	27.7	27.0	35.5	NS	30.0***
Blurred vision (%)	11.2	19.2	15.7	NS	15.6	23.6	23.2	23.6	NS	23.6***
Tinnitus (%)	6.7	9.3	14.1	**	9.6	13.6	21.6	21.6	NS	19.1***
<b>Neuropsychiatric</b>										
Anxiety (%)	33.0	31.1	25.8	< 0.1	30.3	27.7	33.3	31.7	NS	31.2 NS
Insomnia (%)	10.6	14.1	23.0	***	15.1	11.8	21.3	28.8	***	20.9***
Emotivity (%)	34.2	25.1	19.4	***	26.6	30.9	38.7	28.8	NS	33.4***
Depression (%)	2.1	3.2	6.1	*	3.5	8.6	6.4	10.3	NS	8.3***
<b>Urogenital</b>										
Nocturia (%)	6.4	19.2	42.3	***	20.7	14.1	20.0	25.9	**	20.2 NS

†Age and symptom prevalence.  $\chi^2$  for trends: NS=non-significant, \* $P < 0.05$ , \*\* $P < 0.001$ , \*\*\* $P < 0.001$ .

‡Sex and symptom prevalence.  $\chi^2$ : same abbreviations as above.

(exertional dyspnoea, chest pain and palpitation), four neurosensorial (headaches, dizziness, blurred vision and tinnitus), four neuropsychiatric (anxiety, insomnia, emotivity and depression) and one was urogenital (nocturia). The symptom was considered present and was registered in the computerized record when it had appeared at least once a week during the month preceding the interview. Its presence was coded in this record as yes = 1. The absence of a symptom was not coded, nor was its intensity.

Blood pressure was measured in the supine position with a mercury sphygmomanometer after a 10 min rest. The disappearance of the sounds was taken as the diastolic blood pressure.

Weight was expressed as the percentage of the ideal body weight for an average skeleton, and three body size classifications were established<sup>(5)</sup>: (1) thin (> 10% below ideal body weight), (2) normal, and (3) obese ( $\geq$  10% above ideal body weight). The tobacco consumption noted was the one observed at the first visit. Physical activity was defined as the practice of a sport for at least 1 h a week, as 1-h walk a day, or as daily physical work.

Patients were classified into the following three groups according to their occupation: (1) manual workers and employees, (2) middle executives and (3) senior executives, industrialists, and members of the liberal professions<sup>(6)</sup>.

#### STATISTICAL METHODS

The functioning of the ARTEMIS system has been described in detail in a previous report<sup>(7)</sup>. Frequency comparison was made by the  $\chi^2$  method, and the  $\chi^2$  for trend was calculated for those classes of variable which could be arranged in ascending or descending order<sup>(8, 9)</sup>.

## Results

### AGE, SEX AND SYMPTOM PREVALENCE

Table 1 shows the prevalence of the 12 symptoms studied. The most frequent were headaches (40.5%), anxiety (30.7%), emotivity (27.7%), palpitation (28.5%) and dizziness (20.8%). The prevalence of all symptoms except nocturia, anxiety and chest pain was significantly higher in females than males. At the first visit the number of patients complaining of dyspnoea, tinnitus, insomnia and nocturia rose significantly with age for both sexes. In males only, palpitation and emotivity declined significantly with age. Because of the great influence of sex and age on

symptom prevalence, all calculations were made separately for each sex after stratification in the three following age groups: less than 35, 35 to 54 and equal to or greater than 55 years<sup>(8, 9)</sup>.

#### SYMPTOM PREVALENCE AND BLOOD PRESSURE LEVELS

In males, dyspnoea ( $P < 0.01$ ) and nocturia ( $P < 0.01$ ) increased significantly with blood pressure, whereas palpitation and emotivity decreased ( $P < 0.05$ ). After adjustment for age, only nocturia rose significantly with systolic blood pressure ( $P < 0.01$ ). In no case was symptom prevalence dependent on diastolic blood pressure before or after adjustment for age.

In females, tinnitus ( $P < 0.01$ ), insomnia ( $P < 0.01$ ) and nocturia ( $P < 0.001$ ) rose significantly with systolic blood pressure. Headaches ( $P < 0.01$ ) and insomnia ( $P < 0.05$ ) increased with diastolic blood pressure. After adjustment for age, no statistically significant relation was observed between symptom prevalence and either systolic or diastolic blood pressure (Fig. 1).

#### SYMPTOMS AND OTHER PATIENT CHARACTERISTICS

In the 992 males working regularly, symptom prevalence did not differ significantly among the

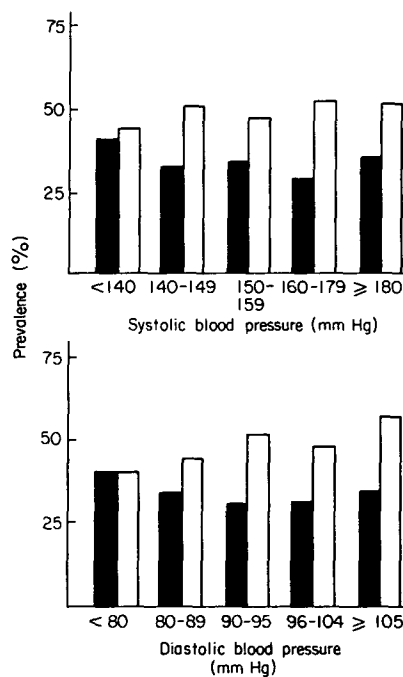


Figure 1 Headache prevalence and blood pressure levels of 1771 patients (first examination). ■ = Males; □ = females.

various categories either before or after adjustment for age. Symptom prevalence among women aged from 20 to 50 years with a regular professional activity did not differ significantly from that found in women of the same age group without such an

activity. The influence of the occupational category itself was not studied because there were too few women in each category.

The prevalence of symptoms was lower in males with regular physical activity than in those without

Table 2 Physical activity and symptom prevalence in males

Symptoms	Regular physical activity (n = 332)	No regular physical activity (n = 651)	$\chi^2$ †
<b>Cardiovascular</b>			
Dyspnoea (%)	6.3	11.1	*
Chest pain (%)	10.8	16.1	*
Palpitation (%)	24.1	23.7	NS
<b>Neurosensory</b>			
Headaches (%)	28.6	36.7	*
Dizziness (%)	10.8	15.2	<0.10
Blurred vision (%)	11.8	17.4	*
Tinnitus (%)	8.4	10.3	NS
<b>Neuropsychiatric</b>			
Anxiety (%)	28.3	31.3	NS
Insomnia (%)	13.6	16.1	NS
Emotivity (%)	28.6	25.7	NS
Depression (%)	2.4	4.0	NS
<b>Urogenital</b>			
Nocturia (%)	17.5	22.1	NS

†After adjustment for age.

Table 3 Anxiety and symptom prevalence

Symptoms	Anxiety			
	Males		Females	
	Absent (n = 691)	Present (n = 301)	Absent (n = 536)	Present (n = 243)
<b>Cardiovascular</b>				
Dyspnoea (%)	8.0	13.3 **	22.6	33.7 **
Chest pain (%)	12.7	18.3 *	12.1	27.6 ***
Palpitation (%)	16.2	40.9 ***	24.6	56.8 ***
<b>Neurosensory</b>				
Headaches (%)	31.0	40.9 **	44.0	59.3 ***
Dizziness (%)	12.3	16.6 NS	26.5	37.9 ***
Blurred vision (%)	12.5	22.9 ***	18.1	35.8 ***
Tinnitus (%)	7.2	15.0 ***	14.6	29.2 ***
<b>Neuropsychiatric</b>				
Insomnia (%)	9.7	27.6 ***	13.3	37.9 ***
Emotivity (%)	11.1	62.1 ***	14.2	75.7 ***
Depression (%)	1.7	7.6 ***	4.5	16.9 ***
<b>Urogenital</b>				
Nocturia (%)	20.7	20.6 NS	18.1	24.7 *

(Table 2). After adjustment for age, the difference between these two groups was significant for dyspnoea, chest pain and headaches. In both males and females, symptom prevalence was independent of daily tobacco consumption and relative body weight.

Except for nocturia in males, all symptoms were significantly more frequent in patients whom the examining physician considered subject to anxiety than in the others (Table 3).

#### PHYSICIANS AND SYMPTOMS

The prevalence of symptoms differed significantly between physicians (Table 4). The differences between physicians could be due to differences in the

characteristics of the patients of each physician. A subsequent study was therefore undertaken in 1981 to compare results obtained with physician-conducted interviews with those obtained in the same patients from a self-administered questionnaire. Two hundred and fifty patients were included in this study, the results of which are summarized in Table 5. The prevalence of the three symptoms studied was higher with a self-administered questionnaire than during a medical interview. No difference between the five groups of patients could be demonstrated when using the self-administered questionnaire. Differences were significant for palpitation and dizziness ( $P < 0.05$ ) when using the physician-conducted interview, despite the much smaller number of patients.

Table 4 Physician and symptom prevalence

Symptoms	Total	Minimum	Maximum	P*
Cardiovascular				
Dyspnoea (%)	16.8	10.2	29.2	< 0.001
Chest pain (%)	15.5	8.6	20.2	< 0.001
Palpitation (%)	28.5	16.7	38.9	< 0.001
Neurosensorial				
Headaches (%)	40.5	34.6	52.2	< 0.001
Dizziness (%)	20.8	15.0	37.0	< 0.001
Blurred vision (%)	19.1	12.4	29.5	< 0.001
Tinnitus (%)	13.7	10.1	21.9	< 0.001
Neuropsychiatric				
Anxiety (%)	30.7	25.8	38.4	< 0.001
Insomnia (%)	17.7	12.9	28.8	< 0.001
Emotivity (%)	29.6	16.5	40.7	< 0.001
Depression (%)	5.6	0.8	11.6	< 0.001
Urogenital				
Nocturia (%)	20.4	10.2	27.6	< 0.001

\* $\chi^2$  between the five physicians.

Table 5 Method of interrogation and symptom prevalence

	Total	Minimum	Maximum	P*
Medical interview				
Headaches (%)	49.8	23.2	56.2	NS
Dizziness (%)	20.0	6.5	33.3	< 0.05
Palpitation (%)	30.2	17.1	48.0	< 0.05
Self-administered questionnaire				
Headaches (%)	59.2	54.5	68.5	NS
Dizziness (%)	43.4	37.7	48.6	NS
Palpitation (%)	54.9	50.0	68.0	NS

\* $\chi^2$  between the five physicians.

## Discussion

Systematic checking for symptoms was included in the ARTEMIS medical record system according to accepted standards of medical teaching. The recording of this information for the 1771 patients referred to the Saint-Joseph Hospital Hypertension Clinic permitted evaluation of symptom prevalence among these hypertensive subjects. None of them was taking antihypertensive drugs when they first visited the outpatient's clinic, thus eliminating any possible connection between such drugs and the presence of symptoms<sup>(10)</sup>. However, all patients were aware of their hypertension and had previously been examined by a physician, two conditions which may have improved their understanding of their state of health and have influenced their answers when interviewed<sup>(11)</sup>.

Symptoms can be registered in a standardized record by the physician, by a medical assistant, or by the patients themselves in a self-administered questionnaire. Interrogation by the physician or an assistant facilitates the patient's understanding of questions, but can also influence their answers or lead to misinterpretation by the physician. The self-administered questionnaire reduces both these risks, but may be misunderstood by the patient. Despite these restrictions, results obtained here by physician-conducted interviews with the patient confirm the great prevalence of the symptoms observed earlier by means of self-administered questionnaires<sup>(12, 13)</sup> (Table 6). Thus, in the present study, physicians reported headaches, palpitation, dizziness, anxiety and emotivity among nearly one-third of patients. For more than one-fifth, they registered dyspnoea, blurred vision, nocturia and insomnia.

The main difference between the results for the

physician-conducted interview and the self-administered questionnaires can partly be explained by these differences in data collection. Thus, in two previous studies, depression was frequently observed (44.7 to 49.3%) in replies to self-administered questionnaires, when the patient was directly asked the simple question 'Do you feel depressed?'<sup>(12, 13)</sup>. However, it was rarely observed in the present study, in which depression was essentially treated as a psychiatric factor diagnosed by physicians to avoid prescription of antihypertensive drugs affecting the central nervous system.

Since the main objective of a hypertension clinic is to normalize blood pressure, the establishment of a relation between symptom prevalence and blood pressure would have at least two advantages: it would constitute firstly, a justification of treatment for the patient, and secondly, a criterion of that treatment's efficiency. Such a relationship was not found in fact in this study or in previous reports from other groups. Kottke, using a self-administered questionnaire in Finland, was unable to detect any relation between the blood pressure level and the prevalence of symptoms among 4535 patients<sup>(13)</sup>. In specialized hypertension clinics in Scotland<sup>(14)</sup> and in New Zealand<sup>(15)</sup>, the prevalence of headaches was not related to the blood pressure levels either. Comparison of data obtained from a self-administered questionnaire completed by normotensive subjects from the general population with information obtained from hypertensive subjects referred to a specialized clinic showed that the latter groups exhibited more frequent morning headaches (31.3 v. 15.1%), depression (44.7 v. 34.3%), dizziness (35.4 v. 7.9%), and nocturia (68.4 v. 45.3%). Unfortunately, the patients themselves or their previous physicians may have unconsciously associated symptoms like

Table 6 Comparison of symptom prevalence in three surveys<sup>(10, 11)</sup>

Symptoms	Self-administered questionnaire	Self-administered questionnaire	Medical Interrogatory
	Specialized clinic, England <sup>(12)</sup> (n = 99)	General population, Finland <sup>(13)</sup> (n = 4535)	Specialized clinic France (n = 1771)
Headaches (%)	31.3	48.8	40.5
Depression (%)	44.7	49.3	5.6
Insomnia (%)	43.2	30.8	17.7
Nocturia (%)	68.4	—	20.4
Blurred vision (%)	29.8	—	19.1
Palpitation (%)	—	30.7	28.5
Dizziness (%)	—	39.9	20.8

headaches with hypertension because of the traditionally assumed relationship between them<sup>(16)</sup>. However, if it were true that headaches are directly related to the blood pressure level, the present study which includes systolic blood pressure ranging from 100 to 264 mm Hg and diastolic blood pressure from 50 to 190 mm Hg, would have shown a significant relationship between the prevalence of headaches and elevated systolic or diastolic blood pressure. However, it must be pointed out that the number of fully normotensive or major hypertensive patients may impede the appearance of a statistically significant correlation.

Certain psychological characteristics of patients may influence their answers to the physician's questions much more than the blood pressure level itself. Thus, in this study symptoms were more frequently recorded among females than males, a finding already observed in replies to self-administered questionnaires<sup>(17)</sup>. In the males of the present series, symptom prevalence correlated with age. Thus, dyspnoea, insomnia and tinnitus were found to increase with age, and emotivity and palpitation to decrease. For the same mean age higher symptom prevalence was observed among patients considered subject to anxiety by their physicians than among the others, thus confirming in our untreated hypertensives what Bulpitt observed in treated hypertensives<sup>(18)</sup>. Physical activity was associated with a lower symptom prevalence, either because the condition of patients with such activity was less serious, or because they paid less attention to it. At any rate, all our results suggest that the relationship between the patient's psychological characteristics and the symptom prevalence is more important than the possible relationship between blood pressure levels and such prevalence.

The absence of any connection between the degree of hypertension and the prevalence of symptoms in our hypertensive patients could have important practical consequences as regards their examination and follow-up. It could imply, at a first glance, that the presence or absence of symptoms should not affect the decision of antihypertensive treatment. From this point of view, it would be useless to record and take account of symptoms. The amount of a medical exam devoted to a systematic search for symptoms, could be shortened and restricted to the spontaneous complaints of the patients. Despite the use of a standardized questionnaire, differences between physicians in the prevalence of symptoms are again demonstrated<sup>(19)</sup>. They represent an additional

argument for reducing the time devoted during the medical interview to the search for symptoms. Available time could be used for other purposes, such as an analysis of the patient's behaviour prior to the invitation to participate in a long-term medical supervision and treatment<sup>(20)</sup>. However, the search for symptoms may be useful for purposes other than determining the severity of hypertension or the need for treatment. For instance, patients suffering from pheochromocytoma frequently exhibit headaches, sweating and palpitation, and the absence of this combination of symptoms has been found to have great negative predictive value (99.9%)<sup>(21)</sup>. Furthermore, symptoms may be relevant to the detection of diseases facilitated by hypertension such as undiagnosed coronary heart disease, or disease other than those related to hypertension but fortuitously associated with it.

#### References

- (1) Janeway TC. A clinical study of hypertensive cardiovascular disease. *Arch Int Med* 1913; 12: 755-98.
- (2) Report of a WHO Expert Committee. Arterial hypertension. Geneva: World Health Organisation, Technical Report Series 1978; 628.
- (3) Stewart IMG. Headache and hypertension. *Lancet* 1953; 1: 1261-6.
- (4) Ayman D, Pratt JH. Nature of symptoms associated with essential hypertension. *Arch Int Med* 1931; 47: 675-87.
- (5) Statistical Bulletin of the Metropolitan Life Insurance Co., Nov.-Dec. 1959.
- (6) INSEE: code des catégories socio-professionnelles 6th ed. Paris: INSEE, 1977.
- (7) Degoulet P, Ménard J, Berger C, Plouin PF, Devriès C, Hirel JC. Hypertension management: the computer as a participant. *Am J Med* 1980; 68: 559-67.
- (8) Armitage P. Tests for linear trends in proportion and frequencies. *Biometrics* 1955; 11: 375-86.
- (9) Armitage P. The chi-square test for heterogeneity of proportions after adjustment for stratification. *J R Stat Soc* 1966; 28: 150-63.
- (10) Bulpitt CJ, Dollery CT. Side effects of hypotensive agents evaluated by a self administered questionnaire. *Br Med J* 1973; 3: 485-90.
- (11) Mann AH. Psychiatric morbidity and mortality in hypertension. *Psychol Med* 1977; 7: 653-9.
- (12) Bulpitt CJ, Dollery CT, Carne S. Change in symptoms of hypertensive patients after referral to Hospital Clinic. *Br Heart J* 1976; 38: 121-8.
- (13) Kottke TE, Tuomilehto J, Pusua P, Salonen JT. The relationship of symptoms and blood pressure in a population sample. *Int J Epidemiol* 1979; 8: 355-9.
- (14) Badran RHA, Weir RJ, McGuinness JB. Hypertension and headache. *Scott Med J* 1970; 15: 48-51.
- (15) Douglas RM. Hypertension and headache. *NZ Med J* 1964; 63: 70-6.

- (16) Waters WE. Headache and blood pressure in the community. *Br Med J* 1971; 1: 142-3.
- (17) Bulpitt CJ, Dollery CT, Carne S. A symptom questionnaire for hypertensive patients. *J Chron Dis* 1974; 27: 309-23.
- (18) Bulpitt CJ, Dollery CT, Hoffbrand BI. The contribution of psychological features to the symptoms of treated hypertensive patients. *Psychol Med* 1977; 7: 661-5.
- (19) Degoulet P, Chatellier G, Devriès C, Plouin PF, Hirel JC, Ménard J. Etude de la variabilité intra et inter médecins dans l'utilisation d'un dossier de surveillance des malades hypertendus. *Lecture Notes in Medical Informatics*. Berlin: Springer-Verlag, 1981; 11: 471-7.
- (20) Inui TS, Yourtee EL, Williamson JW. Improved outcomes in hypertension after physician tutorials. *Ann Int Med* 1976; 84: 646-51.
- (21) Plouin PF, Degoulet P, Tugayé A, Ducrocq MB, Ménard J. Le dépistage du phéochromocytome: chez quels hypertendus? Etude sémiologique chez 2585 hypertendus dont 11 ayant un phéochromocytome. *Nouv Presse Med* 1981; 11: 869-72.