Psychological Stress

Hypertension Awareness and Psychological Distress

Mark Hamer, G. David Batty, Emmanuel Stamatakis, Mika Kivimaki

Abstract—There is conflicting evidence regarding the association of hypertension with psychological distress, such as anxiety and depressive symptoms. The association may be because of a direct effect of the raised blood pressure, adverse effects of treatment, or the consequences of labeling. In a representative study of 33,105 adults (aged 51.7 ± 12.1 years; 45.8% men), we measured levels of psychological distress using the 12-item General Health Questionnaire and collected blood pressure, data on history of hypertension diagnosis, and medication usage. Awareness of hypertension was confirmed through a physician diagnosis or the use of antihypertensive medication, and unaware hypertension was defined by elevated clinic blood pressure (systolic/diastolic ≥ 140/90 mm Hg) without previous treatment or diagnosis. In comparison with normotensive participants, an elevated risk of distress (General Health Questionnaire score ≥ 4) was observed in aware hypertensive participants (multivariable adjusted odds ratio: 1.57 [95% CI: 1.41 to 1.74]) but not in unaware hypertensives (odds ratio: 0.91 [95% CI: 0.78 to 1.07]). Antihypertensive medication and comorbidity were also associated with psychological distress, although this did not explain the greater risk of distress in aware hypertensives. We observed a weak curvilinear association between systolic blood pressure and distress, which suggested that distressed participants were more likely to have low or highly elevated blood pressure. These findings suggest that labeling individuals as hypertensive, rather than having elevated blood pressure, per se, may partially explain the greater levels of distress in patients treated for hypertension. (Hypertension. 2010;56:547-550.)

Key Words: depression ■ anxiety ■ blood pressure ■ medication ■ cardiovascular risk ■ labeling

Studies examining the association of hypertension with psychological distress, such as anxiety and depressive symptoms, have produced mixed findings. Several studies have reported positive associations,1–4 whereas others have observed weak5 or no associations.6 There is even some evidence to suggest lower blood pressure (BP) in participants with depressive or anxiety disorders.7,8 A related issue is the effect of labeling patients as hypertensive.9 Several studies have suggested that individuals "labeled" as hypertensive might adopt a sick role that can impair quality of life.9 Therefore, the association between hypertension and psychological distress may be because of a direct effect of the BP itself, adverse effects of treatment, or the consequences of labeling. Few studies have comprehensively addressed all of these issues. The aim of the present study was, therefore, to examine whether psychological distress was directly related to raised BP, per se, or other factors arising from hypertension diagnosis, such as "labeling."

Methods
Participants were recruited into the Health Survey for England and Scottish Health Survey (between 1994 and 2004), both representa-

tive, general population-based studies sampling individuals living in households in each country.10 Study participants gave full informed consent, and ethical approval was obtained from the London Research Ethics Council. The study adhered to the principles of the Declaration of Helsinki and Title 45, US Code of Federal Regulations, Part 46, Protection of Human Subjects, Revised November 13, 2001, effective December 13, 2001. The procedures followed were in accordance with institutional guidelines.

During a household visit, systolic BP (SBP) and diastolic BP (DBP) were measured with an Omron HEM-907 BP monitor 3 times in the sitting position after 5-minute rest between each reading. The initial reading was discarded, and an average of the second and third BP recordings was used for the present analyses. Hypertension was defined according to the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (systolic/diastolic BP ≥ 140/90 mm Hg or use of antihypertensive medication).11 Nurses also collected information about physician-diagnosed cardiovascular diseases (stroke, ischemic heart disease, angina symptoms, hypertension, and diabetes mellitus), recorded medication usage, and measured weight and height to calculate body mass index [weight (kilograms)/height (meters)²].

In a separate visit, within a maximum of 2 weeks of the clinical assessment, interviewers collected information on psychological distress using the 12-item version of the General Health Questionnaire (GHQ-12), a widely used measure of psychological distress in population-based studies.12 The GHQ-12 enquires about symptoms...
in the last 4 weeks. We used a GHQ-12 cutoff score of ≥4 to denote psychological distress. This definition has been validated against standardized psychiatric interviews and has been strongly associated with depression and anxiety. Interviewers also collected information on self-reported smoking (current/ex-smoker/never) and participation in moderate-vigorous physical activity sessions lasting for ≥30 (walking and heavy domestic activity) or 15 (recreational sports and exercise) minutes (none, ≤3 sessions per week, or >3 sessions per week).

Participants were categorized into 3 groups to define hypertensive status: normotensive (no previous diagnosis of or treatment for hypertension and with BP <140/90 mm Hg), aware hypertensive (physician-diagnosed hypertension and/or taking antihypertensive medication), and unaware hypertensive (no previous diagnosis or treatment of hypertension with BP ≥140/90 mm Hg). The rationale for using these categories was to explore whether the associations with psychological distress were related to labeling (unaware versus aware hypertensive). We used χ² test and 1-way ANOVA to examine differences in baseline characteristics across the normotensive and hypertensive groups. We used multivariate logistic regression to compute odds ratios (OR) with accompanying 95% CIs for the association between hypertensive status and psychological distress. Models were adjusted for potential confounding or mediating factors, such as age, sex, smoking, physical activity, cardiovascular morbidity, antihypertensive medication use, BP, and body mass index. We performed additional analyses to examine associations of SBP and medication use with psychological distress. In the initial logistic regression analyses, we entered SBP as a continuous variable and then a squared term (SBP × SBP) to examine the curvilinear association with psychological distress. In subsequent analyses we present the data per 10-mm Hg increase in SBP. There were no clear differences in our results between men and women, so the data were pooled and sex adjusted. All of the analyses were conducted using SPSS version 14.

Results

From the initial sample of 39 075 men and women who provided complete data on BP, history of hypertension, and medication usage, we excluded 5970 participants because of missing demographic and anthropometric data. Thus, the final analytic sample consisted of 33 105 participants (aged 51.7±12.1 years; 45.8% men). The excluded participants were older (62.3 versus 51.7 years; P<0.001), although there were no differences in sex distribution (men: 45.1% versus 45.8%; P=0.28).

As expected, the normotensive participants were younger, more likely to be women, more physically active, had lower body mass index, and had a lower prevalence of self-reported cardiovascular disease compared with the aware hypertensive participants (Table 1). Unaware hypertensive participants were more likely to be men, undertook more physical activity, had higher BP but lower body mass index, and had a lower prevalence of self-reported cardiovascular disease compared with aware hypertensives.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Normotensive*</th>
<th>Hypertensive†</th>
<th>Unaware Hypertensive‡</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>22 673</td>
<td>8033</td>
<td>2399</td>
</tr>
<tr>
<td>Age, y</td>
<td>48.7±10.7</td>
<td>58.5±12.2</td>
<td>57.2±11.8</td>
</tr>
<tr>
<td>Men, %</td>
<td>43.3</td>
<td>48.6</td>
<td>60.7</td>
</tr>
<tr>
<td>Smoking, %</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>43.6</td>
<td>37.4</td>
<td>39.2</td>
</tr>
<tr>
<td>Quit</td>
<td>29.1</td>
<td>39.9</td>
<td>34.2</td>
</tr>
<tr>
<td>Current</td>
<td>27.3</td>
<td>22.7</td>
<td>26.6</td>
</tr>
<tr>
<td>Physical activity, %</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>19.9</td>
<td>39.2</td>
<td>27.6</td>
</tr>
<tr>
<td>≥3/wk</td>
<td>45.1</td>
<td>38.4</td>
<td>45.4</td>
</tr>
<tr>
<td>&gt;3/wk</td>
<td>35.0</td>
<td>22.4</td>
<td>27.0</td>
</tr>
<tr>
<td>SBP, mm Hg</td>
<td>122.7±10.3</td>
<td>138.0±22.8</td>
<td>163.3±17.4</td>
</tr>
<tr>
<td>DBP, mm Hg</td>
<td>71.0±8.7</td>
<td>79.3±14.8</td>
<td>97.2±7.4</td>
</tr>
<tr>
<td>Body mass index, kg/m²</td>
<td>26.2±4.3</td>
<td>28.8±5.2</td>
<td>27.9±4.5</td>
</tr>
<tr>
<td>Cardiovascular disease, %§</td>
<td>2.3</td>
<td>24.4</td>
<td>3.8</td>
</tr>
<tr>
<td>Diabetes mellitus, %</td>
<td>1.3</td>
<td>8.0</td>
<td>1.9</td>
</tr>
<tr>
<td>Antihypertensive medication, %¶</td>
<td>0</td>
<td>63.1</td>
<td>0</td>
</tr>
<tr>
<td>Self-reported physician hypertension diagnosis, %</td>
<td>0</td>
<td>82.1</td>
<td>0</td>
</tr>
</tbody>
</table>

*Data show no previous diagnosis of hypertension or medication use with SBP/DBP <140/90 mm Hg.
†Data show physician-diagnosed hypertension and/or medication use.
‡Data show no previous diagnosis of hypertension or medication use with BP ≥140/90 mm Hg.
§Data show physician-diagnosed stroke, ischemic heart disease, or angina.
¶Data show ß-blockers, angiotensin-converting enzyme inhibitors, diuretics, or calcium blockers.

To test the robustness of this finding, we performed a series of sensitivity analyses. First, we examined whether the risk of psychological distress differed between aware hypertensives with controlled (SBP/DBP <140/90 mm Hg; n=5784) and uncontrolled (SBP/DBP ≥140/90 mm Hg; n=2249) BP. An elevated risk of distress was observed in both controlled (multivariable adjusted OR: 1.53 [95% CI: 1.37 to 1.71]) and uncontrolled (OR: 1.79 [95% CI: 1.49 to 2.15]) aware hypertensives in comparison with normotensive participants.

Second, after the removal of 3277 participants with existing heart disease and diabetes mellitus, the association between awareness of hypertension and psychological distress persisted (age- and sex-adjusted OR: 1.47 [95% CI: 1.35 to 1.59]).

Third, we observed associations between antihypertensive drug use and psychological distress, which was particularly strong for use of diuretics (multivariable adjusted OR: 1.21 [95% CI: 1.07 to 1.36]) and calcium blockers (multivariable adjusted OR: 1.25 [95% CI: 1.08 to 1.44]). However, when we removed participants taking antihypertensive drugs (n=5069), there remained an elevated risk of distress in aware hypertensive participants (age- and sex-adjusted OR: 1.64 [95% CI: 1.49 to 1.81]).

Awareness of Hypertension and Psychological Distress

Within the analytic sample, 15.7% (13.2% men and 17.7% women) of study members reported psychological distress. Participants aware of their hypertension were at higher risk of psychological distress, and this association remained after adjustment for a number of potential confounders and mediators (Table 2). In contrast, unaware hypertension was not associated with distress.
Table 2. Association Among Hypertensive Status, BP, and Psychological Distress (GHQ-12≥4)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Cases/N</th>
<th>OR (95% CI) Adjusted for Age and Sex</th>
<th>OR (95% CI) Fully Adjusted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertensive category *</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normotensive</td>
<td>3305/22673</td>
<td>1.00 (ref)</td>
<td>1.00</td>
</tr>
<tr>
<td>Aware hypertensive</td>
<td>1621/8033</td>
<td>1.76 (1.64 to 1.89)</td>
<td>1.57 (1.41 to 1.74)</td>
</tr>
<tr>
<td>Unaware hypertensive SBP†</td>
<td>256/2399</td>
<td>0.85 (0.74 to 0.98)</td>
<td>0.91 (0.78 to 1.07)</td>
</tr>
<tr>
<td>&lt;120 mm Hg</td>
<td>1734/9793</td>
<td>1.00 (ref)</td>
<td>1.00</td>
</tr>
<tr>
<td>120.0 to 129.9 mm Hg</td>
<td>1486/9673</td>
<td>0.91 (0.85 to 0.99)</td>
<td>0.93 (0.86 to 1.01)</td>
</tr>
<tr>
<td>130.0 to 139.9 mm Hg</td>
<td>1243/8590</td>
<td>0.89 (0.82 to 0.97)</td>
<td>0.91 (0.84 to 0.99)</td>
</tr>
<tr>
<td>140.0 to 149.9 mm Hg</td>
<td>184/1380</td>
<td>0.83 (0.71 to 0.98)</td>
<td>0.82 (0.70 to 0.98)</td>
</tr>
<tr>
<td>150.0 to 159.9 mm Hg</td>
<td>160/1082</td>
<td>0.96 (0.81 to 1.15)</td>
<td>0.99 (0.82 to 1.19)</td>
</tr>
<tr>
<td>≥160 mm Hg</td>
<td>376/2587</td>
<td>0.95 (0.84 to 1.08)</td>
<td>0.96 (0.84 to 1.10)</td>
</tr>
<tr>
<td>P for trend</td>
<td></td>
<td>0.047</td>
<td>0.134</td>
</tr>
</tbody>
</table>

Discussion

In this representative study of adults, we observed an elevated risk of psychological distress in participants aware of their hypertension, although there was no such association in unaware hypertensive participants. Use of antihypertensive drugs was associated with psychological distress, but this did not explain the elevated levels of distress in aware hypertensives. We observed a weak curvilinear association between SBP and distress, which suggested that distressed participants were more likely to have low or highly elevated BP. This nonlinear association may partially explain the mixed results of several other studies where both positive and negative associations between BP and mood disorder have been observed.1–4,7,8

These findings suggest that the diagnosis of hypertension itself rather than elevated BP might partly explain the elevated risk of psychological distress in patients treated for hypertension. This is consistent with several other studies that have demonstrated higher psychological distress and lower well being in labeled hypertensives and mislabeled normotensives in comparison with unaware hypertensives.9 For example, in a small sample of Spanish participants from the general population, health-related quality of life, including physical functioning, vitality, mental health, and pain thresholds, was better in unaware compared with aware hypertensive participants.13 Several mechanisms might explain the effects of labeling. Some evidence suggests that the act of labeling somebody as hypertensive can cause increases in sympathetic activity during mental stress,14,15 which might partly explain the associations with worse mental health. In a study of 214 normotensive and mildly hypertensive participants, the perception of being hypertensive was associated with greater anxiety during clinic BP measurement and a larger white coat effect.16 Nevertheless, our results suggest that there were no differences in the levels of psychological distress in aware hypertensive participants with normal or elevated BP readings.

In previous studies, depressive disorder was associated with lower SBP,7 although use of tricyclic antidepressants was associated with greater risk of hypertension.5,7 which may correspond with increased risk of weight gain associated with these agents.17 We did not have available information on the use of psychotropic medication, although we did run further analyses to exclude 475 participants with history of a psychiatric hospital admission, which did not alter the results. A further limitation is the cross-sectional design; thus, we cannot infer causality or determine the direction of the observed relationship between hypertension and psychological distress. For example, participants with symptoms of psychological distress may be more likely to seek medical advice and, thus, be diagnosed with hypertension. In most cases, the measurements of BP and psychological distress (GHQ-12) were completed within a few days of each other, although with more simultaneous measurement (ie, in the same screening) the associations may have been stronger. Common factors, such as the central monoamine system, may explain some of our results, because depression is characterized by altered levels of neuropeptide Y18 that might also impact on sympathetic activity and cardiovascular regulation.19 Lastly, the use of ORs with a common outcome can be misleading.20 Psychological distress is on the borderline for reaching the rare disease assumption (typically considered to be a prevalence of <10%). However, when we recalculated relative risks, the associations remained significant albeit slightly attenuated (eg, the relative risk of distress in aware hypertensive versus normotension was 1.36 [95% CI: 1.28 to 1.45]).

Perspectives

These findings suggest that the act of labeling patients as hypertensive rather than having elevated BP, per se, might partly explain the higher levels of psychological distress in patients treated for hypertension. The use of antihypertensive drugs was associated with psychological distress, but this did not explain the elevated risk in participants who were aware of their hypertension. These findings might partly explain...
why previous studies have produced mixed findings regarding the association of hypertension/BP with common mental disorder, such as anxiety and depressive symptoms. Because psychosomatic factors are now known to be related to relevant health outcomes, the act of labeling might warrant clinical concern. Therefore, future research is required to better understand how a diagnosis might impact on the mental health of the patient. More sophisticated techniques may be required when informing the patient about his or her hypertension.

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Disclosures
None.

References
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