

Depression increases the risk for uncontrolled hypertension

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BACKGROUND: Because hypertension and depression share common pathways, it is possible that each disease has an impact on the natural history of the other.

OBJECTIVE: To determine whether depression influences blood pressure control in hypertensive patients.

METHODS: Forty hypertensive patients undergoing antihypertensive treatment, excluding beta-blockers and central-acting agents, self-measured their blood pressure several times a day for three days using a validated, commercially available device. All patients also completed the Zung

Self-rating Depression Scale survey for depression. Associations between the results of the blood pressure and depression tests were determined using the Spearman correlation coefficient; RR was also measured.

RESULTS: Of the 40 patients, 23 were depressed, and 21 of these 23 had poor control of their blood pressure. The RR for uncontrolled hypertension in depressed patients was 15.5. A significant correlation between systolic ($r=0.713$) and diastolic ($r=0.52$) blood pressure values and depression was found.

CONCLUSION: Depression is common in patients with uncontrolled hypertension and may interfere with blood pressure control. Screening for depression in hypertensive patients is a simple and cost-effective tool that may improve outcomes.

Key Words: *Blood pressure control; Depression; Hypertension*

At a prevalence of 30.1%, hypertension is a common health problem in Mexico; furthermore, only 19% of hypertensive patients are able to achieve suggested healthy blood pressure targets (1). Depression is also common in Mexico, with approximately 9% of the population experiencing this mental health disease (2). Depression has a prevalence of 4.8% to 8.6% in primary care settings, and depressive illness is projected to be the second leading cause of disability worldwide in the next 20 years (3).

Several studies (4) suggest that individuals experiencing depression are at high risk for developing hypertension, as well as being predisposed to stroke and ischemic heart disease. In fact, depression may put patients at higher risk for heart disease, stroke and death (4,5).

Recent theories regarding the etiology of depression have involved the biogenic amine pathway, and suggest that the disease is related to a deficiency in monoamines (serotonin, dopamine and norepinephrine) in the central nervous system. Indeed, all clinical antidepressant drugs enhance the effects of the monoamine neurotransmitters (6).

Both depressive and hypertensive patients experience increased sympathetic tone (7) and increased secretion of adrenocorticotrophic hormone and cortisol (4); therefore, it is pathophysiologically plausible that depression and hypertension affect one another.

Dopamine and other related neurotransmitters have antihypertensive actions; bromocriptine and fenoldopam, which are dopamine receptor agonists, have been used in the management of high blood pressure (8). Lack of dopamine at key sites in the brain may increase blood pressure and/or trigger depression (6). Furthermore, the cerebrovascular and ischemic changes in the brain promoted by high blood pressure may predispose individuals with hypertension to depression (9). However, there are currently no studies that correlate the presence of depression with hypertension control.

Despite its high prevalence and impact, depression is usually not detected by primary care physicians, and patients do not typically receive adequate treatment, which may not only affect their quality of life, but may also interfere with the treatment and prognosis of other chronic diseases such as ischemic heart disease and stroke (4,5). In fact, the United States Preventive Services Task Forces recommends "screening adult patients for depression in clinical practices that have systems in place to assure accurate diagnosis, treatment and follow-up"

as a Grade B recommendation (clinicians routinely provide the service to eligible patients, the service improves important health outcomes and benefits outweigh the harms) (10).

The Zung Self-rating Depression Scale is a self-administered screening test for depression that is an easy-to-use, accurate and brief (requires approximately 5 min to complete) instrument for the detection of depression; furthermore, the test has the added advantage of being able to discriminate mild, moderate and severe depression (3).

The aim of the present study was to determine whether depression influences blood pressure control in hypertensive patients.

METHODS

To evaluate hypertension control and to avoid the 'white coat' phenomenon, 40 hypertensive patients undergoing antihypertensive therapy for longer than six months, after being trained on how to measure their blood pressure, self-administered a blood pressure test several times a day for three days using a commercially available automatic digital blood pressure monitor (OMRON HEM713C, OMRON Healthcare Inc, USA) that had been previously validated (11).

Using a cuff appropriate for their arm diameter, patients recorded their blood pressure on waking up (after urination), before meals and before retiring each evening, for three days. After a 5 min seated rest period, measurement was recorded in triplicate at 3 min intervals between measurements.

To monitor adherence to antihypertensive therapy, the relatives of the patients were asked to perform a count of medications each day starting one week before the beginning of self-measurement, and to be able to recall the patient's intake of the drug if required. In addition, counting of returned tablets was also performed by a member of the team.

All patients completed the Zung Self-rating Depression Scale survey; depression was diagnosed if the patient scored >50 points (the maximum possible score using this scale was 80). The Zung Self-rating Depression Scale is a sensitive measure of clinical severity in depressed patients, which has been previously validated and has clinical evidence supporting its use as a research instrument (12).

Patients with any of the following diagnoses were excluded from the study: secondary hypertension; hypothyroidism; psychological

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TABLE 1
Baseline characteristics of patients

	Depressed		Not depressed	
	Blood pressure			
	Controlled	Uncontrolled	Controlled	Uncontrolled
Age, years, mean	59	61	59	60
Sex, male/female, n/n	0/2	7/14	5/11	0/1
Blood pressure, systolic/diastolic, mmHg	130/68	158/89	125/77	142/91
Depression				
Mild	2	10	–	–
Moderate	–	7	–	–
Severe	–	4	–	–

Data presented as n unless otherwise indicated

disorders, patients receiving beta-blockers or central acting agents, patients with a history of alcohol and/or psychotropic drug abuse, and patients receiving antidepressant drugs for any purpose.

The present study was conducted with the approval of the Research and Medical Ethics Committee of the Hospital General de Ticomán SS DF (Mexico DF, Mexico) in accordance with the Declaration of Helsinki. Participants provided written informed consent before their inclusion in the study protocol.

Statistical analysis

Associations between the results from the blood pressure and depression tests were determined using the Spearman correlation coefficient; RR was also measured.

RESULTS

The baseline characteristics of the patients are shown in Table 1. Of the 40 patients included in the study, 23 were depressed (57.5%), of whom two had good blood pressure control and 21 had poor blood pressure control. Of the remaining 17 patients without depression, one patient had poor blood pressure control and 16 patients had good blood pressure control. The average blood pressure in depressed patients with poor blood pressure control was 158/89 mmHg, and the average blood pressure in patients without depression and good blood pressure control was 125/77 mmHg (Table 1).

The RR of experiencing uncontrolled hypertension in patients with depression was 15.5.

When the blood pressure and self-measured depression test results were analyzed, a significant correlation between systolic ($r=0.713$ [95%CI 0.79 to 0.91]; $P<0.001$ [Figure 1]) and diastolic ($r=0.52$ [95% CI 0.56 to 0.82]; $P<0.001$ [Figure 2]) blood pressure values was found.

Compliance with treatment (according to the relatives of the patients) was >90% before the beginning of blood pressure self-measurement, and all patients were compliant with their treatment regimen as prescribed during the study period.

DISCUSSION

In the present study, we found that depression was a risk factor for poor blood pressure control in hypertensive patients.

The study design, which included patients using simple, validated, semiautomatic blood pressure monitoring equipment (11) and a self-administered, validated and accurate screening test for depression (12) at home, without the intervention of the investigator, produced reliable and accurate information that enabled an unbiased analysis of the results without any influence of the ‘white coat’ phenomenon. It is important to note, however, that there is not enough evidence to recommend one depression screening test over another (13).

We did not include patients who were being treated with beta-blockers or central-acting agents because these drugs have been known to cause depression (14).

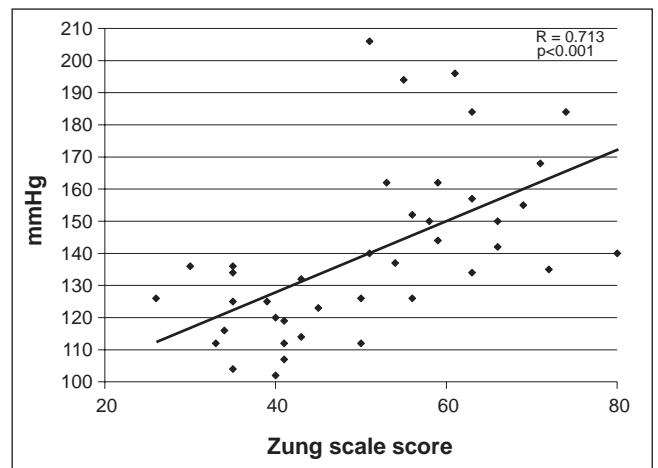


Figure 1) Correlation between systolic blood pressure and Zung Self-rating Depression Scale score

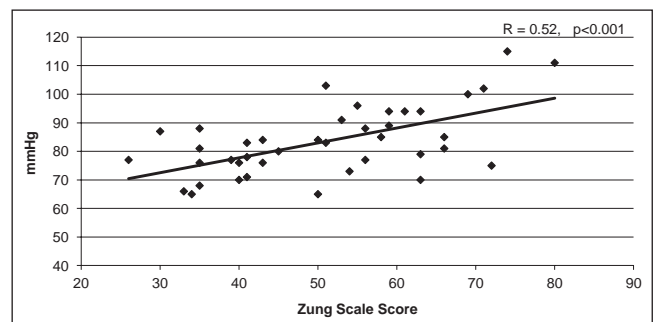


Figure 2) Correlation between diastolic blood pressure and Zung Self-rating Depression Scale score

We found a high prevalence of depression in hypertensive patients; this prevalence was approximately nine times greater than what is observed in the general population. Although the investigators were not directly involved in the gathering of blood pressure data and depression scores for the patients, we recognize that the present study was not a blinded study. It is interesting to note that systolic blood pressure control was poor, yet there was good diastolic blood pressure control in all groups. We do not have an explanation for this finding, but systolic blood pressure control is typically more difficult to maintain than diastolic blood pressure control (15). Nevertheless, the presence of depression in hypertensive patients appears to be a risk factor for poorly controlled blood pressure.

In a study involving 452 psychiatric outpatients with a diagnosis of depression, Rabkin et al (16) found that hypertension was three times more prevalent when compared with those without depression, supporting a significant association between depression and hypertension. However, this study did not relate the presence of depression with the level of antihypertensive control. The study by Jokisalo et al (17) found that a feeling of hopelessness toward hypertension, frustration with treatment and perceived anxiety with blood pressure measurement were associated with poor high blood pressure control. Finally, a recent meta-analysis demonstrated an approximately 42% increased risk for hypertension in depressed patients, especially in patients for whom the diagnosis of depression was made three years before the study (4). The results of these studies further support the correlation between a patient’s psychological status and their level of hypertension control.

Other studies have failed to find associations between depression and hypertension. Hun et al (18) found no relationship between depression and the development of hypertension over a four-year time frame, whereas Licht et al (19) found an association between depression and decreased blood pressure.

The coexistence of depression and hypertension may have prognostic implications not related to blood pressure values because patients with depression exhibit increased sympathetic tone and decreased parasympathetic activity, which not only contributes to an increase (and poor control) of blood pressure, but also may increase the risk of cardiac arrhythmias (4,5). Interestingly, the use of serotonin reuptake inhibitors decreases sympathetic activation (4), although whether antidepressant treatment improves blood pressure control requires additional investigation.

Because depression and hypertension share a common pathway, it is reasonable to consider depression in hypertensive patients (and hypertension in depressive patients) (20).

Furthermore, depressed patients may have poor control of their blood pressure because they have lost interest in adhering to their therapeutic regimen (21). At the *Hospital General de Ticomán SS DF*, we ask relatives of our patients to perform a count of the medication to verify adherence to antihypertensive therapy. In the present study, we also applied this practice starting one week before the beginning of blood pressure self-measurement, with the relatives reporting that

compliance with the treatment regimen was >90% before blood pressure self-measurement, and that all patients had taken their medication as prescribed during the study period.

It is important to note that the different antihypertensive treatments used for blood pressure control in our patients have previously been shown to be equally effective when used as monotherapy (14). Combinations of agents were given to approximately 50% of the patients in each group.

CONCLUSION

Our results suggest that depression is a common feature in patients experiencing uncontrolled hypertension, which may contribute to poor control. Screening for depression in hypertensive patients is a simple and cost-effective tool that may improve outcomes and should be performed in all hypertensive patients.

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