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ORIGINAL ARTICLE

Frequency of masked hypertension and its relation to target organ damage in the heart

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KEYWORDS

Masked hypertension;
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Abstract *Introduction:* The phenomenon of masked hypertension (MH) is common. MH recognition as a clinical entity of its own is still a matter of debate.
Objective: The aim of this study was to investigate the prevalence of MH and its relation to cardiovascular risk factors as well as its relation to target organ damage.
Material and methods: A total of 100 patients who were indicated for 24 h ambulatory blood pressure monitoring (ABPM) were enrolled in the study. Blood pressure (BP) was measured in the clinic, during the following week, echocardiography and ABPM were done. Patients were classified into four groups according to clinical BP and ABPM readings: true normotension, sustained hypertension (SH), white coat hypertension (WCH) and MH.
Results: The incidence of MH was 37%. DM was significantly higher in SH than MH, also, it was significantly higher in MH than true normotensive patients. Obesity was significantly higher in SH than MH. ABPM readings were significantly higher in SH than MH, whereas they were significantly higher in MH than WCH and true normotensive patients. LVH was higher in MH than SH, however, the difference was not statistically significant. LVH was significantly higher in MH than WCH and true normotensive patients.
Conclusion: MH is a common phenomenon and associated with subclinical target organ damage in the heart comparable to SH and significantly higher than WCH and true normotension.

1. Introduction

Hypertension is increasing in prevalence in Saudi Arabia affecting more than one fourth of the adult Saudi population.[1] The use of ambulatory blood pressure monitoring (ABPM) has added a new source of information about out of office blood pressure (BP). Discrepancies between office and out of office BP have resulted in four potential groups of BP status: first, normotensive by both methods (true normotensives); second, hypertensive by both (true, or sustained, hypertensives); third, hypertensive by clinical measurement and normotensive by ambulatory measurement (white coat hypertensives); and fourth, normotensive by clinical measurement and hypertensive by ambulatory measurement.[2] Masked hypertension (MH) (or isolated ambulatory hypertension) was first

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introduced by Devereux and Pickering as "white-coat normotension" in 1990.[3] According to international guidelines, elevated daytime ambulatory BP (systolic at least 135 and diastolic at least 85 mmHg) in the face of normal office BP (systolic less than 140 and diastolic less than 90 mmHg) is defined as masked hypertension.[4] The prevalence of MH lies between 8% and 20% among untreated adults, and up to 61% among treated adults[5], MH remains undiagnosed and untreated for a long period of time.[6]

All patients who have high normal office BP (130–139/85–89 mmHg) should undergo ABPM to rule out MH. If patients are found to have MH (> 135/85 mmHg), the ABPM should be repeated within 2 months, to confirm the diagnosis (similar to the recommendation for diagnosis of hypertension). Once MH is confirmed, patients should undergo comprehensive CV risk assessment (including ECG, fasting lipid profile, fasting glucose, basic metabolic profile, and urinalysis), and they should be treated with antihypertensive medications, similar to patients with s ustained hypertension.[7] About 37% of baseline masked hypertensives progressed to sustained hypertension (SH) over time.[2]

Hypertension is associated with increased CV morbidity and mortality, guidelines of the European Society of Hypertension and the European Society of Cardiology to recommend assessment of asymptomatic organ damage in the diagnostic workup of hypertensive patients, LVH is highly prevalent among hypertensive patients.[7] The association of LVH and increased CV morbidity and mortality has been previously widely documented.[8]

Studies have reported that associations between MH and CV diseases are as strong as those found for sustained hypertension.[9] Yet, MH recognition as a clinical entity of its own is still a matter of debate.[2]

The aim of this study is to investigate the prevalence of MH and its relation to CV risk factors as well as its relation to LVMI representing the subclinical target organ damage in the heart.

2. Patients and methods

This is a prospective, observational study conducted in Olaya Medical Center (Riyadh) during the period from March 2013 to April 2015. The study protocol was approved by the center's ethics committee. A total of 100 patients presented to the cardiology clinic who were indicated for 24 h ambulatory BP monitoring were enrolled in the study. These patients presented with different clinical situations as follows:

- Fluctuating levels of BP in previously non hypertensive patient.
- To assess control of BP in hypertensive patient.
- Epistaxis associated with high BP in non hypertensive patient.
- Symptoms suggestive of hypertension as recurrent occipital headache, dizziness and light headedness with normal repeated BP readings.
- Patients with high normal BP readings (systolic between 130 and 139 mmhg and diastolic between 85 and 89 mmhg)
- Patients with symptoms suggestive of hypotension.

The arterial BP was measured in the clinic. Briefly, the patient was allowed to rest for at least 5 min. Then BP was measured by the author three times using a mercuric manometer. The first value was rejected and the result was calculated as the mean of the second and the third value. The procedure was repeated again after twenty minutes and the result given at the end was the mean value of the second and the third measurement.

During the following week, ABPM was initiated in a 24 h basis by using the apparatus a Oscar 2, SunTech Medical, Inc., USA. Assessment of the results was done by the author. The diagnosis of hypertension was made on the basis of BP = 140 mmHg systolic and/or = 90 mmHg diastolic or use of antihypertensive medications. Hypertension by 24-h ambulatory BP was defined when the mean daytime SBP was equal to or greater than 135 mmHg or when the mean daytime DBP was equal to or greater than 85 mmHg according to the report of seventh report of the 2003 US Hypertension Joint National Committee (JNC 7), European Society of Hypertension (ESH) and European Society of Cardiology (ESC) guidelines for hypertension.[2] Dipping status was defined as a percentage drop in the mean BP from wake to sleep periods. Abnormal dipping was defined as a decline of $< 10\%$.[10]

Patients were classified into four groups according to clinical BP and ABPM readings: First, the true normotension group was defined as subjects who were normotensive according to both methods; second, the SH group was defined as subjects who were hypertensive by both methods; third, the MH group was defined as subjects who were normotensive by clinical BP but hypertensive by ambulatory BP; and fourth, the white coat hypertension group was defined as subjects who were hypertensive by clinical or office BP but normotensive by ambulatory BP.

It was reported that ambulatory BP is more valuable for predicting prognosis than other measures, as it more accurately assesses the risk of CV disease than the measurements of BP made during clinical or office visits, and is closely related to damage to target organs.[11] ABPM enables the continuous observance of changes in BP during activities of daily life, so that BP can be measured automatically at specific time intervals (every 30 min or every hour), resulting in very accurate measurements of BP.[12]

2.1. Echocardiography

Relative wall thickness (RWT) and left ventricular mass index (LVMI) were determined by M-mode echocardiography (ESAOTE Megas CVX machine) automatically using the software of the device after entering the patient height and weight. All echocardiographic examinations were performed and read by the author.

2.2. Statistical analysis

Data entry and analysis were done using SPSS software. Continuous and categorical variables are presented as mean plus or minus standard deviation and percentages, respectively. Mean values between two groups were compared using independent t test (2-tailed). The means between three or more groups were compared using analysis of variance (ANOVA). Chi square test and Fisher Exact test, where appropriate, were utilized in comparing proportions. A P value < 0.05 was considered statistically significant.