Kidney affection in non-complicated high blood pressure patients

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INTRODUCTION: High blood pressure is a very frequent condition that deteriorates the so-called target organs: brain, heart and kidney. Objective: to identify the level of renal affection in non-complicated hypertensive patients.

PATIENTS AND METHODS: A transversal descriptive study was designed in “José Martí” community in Santa Clara; it included a random sample of 47 patients (15%) from a universe of 311 hypertensive patients without evidences of clinical complications. Plasma glucose, creatinine, cholesterol, triglycerides, and uric acid were measured; urinary sediment microscopy was performed as well as search for microalbuminuria. Echocardiogram and funduscopy were performed to all cases.

RESULTS AND DISCUSSION: The majority of patients were white women and the most frequent risk factors were overweight, hypertensive retinopathy grade I or II, the non-white color of the skin and left ventricular hypertrophy. The microalbuminuria was positive in eight patients (17%) while 27 (51.1%) had a creatinine clearance less than 90 ml/min/m² BS and 13 (27.3%) less than 60 ml/min/m² BS, there were evidences of Hypertensive Heart Disease in 36 (76.5%) patients, of them 11 (23.4%) showed evidences of left atrial dilatation, 80% had evidences of renal dysfunction in spite of having normal creatinine, the only variable that correlated significantly with renal affection was the illness evolution time (p<0.05).

CONCLUSION: Hypertensive patients even without evidences of clinical complications had a hidden kidney affection, longer evolution of hypertension increases the frequency of renal function decline.

Key Words: Chronic kidney disease; Hypertension; Risk factors

High blood pressure (HBP) has a world prevalence of 33.7% in adult population, before the age of 50 prevalence of HBP is a little lower in females than in males, this suggests a protector effect of estrogens. After the menopause, the hypertension increases quickly in women and it overtakes that of men. In United States 33% of Afro-American population has hypertension, in comparison with 25% of those of white and Mexican-Americans, in Latin America 140 million people suffer of HBP (1,2).

In Cuba HBP has increased its prevalence and it represented the 38% of people older than 18 years-old in 2016, in that very year the HBP prevalence rate in Villa Clara province was 227.6 per 1000 inhabitant (3). In Santa Clara municipality, at the end of 2015, 46,000 people suffering HBP were reported. In "José Martí" community there was 2,042 hypertensive patients of them 1,050 women and 992 men.

The public health indicators at world level and in Cuba, shows a progressive increase of the number of patients with chronic kidney disease (CKD) associated to a high prevalence of chronic illness as HBP. The CKD can progress to terminal renal disease and implicates a higher risk of cardiovascular illness and mortality, therefore, prevention through early diagnosis and opportune treatment, would allow stopping or retarding the progression of the renal damage and it would diminish its morbidity and mortality.

In a meeting in the National Center of Cardiovascular Investigations of Madrid about the necessity of detection and early intervention on CKD, it was design to determining the level of renal affection in non-complicated HBP patients; this information would allow establishing strategies to prevent the progression from the HBP to CKD.

METHODS

A descriptive, transversal and observational study was designed to detect unidentified presence of renal affection in non-complicated hypertensive patients in “José Martí” community of Santa Clara, Villa Clara, Cuba, between January 2016 and January 2017. From a universe of 2,041 hypertensive patients older than 18 years-old, 311 had no evidences of complications; a 15% random stratify sample was taken from the eight clinics of the community, it was integrated by 47 patients. Plasma glucose, creatinine, cholesterol, triglycerides, and uric acid were measured; urinary sediment microscopy was performed as well as search for microalbuminuria in patients with normal urinaries. Echocardiography was performed in all cases. The personal data included, age, sex, color of the skin and time of evolution of the HBP starting from the diagnosis.

Echocardiographic variables used to find evidence of Hypertensive Heart Disease were: left ventricle relaxation pattern, wall thickness index greater than 0.42 (calculated as 2 times left posterior wall/left ventricle internal diastolic diameter), Left Atrium indexed volume higher than 34 ml/m² BS, previous studies suggest that hidden CKD was frequent in “José Martí” community (10). The present investigation was design to determine the level of renal affection in non-complicated HBP patients; this information would allow establishing strategies to prevent the progression from the HBP to CKD.
Subclinical or asymptomatic renal damage was considered when estimated GFR was between 30-60 ml/1.73 m² BS or microalbuminuria (30-300 mg/24 h), or albumin-creatinine ratio (30-300 mg/g; 3.4-34 mg/mmmol) (12).

It was considered adequate treatment when patients with moderate risk were receiving at least two drugs including a diuretic and three drugs when they were at high risk, also including a diuretic. The risk was considered according the 2013 European Society of Hypertension/European Society of Cardiology Guidelines for the management of arterial hypertension (13).

It was considered a good blood pressure (BP) control when there were normal figures of BP in at least the last three clinic controls, without urgencies, emergencies or decompensating episodes during the year previous to the study entrance.

DATA RECOLLECTION

Data was collected in Ad Hoc form, tabulated with Microsoft Excel 2013 and processed with the statistical package SPSS for Windows 20.0.

STATISTICAL ANALYSIS

A logistical regression that included all variables was done, with renal affection as dependent variable. Some variables of interest were analyzed to find out correlation with low creatinine clearance, finally, absolute and relative frequencies were used for description of qualitative variables.

ETHICAL CONSIDERATIONS

All the patients were informed of the purposes of the study and it was guaranteed their privacy and the use of data exclusively for scientific matter and they were verbally requested their consent to be included in the investigation.

RESULTS

Sample age average was 64 years ±10 and the average of evolution time of HBP was 11.4 years. Distribution by sex and skin color appears in Table 1, in which it can be seen that white women were predominant.

TABLE 1

Distribution of non-complicated hypertensive patients by skin color and sex

<table>
<thead>
<tr>
<th>Sex</th>
<th>Whites</th>
<th>Non-whites</th>
<th>Total</th>
<th>No.</th>
<th>%</th>
<th>No.</th>
<th>%</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>9</td>
<td>61.5</td>
<td>5</td>
<td>38.5</td>
<td>14</td>
<td>29.8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Females</td>
<td>19</td>
<td>57.1</td>
<td>14</td>
<td>42.9</td>
<td>33</td>
<td>70.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>28</td>
<td>59.6</td>
<td>19</td>
<td>40.4</td>
<td>47</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Queries

Of the studied patients 63.9% were overweight with a body mass index (BMI) over 25 Kg/m² and from them 10 (24.3%) were obese (BMI >30 Kg/m²) as seen in Table 2.

TABLE 2

Risk factors in non-complicated hypertensive patients

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overweight (BMI 25 – 30 Kg/m²)</td>
<td>20</td>
<td>42.6</td>
</tr>
<tr>
<td>Obese (BMI &gt;30 kg/m²)</td>
<td>10</td>
<td>21.3</td>
</tr>
<tr>
<td>Subtotal (Patients with BMI &gt;25 Kg/m²)</td>
<td>30</td>
<td>63.9</td>
</tr>
<tr>
<td>Abnormal funduscopia</td>
<td>24</td>
<td>51.1</td>
</tr>
<tr>
<td>Non-white color of the skin</td>
<td>19</td>
<td>40.4</td>
</tr>
<tr>
<td>Left ventricle hypertrophy or remodeling</td>
<td>15</td>
<td>31.9</td>
</tr>
<tr>
<td>Triglycerides &gt;2.1</td>
<td>11</td>
<td>23.4</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>2</td>
<td>4.8</td>
</tr>
</tbody>
</table>

BMI: Body Mass Index; Source: Queries and clinical files

There were only two diabetic patients 4.8%. In 24 patients there was retinopathy in the funduscopy, although in no case it was more than grade II. Of the 15 patients with LVH or remodeling of left ventricle, 12 (80%) had a creatinine clearance under 90 ml/min/m² BS.

There were evidences of Hypertensive Heart Disease in 36 (76.5%) patients, of them 11 (23.4%) had evidences of dilation of the Left Artrium with an indexed volume higher 34 ml/m² BS, 11 presented LVH and other four even without LVH had a relative wall thickness greater than 0.42 (Table 2), although there was any patient with serious hypertensive retinopathy (grade III, IV) 29 patients (61.7%) had alterations in the funduscopy classify as grade I or II retinopathy, 25 of them (86.2%) had a creatinine clearance at least below 90 ml/min/m² BS.

The Table 3 shows the evidences of renal affection, it was found 13 (27.3%) patients with CKD grade III but other 24 patients (51.1%) had a calculated filtrate below 90 ml/min/m² BS, and there was a patient with positive microalbuminuria and normal creatinine clearance, so that 38 patients (80.8%) had evidences of renal involvement.

TABLE 3

Evidence of renal affection in non-complicated hypertensive patients

<table>
<thead>
<tr>
<th>Parameter</th>
<th>No</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microalbuminuria (&gt; 30 mg/L)</td>
<td>8</td>
<td>17</td>
</tr>
<tr>
<td>Creatinine clearance between 60 and 89 ml/min/m² BS</td>
<td>24</td>
<td>51.1</td>
</tr>
<tr>
<td>Creatinine clearance &lt;60 ml/min/ m² BS</td>
<td>13</td>
<td>27.3</td>
</tr>
<tr>
<td>Total</td>
<td>38</td>
<td>80.8</td>
</tr>
</tbody>
</table>

Source: Queries

The microalbuminuria was positive in eight (17.0%) patients, none of which had a previous diagnosis of renal affection before entering the study and seven of them had a creatinine clearance below 90 ml/min/m² BS. Most of the cases were classified as low or moderate risk patients, only 21.27% were classified as high-risk patients. After considering the presence of asymptomatic organ damage, according to the evidences of the study, 37 (78.72%) patients were re-stratified as high risk.

In Table 4 it can be seen, that after considering the evidence provided for the evaluation performed to the patients during the investigation, the new stratification yielded that most patients could be classified as high-risk patients.

TABLE 4

Total cardiovascular risk in non-complicated hypertensive patients with and without renal affection before and after the study evaluation

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Risk before study evaluation</th>
<th>Risk after the study evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>with renal affection</td>
<td>without renal affection</td>
</tr>
<tr>
<td></td>
<td>No. %</td>
<td>No. %</td>
</tr>
<tr>
<td>Low</td>
<td>8</td>
<td>80</td>
</tr>
<tr>
<td>Moderate</td>
<td>21</td>
<td>77.7</td>
</tr>
<tr>
<td>High</td>
<td>9</td>
<td>90</td>
</tr>
<tr>
<td>Total</td>
<td>38</td>
<td>80.8</td>
</tr>
</tbody>
</table>

Source: Queries and clinical files

At the entrance in the study the evidence of renal involvement was similar in low and high-risk patients but after a proper evaluation there was a higher proportion of renal affection between high risk patients, even when the difference was not significant.

A logistic regression including all variables in the study did not yield any useful predictor model. The only variable that shows significant correlation with the renal damage was the evolution time from the initial diagnosis of HBP p<0,01.

According to the criteria used to evaluate the treatments they were appropriate in 29 (61.7%), with the data available at the entrance in the study, but after the evidence offered for the evaluation performed during the investigation, this figure was reduced to only 11 patients (23.4%). Nevertheless 41 (87.2%) patients were in good control, according to BP figures.

DISCUSSION

Most patients were white women, this could have, partly, a demographic explanation since in the province the hypertension is more frequent in women than in men (3,13), so the results agree with the statistic of the latest RF survey, however other studies have shown different sex distribution, an investigation carried out in the adult population of the city of Chiclayo in Peru, that included 322 patients, found that the prevalence of HBP was 29.2% for the whole population, 30.7% for the males and 28.6% for women (14). Ortiz Brown et al. (15) investigated the prevalence of HBP in Madrid, Spain and they found a higher prevalence in men that in women, 35.1% and...
medical treatment, the new stratification found that the 75% of them had renal damage and were treated as low risk patients.

Most patients included in this study classified as low risk at the beginning, had renal damage in the same proportion than those stratified as high risk, this was due to a faulty stratification using the absolute values of creatinine instead of calculation of clearance and the fact that the echocardiogram is not a usual study in non-complicated hypertensive patients, this implies, that not all low risk patients are in their actual stratification and that there is not an appropriate perception of risk not by the patients nor by the physicians, to keep this possibility on mind can be crucial for rectifying the treatment, the falling of creatinine clearance below 90 ml/min/m² BS could be a good reference point to make a deeper evaluation of the total cardiovascular risk, mainly in patients with a longer time of evolution.

The present study has the limitation of a relatively small sample, because of the need to carry out all planned studies in a short period of time; nevertheless, this can be compensated by the high prevalence of the HBP in the studied population. By the other hand an important study as kidney ultrasound was not included and this could have reinforced the results.

CONCLUSION

Although it could not be demonstrated a direct relationship between the risk stratification and the presence of renal damage, it was found that the hypertensive patients, even without evidence of clinical complications, had undetected renal affection, this implies an increment of total cardiovascular risk and points out that the treatments in the majority of cases were inadequate according to the actual risk stratification. Thus, subclinical renal damage should necessitate for more agressives modifications of standard CV risk factors. The absolute benefits of intensive BP lowering in these high-risk individuals (with subclinical CKD) are additional and large.

REFERENCES


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