Serum Electrolytes, Family History And Presence Of Complications In Hypertensive Patients

1Dr. Nagah A.A.Mohamed and 2H.M. Hamad

1Sudan University of science and technology, faculty of animal production science and technology
2Sudan Ministry of health, Wadnubawy medical health center.

ABSTRACT

Hypertension is a chronic medical condition in which the systemic arterial blood pressure is elevated. This study Aims to detect family history and to evaluate whether serum levels of electrolytes Na+, K+ are altered as a consequence of hypertension or its complications. Seventy (37males and 33 females) clinically diagnosed hypertensive patients, under regular visit to the clinical center (Wadnubawy medical health center), were invited to participate in this study as a case. Thirty (30) apparently non hypertensive individuals were also volunteered to participate as control. All subjects were above thirty years of age. 37.14% of study participants claimed that hypertension is operating in the close relative of their families. At P < (0.05) sodium level in hypertensive patients were significantly elevated, with mean+ SD(145.32± 4.6 , 137.2 ± 6.2 ) mmol/L .While, no statistical difference found in potassium value between the study participants with mean+ SD (3.8 ± 0.6, 3.6± 0.4) mmol/L for hypertensive patients and normotensive participants respectively. Genetic factor did not play a major role in hypertensive patients. Serum sodium is elevated in hypertensive patients. So controlling blood pressure is advisable. 

Key words:

Introduction

Hypertension is a chronic medical condition in which the systemic arterial blood pressure is elevated. Essential hypertension is the most prevalent hypertension type,affecting 90–95% of hypertensive patients (Carretero and Oparil, 2000). Although no direct cause has identified itself, there are many factors such as sedentary lifestyle, smoking, stress, visceral obesity, potassium deficiency (hypokalemia) (Gibson, Paul 2009), obesity, (Kyrou ,et al., 2006, & William, 2005) salt (sodium) sensitivity, (Kyrou, et al., 2006& Wofford, and Hall, 2004) alcohol intake (Haslam, and James, 2005), aging (Tuohimaa, 2009). It is also known that hypertension is highly heritable and polygenic (caused by more than one gene) and a few candidate genes have been postulated in the etiology of this condition(Pimenta And Oparil 2009).Hypertension is the most important risk factor for death in industrialized countries. (Johns, 2007).It increases hardening of the arteries (Calhoun, et al., 2008).Thus predisposes individuals to heart disease. (Novo, et al., 2009). Peripheral vascular disease (Riccioni, 2009). Strokes. (Agabiti-Rosei,2008) myocardial infarction, heart failure (White, 2009) left ventricular hypertrophy (Singer,and Kite 2008). Other complications include Hypertensive retinopathy. (Pedrinelli, 2009) Hypertensive nephropathy and encephalopathy (Giacchetti, 2009).

These information’s justifying conducting this study, which aims to detect family history, and to evaluate whether serum levels of electrolytes Na+, K+ are altered as a consequence of hypertension or its complications.

Material And Methods

Study area:

Khartoum state, all clinical examinations and laboratory tests were carried at Wadnubawy medical health center.

Sampling:

Seventy (37males and 33 females) clinically diagnosed hypertensive patients, under regular visit to the clinical center, were invited to participate in this study as a case. Thirty (30) apparently normotensive individuals were also volunteered to participate as control. All subjects were above thirty years of age. Data collection was conducted during Oct-Dec 2012.
Ethical consideration:

Permission to carry out this study was obtained from local medical authorities and a written concert from all participants was obtained and hypertensive patients were fully informed with aim and benefit of this study.

Blood samples:

Serum separated by centrifuging blood for 10 minutes at 3000RPM. Then, decanted into 5ml plain plastic tube, labeled with date, name, time of collection, identification number of the volunteer participating in this study and stored frozen at −4°C for biochemical analysis.

All biochemical tests were done by the researchers and were carried at Wadnubawy medical health center. Quality assurance was conducted in Mohamed Mokhtar private lab and some samples were duplicated. Determination of serum sodium and potassium by using flame photometer (Varley, 1976). Family history was obtained by a pilot questionnaire.

Data Analysis:

The data was analyzed using Statistical Package for Social Sciences (SPSS), Windows version 8x, 1997 SPSS, Inc, Chicago, IL, and USA.

Percentage was calculated, T-test and chi tests were also used.

Results:

37.14% of study participants claimed that hypertension is operating in the close relative of their families. At P < (0.05) sodium level in hypertensive patients were significantly elevated, with mean± SD (145.32± 4.6, 137.2 ± 6.2) mmol/L. While, no statistical difference found in potassium value between the study participants with mean± SD (3.8 ± 0.6, 3.6± 0.4) mmol/L for hypertensive patients and normotensive participants respectively (Tables 1, 2).

Most of hypertensive patients were presented with some clinical complications such as proteinuria 42.85%, diabetes mellitus 8.57%, and other minor complication20%.

<table>
<thead>
<tr>
<th>Biochemical parameter</th>
<th>Hypertensive participants Mean±SD</th>
<th>Normotensive participants Mean±SD</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium (µmol/L)</td>
<td>145.32 ± 4.6</td>
<td>137.2 ± 6.2</td>
<td>*</td>
</tr>
<tr>
<td>Potassium (µmol/L)</td>
<td>3.8 ± 0.6</td>
<td>3.6± 0.4</td>
<td>Not Significant</td>
</tr>
</tbody>
</table>

Key P< 0.05

Table 2: Family history of hypertension disease among the study subjects

<table>
<thead>
<tr>
<th>Disease</th>
<th>Found</th>
<th>Not found</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td>37.14</td>
<td>62.86</td>
</tr>
</tbody>
</table>

Table 3: Presence of complications among hypertensive participants

<table>
<thead>
<tr>
<th>Conditions</th>
<th>(n)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertensive with proteinuria</td>
<td>30</td>
<td>42.85</td>
</tr>
<tr>
<td>Hypertensive with diabetes</td>
<td>6</td>
<td>8.57</td>
</tr>
<tr>
<td>Hypertensive with other complications</td>
<td>14</td>
<td>20.00</td>
</tr>
<tr>
<td>Hypertensive without complications</td>
<td>20</td>
<td>28.58</td>
</tr>
<tr>
<td>Total</td>
<td>70</td>
<td>100</td>
</tr>
</tbody>
</table>

Discussion:

Hypertension is not predominant among participants’ relatives. So genetic factor did not play a major role but it can affect. This finding disagreed with that obtained by Lee, et al., (2008) & Kosugi, et al., (2009) who sited essential hypertension is the most prevalent in some inherited genetic mutations and having a family history of hypertension.

Elevation of serum sodium might be due to the direct effect of aging on sense which leads to increase consumption of salt in the diet, consumption of tinned food that contains preservatives like sodium benzoate. Also the effect of hypertension on the kidney should be taken in the consideration. These matters of observations were similar to that obtained by Rainforth, et al., (2007) & Ospina, et al., (2007) who documented regarding dietary changes, a low sodium diet is beneficial in reducing blood pressure, both in people with hypertension and in people with normal blood pressure. Also, the DASH diet (Dietary Approaches to Stop
Hypertension) to control hypertension. A major feature of the plan is limiting intake of sodium and generally encourages the consumption of nuts, whole grains, fish, poultry, fruits and vegetables while lowering the consumption of red meats, sweets, and sugar. It is also "rich in potassium, magnesium, and calcium, as well as protein.

The majority of participated hypertensive patients were presented with varying degree of disease complications such as proteinuria, DM and other cardiovascular or coronary disease events. This can explain the strong association between hypertension and accelerating the progression of experimental renal disease. In addition to insulin resistance which is a component of metabolic syndrome thought contributing to hypertension. These findings agreed with that obtained by Pierdomenico, et al., (2009) & Jetté et al., (1987) who sited it is well documented that persistent hypertension is one of risk factors for stroke, myocardial infarction, heart failure and arterial aneurysm and is a leading cause of chronic kidney failure.

Conclusion and recommendation:

As serum sodium is elevated in hypertensive patients. So electrolytes assessment can be used to monitor side effects of certain antihypertensive drugs.

References


William, G. Haynes, 2005. Role of leptin in obesity-related hypertension General Clinical Research Center, Carver College of Medicine, University of Iowa, Experimental Physiology, 90: 683-688.