



Evaluation Causes of Hypertension in Some Cities at East Capital Baghdad by Serum Sodium Level

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Abstract

The studies discuss how the higher serum sodium by high sodium dietary intake effect on management & control of primary hypertension. By take a random 150 patients labeled as primary hypertension with the same medication sources from ministry of health (MOH) in east capital Baghdad. And we neglect the other patients they have other causes that lead to higher blood pressure by measure the serum sodium and questionnaire. The result show there is a higher percent have uncontrolled HTN even take the medications cause of high sodium daily dietary intake reach to 32% in adhamiah, 58% in Al - Saader city, 44% in Al-zaafaraniah.

Keywords: *HTN (hypertension), PHCC (primary health care center), serum sodium level.*

Introduction

Sodium is a chemical element with the symbol Na (from Latin: natrium) in the periodic table and atomic number 11. It is a soft, silvery-white, highly reactive metal and is a member of the alkali metals; its only stable isotope is ^{23}Na . The free metal does not occur in nature, but instead must be prepared from its compounds; it was first isolated by Humphry Davy in 1807 by the electrolysis of sodium hydroxide. Sodium is the sixth most abundant element in the Earth's crust; many salts of sodium are highly water-soluble [1, 2].

Salt (sodium) is essential to our bodies. We need about 500 milligrams of salt every day for our body to function. Most people take in about 10 times that amount daily. The recommended amount of salt for people with high blood pressure is about 1500 milligrams a day. Any reduction in your salt intake will help [2]. Normally the kidneys control the level of salt. If there is too much salt, the kidneys pass it into urine. But when our salt intake levels are very high, the kidneys cannot keep up and the salt ends up in our bloodstream. Salt attracts water. When there is too much salt in the blood, the salt draws more water into the blood. More water increases the volume of blood which raises blood pressure [3].

Hypertension

Hypertension (HTN) or high blood pressure, sometimes called arterial hypertension, is a chronic medical condition in which the blood pressure in the arteries is elevated. This requires the heart to work harder than normal to circulate blood through the blood vessels. Blood pressure is summarized by two measurements, systolic and diastolic, which depend on whether the heart muscle is contracting (systole) or relaxed between beats (diastole). Normal blood pressure at rest is within the range of 100-140mmHg systolic (top reading) and 60-90mmHg diastolic (bottom reading).

High blood pressure is said to be present if it is persistently at or above 140/90 mmHg [4]. Hypertension is classified as either primary (essential) hypertension or secondary hypertension; about 90-95% of cases are categorized as "primary hypertension" which means high blood pressure with no obvious underlying medical cause. The remaining 5-10% of cases (secondary hypertension) are caused by other conditions that affect the kidneys, arteries, heart or endocrine system [5, 6]. Hypertension is rarely accompanied by any symptoms, and its identification is usually through screening, or when seeking healthcare for an unrelated problem.

A proportion of people with high blood pressure report headaches (particularly at the back of the head and in the morning), as well as lightheadedness, vertigo, tinnitus (buzzing or hissing in the ears), altered vision or fainting episodes. These symptoms however are more likely to be related to associate anxiety than the high blood pressure itself [6]. Many mechanisms have been proposed to account for the rise in peripheral resistance in hypertension. Most evidence implicates either disturbances in

renal salt and water handling (particularly abnormalities in the intra renal renin-angiotensin system) and/or abnormalities of the sympathetic nervous system. These mechanisms are not mutually exclusive and it is likely that both contribute to some extent in most cases of essential hypertension. It has also been suggested that endothelial dysfunction and vascular inflammation may also contribute to increased peripheral resistance and vascular damage in hypertension [7].

Table 1: stages of hypertension

Classification (JNC7)	Systolic pressure		Diastolic pressure	
	mmHg	kPa	mmHg	kPa
Normal	90–119	12–15.9	60–79	8.0–10.5
Prehypertension	120–139	16.0–18.5	80–89	10.7–11.9
Stage 1 hypertension	140–159	18.7–21.2	90–99	12.0–13.2
Stage 2 hypertension	≥160	≥21.3	≥100	≥13.3
Isolated systolic hypertension	≥140	≥18.7	<90	<12.0

Much of the disease burden of high blood pressure is experienced by people who are not labeled as hypertensive. Consequently, population strategies are required to reduce the consequences of high blood pressure and reduce the need for antihypertensive drug therapy. Lifestyle changes are recommended to lower blood pressure, before starting drug therapy. The 2004 British Hypertension Society guidelines proposed the following lifestyle changes consistent with those outlined by the US National High BP Education Program in 2002 for the primary prevention of hypertension:

Hypertension

- Maintain normal body weight for adults (e.g. body mass index 20-25 kg/m²).
- Reduce dietary sodium intake to <100 mmol/ day (<6 g of sodium chloride or <2.4 g of sodium per day).
- Engage in regular aerobic physical activity such as brisk walking (≥30 min per day, most days of the week).
- Limit alcohol consumption to no more than 3 units/ day.
- Consume a diet rich in fruit and vegetables (e.g. at least five portions per day).

Effective lifestyle modification may lower blood pressure as much an individual antihypertensive drug.

Combinations of two or more lifestyle modifications can achieve even better results [8, 9, 10].

Material and Method

Serum of 150 patients labeled as essential hypertension, 50 patients from al-adhamia city, 50 patients from al-sa'ader city and 50 patients from al - za'afarianiah city. All these patients received the care and medication in primary health care center (PHCC) that related to ministry of health (M.O.H) in their places. To measure the serum sodium level by used sodium rapid technique (photometric determination of serum sodium Mg-Uranyl acetate Method, colour test). The normal value of serum sodium (135-155) mmol / l.

Specimen

Serum.

Method

Sodium is precipitated Mg-uranyl acetate; uranyl ions remaining in suspension from a yellow-brown complex with thioglycolic acid. The difference between reagent blank (without precipitation of sodium) and analysis is proportional to the sodium concentration.

Contents, Reagent Composition:

For 20 macro-/60semis-micro determinations

PREC.	60 ml precipitating solution Uranyl acetate Mg acetate	19 mmol / l 140 mmol / l
RGT.	60 ml colour reagent Ammonium thioglycolate Ammonia	550 mmol / l 550 mmol / l
STD.	2 ml standard Sodium (Na+)	150 mmol / l

Pipetting Scheme

	Macro			Semi-micro		
RB : Reagent blank STD : Standard	RB [μl]	STD [μl]	Sample [μl]	RB [μl]	STD [μl]	Sample [μl]
STD	-----	50	-----	-----	20	-----
Serum	-----	-----	50	-----	-----	20
PREC	-----	3000	3000	-----	1000	1000

We closed the tubes and mixed well. Allow to stand for 5 minutes. And then we shacked intensively for at least 30 sec. allow standing

for 30 min. centrifuge at high speed for 5 – 10 min.

PREC	50	-----	-----	20	-----	-----
Clear supernatant	-----	50	50	-----	20	20
RGT	3000	3000	3000	1000	1000	1000

Then we mixed well. After 5-30 min., measured absorbance of RB (Δ ARB), the standard (Δ A STD) and the sample (Δ A Sample) against distilled water at 360 – 410 nm. [11, 12]

Calculation:

$$C = 150 * \frac{(\Delta A RB - \Delta A Sample)}{(\Delta A RB - \Delta A STD)} \text{ mmol / l}$$

Note: C= concentration of sodium.

150 = factor.

Result and Discussion

The hypertension is one of the most common chronic diseases in Iraq, and it is the main causes with the diabetes mellitus (DM) for ischemic heart diseases (IHD), cerebrovascular accident (CVA) & sudden death [7]. There is many causes lead to fail the programs of management and control of hypertension, these causes:-

- The overweight (obesity).
- Higher sodium dietary intake / day.
- Psychological problem.
- Other diseases such as urinary tract infection (UTI).

Many Iraqi patients have no health educations and low information about the control and management of chronic disease, and some wrong behaviors that effect directly on control & management of hypertension,

one of these higher sodium intake daily, even the patient know the effect of sodium, but may be the patient neglect the health or he don't trust about this information. The studies discuss the direct effect of sodium dietary intake on increase blood pressure in patient already have a hypertension, by measured the sodium level in a sample of serum from 150 patients that labeled as a primary hypertension, with the same medications (from M.O.H), and the body weight within normal range, from both sex with different age, collected from east Baghdad al-Resafa'a [50 samples from north east (al adhamiah city), 50 samples from middle east (al sa'ader city) & 50 samples from south east (al zafaraniyah city)], by co-operation with PHCC (primary health care centers) in these cities, we take the samples of blood with the answer on the questioners that given to the patients.

The normal range of Na⁺ (135-155) mmol /l.

Salt (sodium) is essential to our bodies. Normally the kidneys control the level of salt. If there is too much salt, the kidneys pass it into urine. But when our salt intake levels are very high, the kidneys cannot keep up and the salt ends up in our bloodstream. Salt attracts water. When there is too much salt in the blood, the salt draws more water into the blood. More water increases the volume of blood which raises blood pressure [8, 9]. We need about 500 milligrams of salt every day for your body to function. Most people take in about 10 times that amount daily. The recommended amount of salt for people with high blood pressure is about 1500 milligrams a day. In patient with hypertension the amount of daily sodium intake may be reduced to less than 500 mg / day [9]. The result shows there is a high percent of patients suffer from uncontrolled blood pressure even take the medication, and the main causes sodium intake in case we neglect the psychological effect because it's general situations. And this study shows the direct effect of sodium intake in management of primary hypertension.

The percent in these cities:-

- Al-Adhamiah 32% of patients have uncontrolled blood pressure.
- Al-Sa'ader city 58% of patients have uncontrolled blood pressure.

- Al-Zafaraniah 44% of patients have uncontrolled blood pressure.

The study shows in al-Sa'ader city there is a higher percent of these patients, then al-Zafaraniah, and al-Adhamiah last.

So, to control and decrease the complications of primary hypertension we must do some programs for health education, not by medications alone, by direct studies & use the AV (audio visual) way, as a reassurance management.

Questionnaire for hypertension patients those used the same sources of treatments from PHCC:

- Name?
- Age?
- Gender?
- Weight?
- Location?
- DO you suffer of hypertension?
- What is treatment used? From where received the treatments?
- DO you have attendance on take it treatment?
- Are you suffering of hypertension despite attendance on treatment?
- Are you continued diet or committed food special for blood pressure patient?
- Do you have any urinary tract infection, anomaly or renal diseases?
- Do you have any electrolyte disturbance?

Table 2: serum Na⁺ concentrations in hypertension patients of Al - Sa'ader city (58%)

Patient No.	Age / years	Sex ♂/♀	Serum Na ⁺ (mmol/l)
1	63	♂	139
2	55	♂	188
3	49	♀	191
4	53	♂	201
5	67	♂	190
6	71	♀	133
7	51	♀	177
8	64	♀	169
9	62	♂	149
10	70	♀	186
11	63	♀	190
12	52	♂	150
13	49	♀	167
14	56	♀	173
15	55	♂	135
16	47	♂	142
17	59	♂	160
18	52	♂	134
20	48	♂	196
21	59	♀	137
22	70	♂	181
23	49	♂	170
24	50	♀	141
25	47	♀	150
26	56	♂	188
27	55	♀	170
28	49	♂	160
29	53	♀	150
30	45	♀	177

31	57	♂	180
32	48	♀	179
33	67	♀	150
34	58	♂	163
35	51	♀	145
36	54	♂	173
37	62	♀	163
38	70	♀	177
39	61	♂	145
40	53	♂	167
41	46	♀	185
42	49	♀	176
43	72	♂	139
44	49	♀	140
45	58	♀	150
46	67	♂	167
47	49	♀	144
48	56	♂	190
49	67	♀	139
50	59	♂	147

Table 3: Serum Na⁺ concentrations in hypertension patients of Al -za'afaraniah city (44%)

Patient No.	Age/years	Sex ♂/♀	Serum Na ⁺ (mmol/l)
1	54	♂	139
2	61	♂	173
3	55	♀	167
4	62	♂	177
5	49	♂	145
6	54	♂	150
7	63	♀	164
8	59	♂	189
9	56	♀	153
10	47	♀	140
11	57	♀	139
12	62	♀	133
13	72	♀	159
14	47	♂	158
15	55	♂	148
16	51	♀	139
17	60	♀	142
18	49	♂	150
19	53	♀	167
20	58	♂	166
21	62	♂	150
22	52	♀	139
23	57	♂	172
24	61	♀	161
25	46	♂	177
26	71	♀	134
27	53	♀	147
28	68	♀	153
29	51	♂	171
30	58	♀	159
31	49	♂	161
33	72	♀	174
34	47	♀	151
35	56	♂	180
36	61	♀	177
37	48	♂	182
38	53	♀	139
39	47	♀	147
40	53	♂	160
41	55	♀	172
42	69	♂	155
43	53	♀	147
44	56	♀	152
45	58	♀	157
46	61	♂	145
47	49	♂	144
48	53	♀	134
49	51	♀	153
50	46	♂	142

Table 4: Serum Na⁺ concentrations in hypertension patients of Al – adhamiah (32%)

Patient No.	Age / year	Sex / ♂♀	Serum Na ⁺ (mmol / l)
1	56	♂	149
2	61	♂	155
3	72	♀	160
4	68	♂	142
5	52	♀	148
6	58	♂	170
7	48	♀	159
8	50	♀	162
9	55	♂	139
10	64	♀	153
11	66	♂	180
11	66	♂	180
12	54	♀	150
13	81	♀	157
14	44	♂	167
15	48	♂	145
16	57	♀	177
17	49	♀	140
18	56	♂	184
19	43	♀	157
20	52	♂	135
21	67	♂	145
22	53	♂	152
23	51	♀	155
24	47	♂	146
25	57	♀	170
26	45	♀	134
27	59	♀	139
28	64	♀	170
29	54	♂	139
30	58	♀	140
31	53	♂	144
33	49	♂	150
34	74	♂	153
35	46	♂	145
36	54	♂	178
37	51	♂	180
38	49	♀	150
39	58	♂	152
40	59	♀	149
41	50	♀	146
42	73	♀	190
43	63	♀	138
44	61	♂	178
45	54	♂	146
46	50	♂	150
47	46	♀	147
48	74	♀	153
49	67	♂	144
50	62	♂	139

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