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Comparison between Hypertensive and Non-Hypertensive Individuals in the Value of Response to Salt Administration

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Abstract

Background: consumption of,salt (sodium-chloride) causes,increment of blood pressure (B.P) in both normal and,hypertensive individuals, that is why,the use of diuretics which eliminate salts from the body decreases the B.P. and used as a line of treatment,in hypertension.

Objective: the study,aims to know whether there is any,difference in the increment of B.P. both systolic and diastolic between normal people and hypertensive people after giving salt orally.

Method: one hundred individuals were involved in the study, 50 patients were hypertensive,individuals (25 males and 25 females) and labelled as group A, and 50 persons (25 males and 25 females) were normal individuals and labelled as group B and played as control. After full physical examination including 3 times B.P. checking before and after giving 6 gm of sodium-chloride (table salt) orally ; after 2 hours the values of B.P. were recorded and statistical,analysis was done to know the difference,between the two groups.

Results: in all individuals of both groups, the B.P. increased,after salt consumption. In group A (the hypertensive group) the mean increment,of systolic B.P. (S.B.P.) was (15.98) mmHg and the mean diastolic B.P. increment (D.B.P.) was (9.4) mmHg , while the mean S.B.P. increment,in group B was (8.7) mmHg and mean D.B.P. increment was (8.0) mmHg.

Conclusion: the study showed significant difference in the increment of B.P., both systolic and diastolic between the two groups, showing that hypertensive group is more sensitive to salt consumption than normal individuals (the control group).

Keywords: *systolic B.P. , diastolic B.P., increment, sodium-chloride.*

Introduction

Hypertension (HTN) is a major health,problems world wide [1]. It is defined as chronically,elevated blood pressure (B.P.) and the British hypertensive society defined B.P. as :1- optimal if the B.P. > 120 mmHg systolic,and less than 80 diastolic, 2- normal B.P. as > 130/85 mmHg and 3- high normal of 130/89 mmHg [2].

Elevated,arterial B.P. is a major cause of premature vascular disease leading to cerebrovascular events, coronary heart disease,and peripheral vascular disease [3] .

In the past 1-2 decades, hypertension varied in prevalence,from western compared with eastern,countries e.g. it was very high in Germany and lowest in china. Now a days,the differences are less [4] .

Recently no much difference was found between developed,and developing countries, although it is still high,especially among black Africans (40-45-%) prevalence rate.

According to WHO reports in 2008, the prevalence,of high B.P. in Iraqi people was 40% among 25 years,old and above , in Oman also 40% (NCD/ Oman country WHO https:// www. WHO. Int/ beat – ncd / countries/ Oman/ enl). In Indian WHO 2008 also reported a prevalence,rate of (32-5)%. In November 16, 2006 the largest rise in prevalence of adults has been in Canada & U.K.

It is documented that HTN immediately,rises after the age of 60 years [5].

Essential hypertension,has no single or definite cause, there are multiple factors e.g. heredity, environmental,factors e.g. obesity, alcohol, smoking,and high salt intake and,probably other factors [3] .The effect of salt,consumption on B.P. differs among different,people and high potassium intake does the opposite effect.

Japanese who live north east of Japan eat more apple,which is rich in potassium suffer from low,cardio-vascular hypertension complications e.g. apoplexy compared with other regions in,Japan [6].

A positive linear correlation between,salt intake and B.P. which has been considered,since ancient times [7].

Experimental observations over the,few past decades have indicated that B.P. can significantly be reduced with salt restriction,and enhancing sodium excretion in urine,with the use of diuretics [8, 9, 10].

Diner stein in August. 9. 2018 wrote that 1 gm of salt consumed,increases B.P. by 3 mmHg [11] .

Patients and methods:

One hundred individuals were a dopted to this epidemiological,study. Fifty patient with hypertension,either having uncontrolled or controlled,B.P but should have BP less than 160/100 mmHg to avoid complication during the study.

This group is labelled as group A, they were 25 males,and 25 females. The same for normal individual, as control(group B) , for comparison they accepted to carry out the study,by their own wish (volunteers).

The study was conducted in the Al-Hussain teaching,hospital (Al-Hussain medical city), at the out patient medical,clinic. Hypertensive patients were labelled as group A and companions,of patient were labelled as control.

The study was conducted,from first February to first June 2019. For every individual after complete physical examination,including taking B.P at sitting position 3 times with 5-10 minutes,intervals in between, taking the mean B.P for both group, then 3 ml of blood was taken from each person for routine,blood test e.g.RBS, or (FBS) B. urea, S. creatine ,S. uric acid and CBP.

Blood pressure was taken,according to the strict B.P guide line, suspected white coat hypertension persons, pregnant,ladies and patient with renal failure were excluded from the study as well as patient,with B.P higher than 160/100 mmHg.

Then each individual was given 6 gm. of pure salt (measured by gold balance). Two,hours later the B.P was re-measured as before taken the average B.P. finally all data were collected,and statistically analyzed.

Results and Discusion

One hundred,individuals were studied. Fifty hypertensives and 50 normals as group A and as group B respectively. Each group,contained 25 males and 25 females they were matched for age and sex. Their ages ranged from 35-78 years with a mean of 60 $^{+}$_5 SD. The majority of individuals,lie in the age group 57-78 years (69%) , (table 1).

The prevalence rate of hypertension,for females and males differ slightly with 37.8% vs. 38.5% respectively – (table 2). The degree of increased,in S.B.P. among group A ranged from 1 to 20 mmHg with a mean of 15.98 - (table 3), while the degree,of increment of D.B.P. was also from 1-20 with a mean of 9.4 mmHg.- (table 4).

In group B the average,value of increment of S.B.P. was 8.2 mmHg and for D.B.P was 8.0 mmHg (table 6)

Table (1): Age distribution of both groups (n = 100)

Age groups in years	No. of individuals
35 – 45	11
46 – 56	20
57 – 67	33
68 – 78	36
Total no.	100

Table (2): Prevalence to Hypertension in both groups matched with age

Sex	Prevalence rate
Males	38.5
Females	37.8

Table (3): value of increment of Systolic B.P. in group A in mmHg (patients)

Value of increment	No. of patients	Average
0 – 5	1	15.98
6 – 10	8	
11 – 15	23	
16 – 20	15	
< 20	3	
Total no.	50	

Table (4): value of increment of Diastolic B.P.in group A in mmHg (patients)

Value of increment	No. of patients	Average
0 – 5	18	9.4
6 – 10	20	
11 – 15	11	
16 – 20	1	
Total no.	50	

Table (5): value of increment of Systolic B.P. in group B in mmHg (control)

Value of increment	No. of individuals	Average
0 – 5	25	8.7
6 – 10	15	
11 – 20	10	
Total no.	50	

Table (6): value of increment of Diastolic B.P.in group B in mmHg (control)

Value of increment	No. of individuals	Average
0 – 5	22	8.0
6 – 10	23	
11 – 20	5	
Total no.	50	

In industrialized,societies the high degree of inter-individual variability or difference of sodium intake compared to much smallesr inter individual,deference may obscure,potential biological association probably,better solved by quantitative,statistical method using,urinary sodium estimation [12] . The age distribution in the study (table 1) showed higher prevalence,value as the age advances. It is reported that the average systolic,B.P (SBP) rises with age while the diastolic,B.P. (D.B.P.) rises up to the age of 50 years and then declines [13] . The sex deference in prevalence,rate also showed little difference with slight male preponderance. After adjusting for age no significant,difference between sexes in mean prevalence except for higher prevalence among men in developed,countries [14]. The average male,prevalence rate in developed,countries is 40.8% VS 32.2% in developing countries , while in female the prevalence rate was 33.0% VS 30.5% respectively, these figures are not far away from the study figures (table2) . High salt intake is the major,cause of raised B.P and,accordingly leads to cardiovascular disease as well as,recently showed association with increased risk of obesity through sugar- sweetened beverage,consumption [15]. Uptill now the exact pathophysiology,of how increased salt intake,increases B.P is unknown, but the known fact is that high salt intake,increases B.P, while reducing daily,salt intake reduces B.P, as well as by using diuretics [16].

Conclusion

The study showed that salt intake,increases both S.B.P. and D.B.P., but the increment is different in the two groups (A & B) e.g the value of increment is more obviously higher in group A (the hypertension,group), than group B (the control group) as shown in,tables from 3 to 7 . especially noted by highly significant increment

of the S.B.P. in group A compared,with group B but to a lesser extent regarding,increment in DBP between the two groups.

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Conflict of Interest: None to declare.

Ethical Clearance: All experimental protocols were approved under the AL- Safwa University College, Karbala province, Iraq and all experiments were carried out in accordance with approved guidelines.

References

1- Oparil S , Calhoun DA . High blood pressure in: Dale and Federman . Scientific American,Medicine , New York, web MD, 2003; 1: 195-210.

2- New by DE, Grubb NR, Bred burg A; Cardiovascular disease, Hypertension,In: Colledge NR, Walker BR, Ralston SH, Davidson's principles and practice,of Medicine, 21st edition , Edinburgh, Churchill Livingstone 2010;606-612.

3- Camm AJ , Bunce N . Systemic Hypertension,In : Kumar and Clark Michael , clinical Medicine, Seventh edition , Edinburgh Saunders 2009; 798-805.

4- Al-Hilali KA . Prevalence of Hypertension,among companions of patients attending outpatient clinics ; Karbala J. Med, December 2007 ; 1 (3) :211-216.

5- Sharms Sat . The prevalence of hypertension,immediately increases with patients older than 60 years, 2001. available at http:// www.e medicine. Com/med/topic 1106.htm.

6- Sasak N . High blood pressure and salt,intake in Japanese , Japanese heart Journal .1962; 3 (4): 313:34.

7- Liu Z . Dietary Sodium and The incidence,of hypertension in Chinese population : a review of international survey . AMJ hypertens 2009; 22: 929-933.

8- Altun B, Airc M . Salt and blood,pressure , Time to challenge, cardiology 2006; 105: 9-16.

9- He FJ Mac Gregor GA, A comprehensive review on Salt and health had current experience of wide world salt restriction programs. J. Human Hypertens 2009; 23:363-384.

10- Yerden M , Arici B, Altun ,et al. The relation between hypertension and salt intake in Turkish population ; Salturic Study, Google- windows, Internet explorer. 2017.

11- Dinerstein . relation of salt to,Hypertension , A M council on Scientific and health August 9. 2018.

12- Cooper et al . assessment,of the association between,habitual salt intake and high blood pressure Methodological,problems, AMJ of epidemiology , august 1979; 110(2): 219- 226.

13- Rockwood , MRH BE ng ,Howlett SE . Blood pressure in relation to age and frailty , Canadian Geriatric Journal 2011; 14(1) :March PMC 3516342.

14- Periera et al . Difference in Prevalence , awareness , treatment and control of hypertension between developed and developing,countries J of hypertension May 2009; 27 (5): 963-975

15- Yuan MA , Feng J, He , Graham A, Mac Gregor. High salt intake ; Independent,risk for obesity, hypertension, 2015; 66: 843-849.

16- Alderman MH reducing daily sodium, the case for caution, JAM, 2010; 303:448-449.