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Research Article

### EXISTENCE OF HYPERTENSION IN PEOPLE DEVOURING ROUGH WATER OR FRESH WATER AND HARDNESS LEVELS, IN PERSON WATER PROPERTIES

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**Abstract:**

**Objective:** The point of our investigation was to think about the presence of hypertension in individuals devouring hard water or new water and level of hardness, in individual water assets in Lahore Punjab, Pakistan.

**Methods:** A cross sectional investigation was led in Mayo Hospital, Lahore from March 2019 to February 2020. There are two wellsprings of water supply in the territory; downpour water/hard water. 340 individuals were incorporated. Individuals > 18years old enough, living in Lahore for > 5 years were incorporated. Individuals having persistent kidney infection, diabetes, or ingesting hostile to hypertensive medications/oral calcium supplements were barred. Segment highlights, Body Mass Index (BMI) and pulse were recorded. Water test was checked imposition. Hardness of > 180 ppm was viewed as hard. Hypertension was looked at be-tween individuals devouring hard or new water.  $p < 0.05$  was considered measurably huge.

**Result:** Out of 340 individuals, 80 (23.5%) had hypertension; in individuals burning-through hard water 38 (20%) were hypertensive while 42 (28%) individuals burning-through new water were hypertensive. This distinction was not discovered to be measurably critical. While testing the hardness of water assets, the degree of hardness was discovered to be high, 3 out of 4 supplies; which were not reasonable for human utilization.

**Conclusion:** We infer that hypertension is not any more typical in individuals taking new water than hard water; however, the underground well water in region of Lahore has elevated levels of hardness.

**Keywords:** hypertension, Soft Water, Hard water.

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**INTRODUCTION:**

Water is essential for hydration and therefore for life. The safe drinking water supply has high impact on protecting human health. It is estimated that approximately 17% of the world's population uses water from the unprotected and remote sources, that means approximately, 884 million people lack access to safe water supplies; approximately one in eight people [1]. Among them large number of people consume hard water. Hard water is usually defined as underground water, which contains a high concentration of calcium and magnesium salts [2]. However, several other dissolved metals can cause hardness; those forms divalent or multivalent cations, including aluminum, barium, strontium, iron, zinc, and manganese. Some impurities of underground water can be significant etiological factor for diseases such as gastrointestinal problems, reproductive failure, neural diseases, and renal dysfunction [3]. However, some minerals especially high levels of calcium and magnesium salts in water have protective effect on hypertension and ischemic heart disease It is thought that higher content of calcium and magnesium salts in hard water decreases vascular tone and thus protective against hypertension [4]. Number of large-scale studies show protective effect of hardness of drinking-water on hypertension and cardiovascular disease However, no clear association has been found in some other studies the variability in the results is likely because of different ecological and geographical settings, having different forms and concentrations of minerals. Most of the studies available reflect European data; Asian and African data is very sparse. To date there is no study Pakistan regarding protective effect of hard water on in blood pressure [5]. Since the results are highly variable with ecological environment, studies from local areas will be of great value to get the knowledge about, effects of using hard water on blood pressure levels. The primary objective of our study was to compare the presence of hypertension in people consuming hard water or fresh water and secondarily measuring level of hardness, in individual water resources in Lahore Pakistan.

**METHODOLOGY:**

A cross sectional investigation was led in Mayo Hospital, Lahore from March 2019 to February 2020. This village is 150 away from metropolitan city Karachi, estimated population of the area is 2500; out of which 1500 are adults; the people of area mostly belong to low socioeconomic class; farmers and laborers by profession; with low literacy rate, lack of health awareness and limited accessibility to healthcare facilities. The reason for selecting Lahore areaways, the population was using both hard and soft water,

making comparison of hypertension easy There are two main sources of water supply in Lahore area; people living in Southern area of village mainly consume fresh water from small local reservoir i.e. rainwater; while in rest of the area relies on hard water from four hand pumps Our sample size was estimated to be 300 subjects (representing 20% of given population) on the basis of National Health Survey in Pakistan<sup>9</sup> but 340 people approached us so we included all of them in study. Sampling technique was purposive on-probability sampling. Inclusion criteria comprised people >18 years of age, living in Lahore for at least 5 years. People having chronic kidney disease, diabetes, or taking anti-hypertensive drugs/oral calcium supplements were excluded Informed consent was taken before enrolling in the study, participants were reassured that their identification will not be disclosed and collected information will be used for research purpose only. We collected information regarding demographic features age, gender, risk factors for hypertension like smoking, and family history of hypertension. We inquired about type of water being consumed (well water or fresh water), average daily intake of water measured by number of glass/day); rough estimate of daily salt intake (high salt diet/pinches of table salt with meals). Body Mass Index (BMI) was measured. Blood pressure was recorded by an aneroid sphygmomanometer from right arm. Two readings were taken with interval of 5 minutes, taking the mean value as final reading. Hypertension was classified by Joint National Commission Report (JNC7)<sup>10</sup>. Blood pressure of <120/80 mmHg was considered normal, 120-139 mmHg systolic and 80-89 diastolic was considered pre-hypertension and >140/90 mmHg was considered hypertension. Sys-topic blood pressure 140-159 mmHg and diastolic blood pressure of 90-99 mmHg was considered Stage 1, while values > 160/100 mmHg was considered as Stage 2 hypertension<sup>10</sup>. Water sample was taken from soft water reservoir as well as from four hard water hand pumps and tested for hardness classification of water hardness was done on the basis of proposed classification Hardness of >180 ppm (parts per million) was considered to be very hard and unsafe for human consumption. Data was analyzed in SPSS version 17. Quantitative variables; age, daily water intake and BMI was presented as mean. While qualitative variables.

**RESULT:**

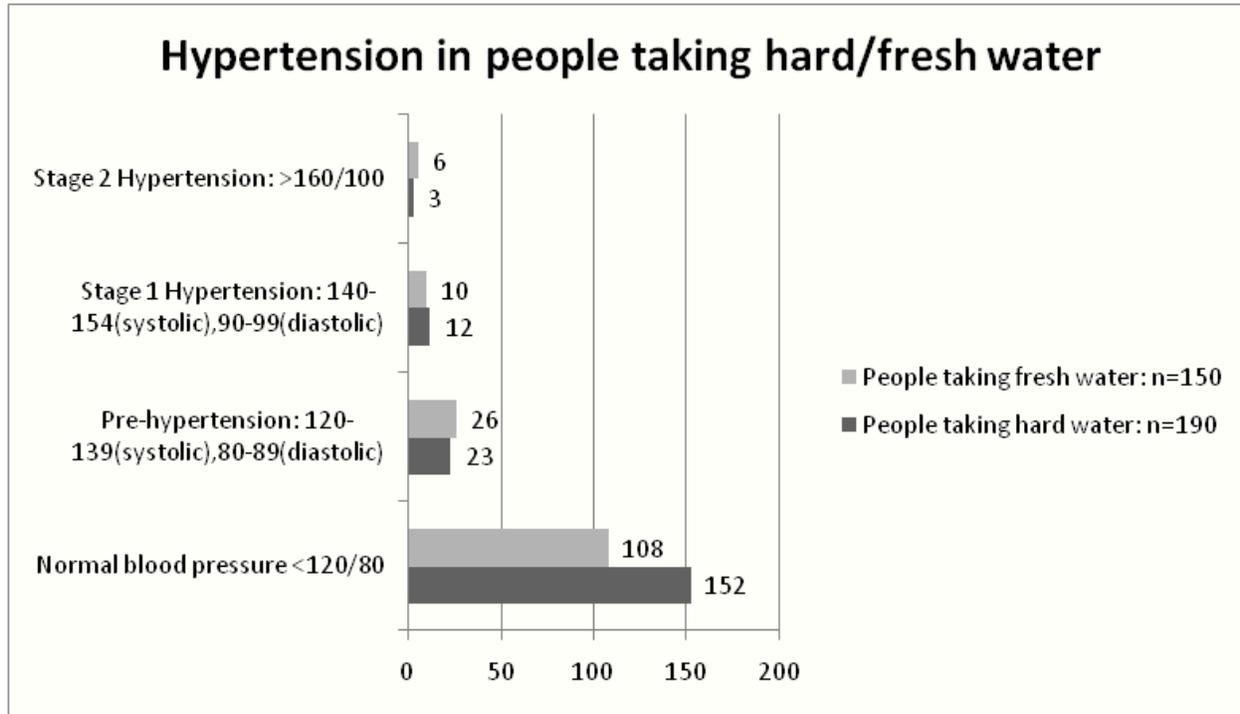
Total 340 people were included in the study out of which 216 (64%) were male and 124 (36%) were female; mean age was  $42.63 \pm 12.2$ . 190 (56%) were using hard water; while 150 (44%) were using fresh water. In hard water group 60 (31.5%) were smokers while in fresh water group 62 (41.3%) were smokers

( $p=0.16$ ). Mean BMI was 29.9 in hard water group while 27.52 in fresh water group ( $p=0.23$ ). On comparing daily water consumption, there was significant difference in average daily water intake people taking fresh water were consuming average 1400 ml/day while people consuming hard water were consuming 900 ml/day ( $p=0.01$ ). There was no significant difference between dietary salt intakes ( $p=0.457$ ) as shown in (Table 1). The results of average blood pressure readings shows that out of total 340 people; 80 (23.5%) had hypertension. In people consuming hard water 38 (20%) had hypertension, out of which 12% had prehypertension, 6% had stage I and 2% had stage II hypertension. From people consuming fresh water 42 (28%) people had hypertension, 17% had prehypertension, 7% had stage I and 4% had stage II hypertension. Although hypertension was slightly more common in people taking soft water but the difference was not statistically significant ( $p=0.23$ ). As shown in (Table 2.) and Fig. 1. While testing the water resources, the level of hardness was found to be very high, 3 out of 4 reservoirs; which were not suitable for human consumption. More importantly; nearly half 168 (49%) people were using the water from the unsafe reservoirs. The safe level of hardness (120-180 ppm) was found to be in fresh water reservoir and only one hand pump used by 172 (51%) people, as shown in (Table 3.).

### DISCUSSION:

Safe and healthy water is basic right of every human being. It is estimated that only 51% people consume safe and protected water. Hard water is defined as underground water rich in minerals especially calcium and magnesium salts [6]. The high concentration of

calcium and magnesium in water is crucial factor indicating the hardness although many other minerals are responsible for hardness like zinc, cadmium, sulphate and phosphates. Hardness generally enters groundwater as the water percolates through minerals containing calcium or magnesium. The most common sources of hardness are limestone (which introduces calcium into the water) and dolomite (which introduces magnesium) [7]. Number of studies have postulated that magnesium and calcium supplementation in water and diet is not only protective against cardiovascular disease and hypertension but also lower the blood pressure in people with pre-existing hypertension. It has been thought that magnesium, as well as calcium, decrease in vascular smooth muscle tone, thus reducing risk of hypertension and coronary artery disease [8]. Protective role of hard water on blood pressure has been studied in few studies. Since the concentration and composition of hardness extremely varies in different ecological and geographical boundaries, that's why the results are also variable. In our study we observed that hypertension was slightly more common (28%) in people taking soft fresh water as compared to people taking hard water (20%) but statistically the difference was insignificant [9]. Unfortunately, there is paucity of national and international research on this topic. Kawano *et al.* conducted a study on 67 people also concluded that protective effect of hard water was small and significant. Moment *et al.* conducted a study in Ireland. Rylander *et al.* conducted a study in Sweden observed that hard water had favorable effects on cardiovascular disease and blood pressure. Sauvant *et al.*, Monarca *et al.*, Lake *et al.* and Tubek *et al.* in quantitative reviews of several epidemiological as well as analytical studies observed [10].



the benefits effect of calcium and magnesium con-tents in water on cardiovascular mortality as well as hypertension.

#### CONCLUSION:

We conclude that hypertension is no more common in people taking fresh water than hard water; in area of Lahore, but the level of hardness is inappropriately high in most water resources

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