# IDENTIFYING EFFECTIVE CAUSES OF HYPERTENSION IN NORTHERN AREA OF BANGLADESH

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**Abstract:** The rate of morbidity and fatality owing to non-communicable diseases has been risen recent years in Bangladesh. One of the non-communicable diseases is hypertension. This cardiovascular disease is a serious risky cause of the human body which may bring hazards at any time. The main aim of this research is to pull out the effective causes of hypertension and also study about the prevalence of it in the northern area of Bangladesh. We have collected data from two northern division of Bangladesh. From this study, we found younger people have less chance to attack with hypertension and it showed the positive association with food habit, taking fatty food, smoking, alcohol consuming, taking extra salt and family past history compared with the disease and these are the significant factors to develop hypertension. This study revealed that among all other factors consumption of fatty food, intake of extra salt and having family past history with hypertension are the higher influencing factors to develop hypertension in northern area of Bangladesh.

**Keywords:** *Hypertension, odds ratio, smoking, fatty food, family history.*

## 1. INTRODUCTION

Hypertension is a significant medical and community health topic as it is common and rises the risks of cardiovascular and kidney disease [1]. Hypertension is also known as 'silent killer'. Due to cardiovascular disease (CVD), hypertension is now extensively prevalent. According to Chowdhury *et al* (2020), 13% of global deaths occur due to hypertension and three-quarters of the world's hypertensive population exist in in low- and middle-income countries [2]. Almost 7.7 million premature life loss, about 6% burden diseases comes from hypertension [3]. Nearly 54% of total deaths are in the South East Asia area and 68% in Bangladesh resulted in non-communicable diseases [4]. In universal hypertension problem, South Asia region accounts for 23% that is an estimated 258 million suffer from hypertension problem [5]. People from this region including Bangladesh are facing increased hypertension due to some behavioral risk factors such as unhealthy diet, sedentary lifestyle, excess weight, tobacco consumption, alcohol abuse and chronic stress including ageing and urbanization [6, 7]. Hypertension is a significant risk factor for cardiovascular attack such as kidney disease, heart attack etc. According to Khanam *et al* (2019), untimely diet and insufficient physical activity lead to overweight/obesity, raises blood pressure (BP) and increases disapproving blood lipids, together with tobacco use, describe at least 75% of cardiovascular disease [8]. Thus, hypertension plays a significant role, for commonly occurring heart attack and strokes. Though, hypertension incidence varies according to gender, age group and geographic location of subjects studied the occurrence of hypertension is still high and rising in Bangladesh [2]. Therefore, we can realize about the scare of occurring hypertension. At present it is a common disease among all ages of people in Bangladesh which leads many major physical weaknesses and physical disability as well. Thus, feeling the negative consequences of hypertension and its' high occurrences, it is very necessary to know its' significant causes. The study revealed to address the factors which are responsible for hypertension. Therefore, the main objective of this study is to find out significant causes which effect on hypertension in the northern area of Bangladesh.

## 2. MATERIALS AND METHODS
### A. Sample size calculation

In April, 2019 we have collected data from two divisions situated in the northern area of Bangladesh named as Rajshahi division and Rangpur division. Rajshahi and Rangpur are the north of the capital of Dhaka, Bangladesh. The age levels of samples were divided into four categories like bellow 30 years, 30 to 45 years, 45 to 60 years and above 60 years. We have taken their education level, income and food habits under consideration for data collection. In the selected area, we collected data through structured interview method. Data has been collected by the researchers. We defined hypertension frcom some literature as systolic

blood pressure (SBP) ≥ 140 mm of hydrargyrum (Hg) and diastolic blood pressure (DBP) ≥ 90 mm of Hg [9-10]. Our study populations are aging with twenty years or above twenty years. After calculating sample size we got this number is 330 and we use the prevalence of hypertension is 26.4% and the prevalence rate presented higher in female group (32.4%) than male group (20.3%) [11]. The formula is given below:

$$n = \frac{Z_{\alpha/2}^2 pq}{d^2}$$

Where n = sample size,

    p = prevalence of hypertension in Bangladesh is 26.4%

    q = prevalence of non-hypertension in Bangladesh is 73.6%

    d = allowable error (5%)

    $z_{\alpha/2}$ is the value cutting off an area of α /2 in the right hand tail of the standard normal distribution and 5% level of significance its value is 1.96.

So $n = \frac{Z_{\alpha/2}^2 pq}{d^2} = 298.5 \approx 299$

We added 10% nonresponsive rate and finally we got the sample size is 330. Among all of these respondents, 165 are collected from Rajshahi division and other 165 data collected from Rangpur division through simple random sampling technique.

### B. Odds ratio (OR)

In medical science odds ratio is vastly used statistical technique. In cross-sectional studies or case-control studies, we can use this measure. It is a method of association between an exposure and an outcome. It describes the odds that an outcome will occur given a certain exposure, with weighed to the odds of the outcome occurring in the non-existence of that exposure. The OR can be estimated as

$$OR = \frac{a/c}{b/d} = \frac{ad}{bc}$$

    Where a = Number of exposed cases

    b = Number of exposed non-cases

    c = Number of unexposed cases

    d = Number of unexposed non-cases

The interpretations from the OR will be

Estimated in case-control studies as occurrence of outcome is unknown

- OR >1 shows increased happening of the event
- OR <1 shows decreased happening of the event

Also we need to calculate confidence interval (CI) and P value for statistical significance of value.

95% confidence interval for an OR = $e^{(\ln(OR) \pm 1.96 \sqrt{(\frac{1}{a} + \frac{1}{b} + \frac{1}{c} + \frac{1}{d})})}$

There are some writings about OR is available [12-14].

## 3. RESULTS AND DISCUSSION

The rate of prevalence of hypertension is more in males, which is 55.8% compared with female (41.4%) according to our collected primary data. Maximum respondents were at the age of 45 – 60 years and illiterate. Also the following diagram depicts that in the age group of 45 – 60, the frequency rate of suffering from hypertension is maximum and in the age group of below 30, the frequency rate of suffering from hypertension is minimum.
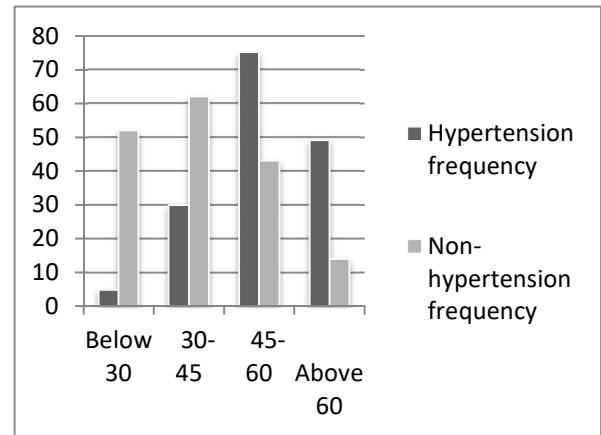


**Fig. 1:** Different age groups

Figure 2 shows high rate of frequency of hypertension for taking extra salt. Taking extra salt in foods increase the prevalence of hypertension.
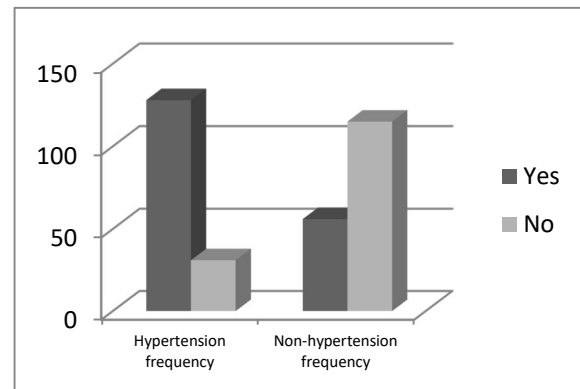


**Fig. 2:** Characteristics of taking extra salt

The prevalence rate of this disease in excessive salt consumed is 69.6%.

For the variable of age group, the odds ratio is minimum one compared with the reference age group above sixty years. So we can say from this research according to our data is that the rate of rising hypertension among younger people has less probability. A study showed one adults in five aged as 25 years or more suffering from hypertension in Bangladesh according to nationally representative

sample and the rate of hypertension growing with the increasing age and BMI [15]. The prevalence of this cardiovascular disease in fatty food intake persons is 82.4% and the odds ratio for fatty food consumed is 16.269 which is relatively large compare with not taking fatty foods. It indicates an alarming position for hypertension to take fatty foods. If we consume more

fatty food, then also the hypertension will develop more. They have positive associations. Since we got the odds ratio is greater than one for the variable of food habit and it is 3.336 with reference to vegetarian, which indicates that there was a low chance of rising hypertension in the vegetarian group.

**TABLE I:** SOCIODEMOGRAPHIC ATTRIBUTES AMONG MALES AND FEMALES IN RAJSHAHI AND RANGPUR DIVISION IN BANGLADESH

| Variable | | Hypertension | | P value | Odds Ratio |
|---|---|---|---|---|---|
| | | Yes | No | | 95% CI |
| Sex | Female | 72(41.4%) | 102(58.6%) | 0.009 | 0.560 (0.362-0.867) |
| | Male | 87(55.8%) | 69(44.2%) | - | Ref |
| Age | Below 30 | 5(8.8%) | 52(91.2%) | 0.000 | 0.027 (0.009-0.082) |
| | 30-45 | 30(32.6%) | 62(67.4%) | 0.000 | 0.138 (0.066-0.289) |
| | 45-60 | 75(63.6%) | 43(36.4%) | 0.05 | 0.498 (0.247-1.066) |
| | Above 60 | 49(77.8%) | 14(22.2%) | - | Ref |
| Education | Illiterate | 77(67%) | 38(33%) | 0.012 | 3.039 (1.25-7.40) |
| | Primary | 5(22.7%) | 17(77.3%) | 0.205 | 0.441 (0.123-1.584) |
| | Secondary | 32(56.1%) | 25(43.9%) | 0.178 | 1.92 (0.738-4.99) |
| | Higher Secondary | 10(19.6%) | 41(80.4%) | 0.058 | 0.366 (0.127-1.053) |
| | Bachelor degree | 25(41.7%) | 35(58.3%) | 0.887 | 1.071 (0.414-2.772) |
| | Post graduate | 10(40%) | 15(60%) | - | Ref |
| Income | Below 20000 | 95(56.2%) | 74(43.8%) | 0.008 | 3.851 (1.339-11.08) |
| | 20000-40000 | 25(31.6%) | 54(68.4%) | 0.563 | 1.389 (0.454-4.247) |
| | 40000-60000 | 34(54.8%) | 28(45.2%) | 0.02 | 3.643 (1.178-11.265) |
| | Above 60000 | 5(25%) | 15(75%) | - | Ref |
| Food habit | Non-Vegetarian | 122(58.9%) | 85(41.1%) | 0.000 | 3.336 (2.076-5.362) |
| | Vegetarian | 37(30.1%) | 86(69.9%) | - | Ref |
| Fatty food Intake | Yes | 117(82.4%) | 25(17.6%) | 0.000 | 16.269 (9.37-28.243) |
| | No | 42(22.3%) | 146(77.7%) | - | Ref |
| Taking extra salt | Yes | 128(69.6%) | 56(30.4%) | 0.000 | 8.479 (5.113-14.063) |
| | No | 31(21.2%) | 115(78.8%) | - | Ref |

We got significant results with age, food habit, intake of fatty food (like fast food), smoking, alcohol drunk, taking extra salt, exercise and family having past history of hypertension. Also, we found the significant result of the variable of sex. The analysis outcome is insignificant with education level, income level, sleeping hours, obesity and also for work load variables.

For smoking the prevalence of hypertension is 64.1% as well as for alcohol consumers is 61.4%.

Almost same result shows for the variables as smoking and taking extra salt and Odds ratio are 5.305 and 8.479 respectively. Moreover, there is also a positive correlation between the smoker and the disease of hypertension as well as extra salt consumed people and

hypertension. If anyone smokes, then the chance of hypertension will grow up 5.305 times more with compare to non-smoking habit and same as for taking excess salt. According to Gao *et al.* (2017), among the respondents 36–55 and 56–80 age limits was positively correlated between smoking and risk of incident respiratory diseases, hypertension and myocardial infarction in the perspective of life-course and this risk is growing with age [16]. But in this study the age limit addressed as below 30. The variables such as sex, physical exercise, father's and mother's education, regular health check up, sleep time and body mass index made direct effects on self-rated physical health among the student but the variable smoking pattern was not detected as a predictor of health status [17].

**TABLE II:** DISTRIBUTION OF COLLECTED DATA THROUGH DIFFERENT VARIABLES ASSOCIATED WITH HYPERTENSION

| Variable | | Hypertension | | P value | Odds Ratio 95% CI |
|---|---|---|---|---|---|
| | | Yes | No | | |
| Smoking | Yes | 125(64.1%) | 70(35.9%) | 0.000 | 5.305 (3.261-8.628) |
| | No | 34(25.2%) | 101(74.8%) | - | Ref |
| Alcohol drunk | Yes | 102(61.4%) | 64(38.6%) | 0.000 | 2.992 (1.911-4.684) |
| | No | 57(34.8%) | 107(65.2%) | - | Ref |
| Sleeping | Sufficient (7-8 hours) | 100(51.8%) | 93(48.2%) | 0.117 | 1.422 (0.915-2.208) |
| | Insufficient (below 7 hours) | 59(43.1%) | 78(56.9%) | - | Ref |
| Obesity | Yes | 98(52.1%) | 90(47.9%) | 0.09 | 1.446 (0.933-2.242) |
| | No | 61(43%) | 81(579%) | - | Ref |
| Work load | 5-8 hours | 87(48.1%) | 94(51.9%) | 0.963 | .990 (0.641-1.528) |
| | Above 8 hours | 72(48.3%) | 77(51.7%) | - | Ref |
| Exercise | Yes | 85(41.1%) | 122(58.9%) | 0.001 | 0.461 (0.293-0.727) |
| | No | 74(60.2%) | 49(39.8%) | - | Ref |
| Family past History of Hypertension | Yes | 130(65.7%) | 68(34.3%) | 0.000 | 6.79(4.095-11.26) |
| | No | 29(22%) | 103(78%) | - | Ref |

Also the OR is 2.992 for the variable is alcohol consumed. It has a high risk to suffer from hypertension with drunken alcohol. At the same time, this study reveals that the odds ratio for doing exercise is 0.469 compared with people who do not take exercise. Which indicates that the people are in the risky zone for the developing of hypertension who are not taking exercise. For bearing family past history of hypertension its prevalence ratio is 65.7%. Again, the people who have a family history of having hypertension, it has 6.79 times greater possibility of suffering from hypertension with compare to not having a family history of hypertension. Here 95% confidence intervals are listed and the significance of different variables was also presented significant.

Some studies showed that alcohol consume is the most efficient cause for hypertension [18-19]. We got also about alcohol that it has a significant effect on hypertension. Again family past history of hypertension is major factors to increase the risk of hypertension [18]. This analysis revealed same type result. Some research showed that lack of physical movements is responsible for hypertension, but this study found work load is insignificant where as exercise is significant here according to respondents answer. A good suggestion revealed in a study that healthy diet structures like as Nordic diet, and Mediterranean diet significantly lowered systolic BP and diastolic BP by 4.26 mm Hg and 2.38 mm Hg, respectively [20]. These diets combine with fruits, vegetables, whole grains, seeds, nuts, fish, and dairy in rich and low in meat, sweets, and alcohol. A good review presented in Grillo et al. (2019) about sodium intake associated with hypertension [21]. To prevent hypertension different approaches was presented in some studies [22,23].

## 4. CONCLUSION

This study shows the significant result with sex, age, food habit, intake of fatty food, smoking, alcohol drunk, intake of excess salt, exercise and family having past history of hypertension. So it should be avoided to drink any alcohol, smoking, intake of excess salt, fatty food item to control hypertension in the perspective of the northern part in Bangladesh. At the same time, exercise can reduce its risk. Male people are attacked more by hypertension than female in this research area of Bangladesh according to our data analysis. It also is raising the risk of hypertension with our age as older is more risky zone for hypertension. So it is one of the recommendations from our study that take a clam and quite food and lead a structured life which can reduce the rate of hypertension. Foods are more accountable for this disease. So we should try to concentrate on our food habit. As days past we go through older more and risk will come to us about hypertension. If we focus on our life leading part consciously then more time we can belong with physically fit.

In this current study, different causes of hypertension in Rajshahi and Rangpur division has explored with a structured questionnaire. Future scopes of this study can

be using more new variables or characteristics in a wide range to explore significant causes of hypertension all over the country.

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