**International Journal of Medical and Health Research**
**ISSN: 2454-9142; Impact Factor: RJIF 5.54**
**Received: 23-05-2019; Accepted: 27-06-2019**
**www.medicalsciencejournal.com**
**Volume 5; Issue 8; August 2019; Page No. 224-227**

# Factors responsible for incidences of hypertension in females from Bihar region

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**Abstract**
If the situation of the risk-factors for the hypertension is identified in the population, and appropriate action is taken to reduce the adverse-health life styles; the prevalence of hypertension will be effectively controlled. Hence based on above literature findings the present study was planned to evaluate the factors responsible for incidences of hypertension in females from Bihar region.

The present study was planned in Department of Medicine, Darbhanga Medical College and Hospital, Laheriasarai, Darbhanga, Bihar from January 2018 to july 2018 Total out of 378 females visiting the Hospital for the routine check-up 50 cases were identified with the symptoms for the hypertension were included in the present study. The detailed information were collected regarding the all basic factors. As we know, the main factors that contribute to the development of high blood pressure include age, sex, unhealthy diet, tobacco use, physical inactivity, harmful use of alcohol, obesity, etc., impact of these main risk-factors were taken into account for the present study.

The data generated from the present study concludes that increase in age, large family size, occupation, obesity, use of oral contraceptives and diabetes mellitus were found to be associated with hypertension. There is a necessity for the health care providers to take note of this trend and institute appropriate preventive measures, including changing life style modifications. Also many of the participants identified as pre hypertensive are at risk of developing hypertension, thus immediate interventions are indicated, including information, education and communication activities to generate and sustain health awareness; promote blood-pressure check-ups; and reduce mean sodium consumption at the community, household and individual levels.

**Keywords:** hypertension, blood pressure, BP, females, Bihar region, etc

## Introduction

Hypertension, or high blood pressure, is the constant pumping of blood through blood vessels with excessive force and is one of the most important causes of premature death worldwide. In 2025, an estimated 1.56 billion adults will be living with hypertension. Hypertension kills nearly 8 million people every year, worldwide and nearly 1.5 million people each year in the South-East Asia (SEA) Region [1].

Hypertension, also known as high or raised blood pressure, is a condition in which the blood vessels have persistently raised pressure. Blood is carried from the heart to all parts of the body in the vessels. Each time the heart beats, it pumps blood into the vessels. Blood pressure is created by the force of blood pushing against the walls of blood vessels (arteries) as it is pumped by the heart. The higher the pressure in blood vessels the harder the heart has to work in order to pump blood. If left uncontrolled, hypertension can lead to a heart attack, an enlargement of the heart and eventually heart failure. Blood vessels may develop bulges (aneurysms) and weak spots due to high pressure, making them more likely to clog and burst. The pressure in the blood vessels can also cause blood to leak out into the brain. This can cause a stroke. Hypertension can also lead to kidney failure, blindness, rupture of blood vessels and cognitive impairment [2].

Hypertension (HTN or HT), also known as high blood pressure (HBP), is a long-term medical condition in which the blood pressure in the arteries is persistently elevated. High blood pressure typically does not cause symptoms. Long-term high blood pressure, however, is a major risk factor for coronary artery disease, stroke, heart failure, atrial fibrillation, peripheral arterial disease, vision loss, chronic kidney disease, and dementia [3].

Hypertension is classified as either primary (essential) high blood pressure or secondary high blood pressure. About 90–95% of cases are primary, defined as high blood pressure due to nonspecific lifestyle and genetic factors. Lifestyle factors that increase the risk include excess salt in the diet, excess body weight, smoking, and alcohol use. The remaining 5–10% of cases are categorized as secondary high blood pressure, defined as high blood pressure due to an identifiable cause, such as chronic kidney disease, narrowing of the kidney arteries, an endocrine disorder, or the use of birth control pills [4].

Blood pressure is expressed by two measurements, the systolic and diastolic pressures, which are the maximum and minimum pressures, respectively. For most adults, normal blood pressure at rest is within the range of 100–130 millimeters mercury (mmHg) systolic and 60–80 mmHg diastolic. For most adults, high blood pressure is present if the resting blood pressure is persistently at or above 130/80 or 140/90 mmHg. Different numbers apply to children. Ambulatory blood pressure monitoring over a 24-hour period appears more accurate than office-based blood pressure measurement [5].

Lifestyle changes and medications can lower blood pressure and decrease the risk of health complications. Lifestyle changes include weight loss, physical exercise, decreased

salt intake, reducing alcohol intake, and a healthy diet. If lifestyle changes are not sufficient then blood pressure medications are used. Up to three medications can control blood pressure in 90% of people. The treatment of moderately high arterial blood pressure (defined as >160/100 mmHg) with medications is associated with an improved life expectancy. The effect of treatment of blood pressure between 130/80 mmHg and 160/100 mmHg is less clear, with some reviews finding benefit and others finding unclear benefit. High blood pressure affects between 16 and 37% of the population globally. In 2010 hypertension was believed to have been a factor in 18% of all deaths (9.4 million globally) [6].

Hypertension is rarely accompanied by symptoms, and its identification is usually through screening, or when seeking healthcare for an unrelated problem. Some people with high blood pressure report headaches (particularly at the back of the head and in the morning), as well as light headedness, vertigo, tinnitus (buzzing or hissing in the ears), altered vision or fainting episodes. These symptoms, however, might be related to associated anxiety rather than the high blood pressure itself [7].

On physical examination, hypertension may be associated with the presence of changes in the optic fundus seen by ophthalmoscopy. The severity of the changes typical of hypertensive retinopathy is graded from I to IV; grades I and II may be difficult to differentiate [8]. The severity of the retinopathy correlates roughly with the duration or the severity of the hypertension.

In most people with established essential hypertension, increased resistance to blood flow (total peripheral resistance) accounts for the high pressure while cardiac output remains normal. There is evidence that some younger people with prehypertension or 'borderline hypertension' have high cardiac output, an elevated heart rate and normal peripheral resistance, termed hyperkinetic borderline hypertension. These individuals develop the typical features of established essential hypertension in later life as their cardiac output falls and peripheral resistance rises with age. Whether this pattern is typical of all people who ultimately develop hypertension is disputed. The increased peripheral resistance in established hypertension is mainly attributable to structural narrowing of small arteries and arterioles, although a reduction in the number or density of capillaries may also contribute [9].

It is not clear whether or not vasoconstriction of arteriolar blood vessels plays a role in hypertension. Hypertension is also associated with decreased peripheral venous compliance which may increase venous return, increase cardiac preload and, ultimately, cause diastolic dysfunction. Pulse pressure (the difference between systolic and diastolic blood pressure) is frequently increased in older people with hypertension. This can mean that systolic pressure is abnormally high, but diastolic pressure may be normal or low, a condition termed isolated systolic hypertension. The high pulse pressure in elderly people with hypertension or isolated systolic hypertension is explained by increased arterial stiffness, which typically accompanies aging and may be exacerbated by high blood pressure [10].

Many mechanisms have been proposed to account for the rise in peripheral resistance in hypertension. Most evidence implicates either disturbances in the kidneys' salt and water handling (particularly abnormalities in the intrarenal renin–angiotensin system) 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. Interleukin 17 has garnered interest for its role in increasing the production of several other immune system chemical signals thought to be involved in hypertension such as tumor necrosis factor alpha, interleukin 1, interleukin 6, and interleukin 8 [11].

Consumption of excessive sodium and/or insufficient potassium leads to excessive intracellular sodium, which contracts vascular smooth muscle, restricting blood flow and so increases blood pressure.

If the situation of the risk-factors for the hypertension is identified in the population, and appropriate action is taken to reduce the adverse-health life styles; the prevalence of hypertension will be effectively controlled. Hence based on above literature findings the present study was planned to evaluate the factors responsible for incidences of hypertension in females from Bihar region.

## Methodology

The present study was planned in Department of Medicine, Darbhanga Medical College and Hospital, Laheriasarai, Darbhanga, Bihar from January 2018 July 2018. Total out of 378 females visiting the Hospital for the routine check-up 50 cases were identified with the symptoms for the hypertension were included in the present study. The detailed information were collected regarding the all basic factors. As we know, the main factors that contribute to the development of high blood pressure include age, sex, unhealthy diet, tobacco use, physical inactivity, harmful use of alcohol, obesity, etc., impact of these main risk-factors were taken into account for the present study.

All the patients were informed consents. The aim and the objective of the present study were conveyed to them. Approval of the institutional ethical committee was taken prior to conduct of this study.

As per the WHO following is the blood pressure levels in different grades:

### Blood Pressure Levels [12]

**Table 1**

| Normal | Systolic: less than 120 mmHg |
|---|---|
| | Diastolic: less than 80 mmHg |
| At risk (prehypertension) | Systolic: 120–139 mmHg |
| | Diastolic: 80–89 mmHg |
| High | Systolic: 140 mmHg or higher |
| | Diastolic: 90 mmHg or higher |

## Results & Discussion

The majority of the population in India has inadequate access to healthcare. More than half of outpatient consultations are with indigenous and private medical practitioners, who do not screen regularly for hypertension. Opportunistic, clinic-based screening therefore identifies only a small proportion of hypertensives and people with undetected hypertension do not seek care from the formal health sector until they are seriously ill. Community-based screenings can improve the detection and treatment of hypertension.

Until recently hypertension was considered to be one of the important public health problems in the developed and industrialized countries only. In the developing countries, its impact was not fully felt due to presence of rampant communicable diseases. However with control of communicable disease and increased life expectancy with life style changes, hypertension is becoming one of the emerging problems with its implications for concomitant increase in risk of cardiovascular and renal disease. Different studies carried out by Indian workers revealed varying prevalence rate of hypertension among adult population depending upon the criteria taken for classification, age group and type of population studied.

The occupational status has been found to have association with hypertension in the present study. Those who were in professional group had lesser prevalence rate as compared to other category of occupation. On the contrary Padmavathi and Guptha [13] at Delhi, Gosh & Joshi *et al*. [14] at Simla found that hypertension was more common in professional group as compared to unskilled and semiskilled groups, but Mill *et al*. [15] did not find any significant association between occupational status and hypertension. Probably, the level of occupation may materially affect physical activity and other aspect of life in relation to hypertension.

**Table 1:** Details of Cases

| Factors | No. of Cases |
|---|---|
| Age (years) | 28 – 68 years |
| Total Cases Analyzed | 378 |
| Cased of Hypertension | 50 |
| Marital status | |
| Unmarried | 9 |
| Married | 41 |
| Widow/widower | 0 |
| Occupation | |
| Unemployed | 28 |
| Unskilled work | 6 |
| Semiskilled/skilled | 3 |
| Clerical/professional | 13 |
| Body mass index | |
| <18.0 | 1 |
| 18.0–22.9 | 2 |
| 23.0–24.9 | 5 |
| ≥ 25 | 42 |
| Waist circumference | |
| Normal | 7 |
| Abnormal ≥80 cm | 43 |
| Waist hip ratio | |
| Normal | 15 |
| Abnormal | 35 |
| Exercise | |
| None | 24 |
| Irregular | 23 |
| Regular | 3 |
| Daily salt intake | |
| Below average/average | 8 |
| Above average | 42 |
| Hypertension: Family history | |
| Neither parent positive | 32 |
| One parent positive | 8 |
| Both parents positive | 5 |
| Participant did not know | 5 |

Obesity is one of the risk factors for hypertension, and this has been observed in this study, as increased BMI was resulting in hypertension in the selected subjects. Similarly, Friedman *et al*. [16] carried out a 6-year follow-up study on hypertension and obesity and found that obesity and weight gain were clear precursors of hypertension.

Several communities whose intake of sodium chloride is 3 g or less per day have low average blood pressure. When these people migrate to communities where the daily salt intake is 7 to 8 g, their blood pressure increases proportionately. As these people are also exposed to new social environments with changes of dietary habits, it is unclear whether any change in salt intake is solely or partially responsible for the observed rise of blood pressure.

Radhika found that mean dietary salt intake (8.5 g/d) in the population was higher than the recommended/by the World Health Organization (< 5 g/d). Higher salt intake was associated with older age and higher income. Subjects in the highest quintile of salt intake had significantly higher prevalence of hypertension than did those in the lowest quintile. Both systolic and diastolic blood pressure significantly increased with increase in quintiles of total dietary salt both among hypertensive and normotensive subjects. Addition of salt > 1 teaspoon/day at the dining table was associated with a higher prevalence for hypertension compared to zero added salt [17].

Different studies carried out by Indian workers revealed varying prevalence rate of hypertension among adult population depending upon the criteria taken for classification, age group and type of population studied. The prevalence rate of hypertension reported in the present study 25.2% was the highest as compared to other studies in rural populations of India. The criteria taken for labelling hypertension (that is > 140 / 90 mm of Hg.), the increasing global trend in high prevalence of hypertension including rural areas due to changing life styles, stress and strain of life.

The awareness of the problem and the co-operation of rural population for subjecting themselves readily for medical examination might be some of the factors for finding the high prevalence of hypertension in the present study. According to W H O scientific group 10-20 percent of adults in the world have hypertension based on the criteria suggested by their expert committee [18]. In the developing countries [19] the prevalence rate of hypertension varied from 15 to 33 percent. Thus the prevalence rate of hypertension differs from population to population depending upon the cut-off point used.

We report that the risk for progression to hypertension in this population is associated with several socio-demographic (age, and educational status) and biological factors (overweight, blood pressure levels, and dysglycemia). Unlike the previous studies where they had used prevalent hypertension [20-21], the outcome variable in our analyses was incident hypertension, confirming temporality of association. Some findings of public health significance are that the incidence of hypertension in individuals with pre-hypertension is more than three times than in those with normal BP, and furthermore, it is considerably higher in older age groups. Even at younger age groups, hypertension incidence risk is significantly higher in individuals with pre-hypertension than in those with normal BP. Risk stratification and targeted preventive strategies among non-hypertensive persons who are at greatest risk for progression to hypertension may help prevent the rapid rise in prevalence of hypertension.

The advantage women had in the younger age group is

completely offset by higher incidence of hypertension in the older age group in comparison to men. This may be due to changes in the level of endogenous sex hormones in the postmenopausal age group as they are associated with greater longitudinal rise in BP [22]. The predilection of hypertension was 28% higher in participants above the BMI of 25 kg/m2, in comparison to individuals with BMI of 18–22.99 kg/m2, after adjustment of the effect of waist circumference and other potential confounding variables. However, it was similar in individuals with BMI of 23–24.99 kg/m2 and in individuals with BMI of 18–22.99 kg/m2. This implies that the overweight cut-off of BMI > 23 kg/m2 as suggested by some of the authors [23] are probably not relevant for hypertension risk stratification in South Asian settings.

The study also has some limitations. First, self-report bias and recall bias will have affected the validity of responses to questions about lifestyle such as alcohol or tobacco consumption and frequency of blood-pressure check-ups. Second, the study did not record the duration and quantity of tobacco consumption. Third, the findings emerging out of the current study cannot be extrapolated to the populations of all slums in India. Fourth, pregnancy-induced hypertension in the participants who were currently normotensive and not on any pharmacological or non-pharmacological treatment were considered normotensive.

**Conclusion:**

The data generated from the present study concludes that increase in age, large family size, occupation, obesity, use of oral contraceptives and diabetes mellitus were found to be associated with hypertension. There is a necessity for the health care providers to take note of this trend and institute appropriate preventive measures, including changing life style modifications. Also many of the participants identified as pre hypertensive are at risk of developing hypertension, thus immediate interventions are indicated, including information, education and communication activities to generate and sustain health awareness; promote blood-pressure check-ups; and reduce mean sodium consumption at the community, household and individual levels.

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