

# Changes in Blood Pressure Level With Aging and Factors Which Affected Blood Pressure Level and Its Association with Women Health

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**Abstract-** The aim of the present study was to examine changes in blood pressure among an adult woman with age. Hypertension is a major contributor to morbidity and mortality worldwide and is widespread in older women. Hypertension is one of the major risk factors associated with cardiovascular disease and is also a component of the metabolic syndrome. A total of 2,000 women classified in four age groups were examined: 20-30, 31-40, 41-50 and 51-60 years. Blood pressure was measured with a sphygmomanometer and a stethoscope (either electronically or directly into the arteries). In this study, we found that hypertension is a more common problem in women with increasing age. It affects all age groups, but the most vulnerable group was between 51 and 60 years old.

**Keywords:** Hypertension, Blood pressure, Sphygmomanometer, Systolic-Diastolic

## I. INTRODUCTION

Blood pressure is the force of blood that pushes against the inner lining of the arteries. High blood pressure, or hypertension, occurs when this force increases and stays higher than normal for a period (<https://www.healthline.com/health/high-blood-pressure-symptoms-women>). Hypertension and elevation of systolic or diastolic or systolic and diastolic pressure are an important public health problem due to its high prevalence, about 26% in the general population and due to the high morbidity and mortality associated. There is also evidence that changes related to the age of blood pressure occur and that these changes are gender-specific, meaning systolic hypertension is more prevalent in older women than in men. These changes related to the age of blood pressure may account for, in part, the higher cardiovascular mortality reported among older women compared to older men, and should be considered an important target for preventive strategies in older women "(Yasar et al. , 2011). The increase in Arterial pressure with age is mainly associated with structural changes in the arteries and above all with a great rigidity of the artery. It is known from several studies that the increase in blood pressure is associated with an increased cardiovascular risk. In the elderly, the most powerful risk predictor is the increase in pulse pressure due to the decrease in systolic blood pressure and diastolic blood pressure. All evidence indicates that treatment of the elderly hypertensive patient will reduce the risk of cardiovascular events. However, there is no evidence yet for the very old. This population is particularly susceptible to the side effects

of treatments and the reduction of blood pressure, although it reduces the risk of cardiovascular events such as stroke, can cause an increase in mortality (Pinto E, 2007).

Hypertension (HBP) is the biggest risk factor for disease burden worldwide. In India, hypertension has become an important risk factor for mortality. Several studies over the years have shown a growing prevalence of hypertension in India. In his article he predicted that the hypertension burden in India is expected to nearly double by 118 million in 2,000-213,500,000 in 2025. A recent systematic analysis suggested a high prevalence with poor awareness, treatment and control of hypertension in India. A population level, the effect of increased blood pressure is continuous with increased cardiovascular risk with increased blood pressure above 115/75 mmHg. According to the Global Burden of Disease-2015 analysis, estimated annual deaths associated with systolic blood pressure (SBP) of at least 110-115 mm Hg between 1990 and 2015 increase rate 135.6-145.2 100 000. However, data from India on trends in blood pressure distribution, hypertension prevalence, awareness, treatment and control of the representative population over time are scarce due to the lack of active monitoring "(Roy A et al, 2017)

**A. Age:**As people grow older, the heart tends to widen slightly, developing thicker walls and slightly larger chambers. The increase in size is mainly due to the increase in the size of the individual cells of the heart muscle. During rest, the older heart works the same way as a younger heart, except that the heart rate (the number of times the heart beats in a minute) is slightly lower. Moreover, during exercise, the heart rate of the elderly does not increase as much as in young people. The walls of the arteries and arterioles become thicker and the space within the arteries expands slightly. The elastic tissue is lost within the walls of the arteries and arterioles. Together these changes make vessels more rigid and less resistant. Because the arteries and arterioles become less elastic when people get older, they cannot relax faster during rhythmic pumping of the heart.

**B. Gender:**The prevalence of hypertension is more common in men than in women up to age 55. With aging, it begins to change because female sex hormones offer cardiovascular protection." The loss of estrogen in menopause causes a more rapid increase in the time of systolic pressure in

women than in men in fact; pre-menopausal women have a lower systolic pressure than men, whereas diastolic pressure does not differ in women and postmenopausal women. Before the age of 45, men have higher systolic blood pressure than women, whereas women have higher systolic blood pressure after 45 years.

**C. Diabetes Mellitus:** arterial hypertension (hypertension) can cause many complications of diabetes, such as diabetic eye diseases and kidney disease, or make them worse. Most people with diabetes will eventually have high blood pressure, along with other heart and circulatory problems. Diabetes damages the arteries and makes them targets for hardening, called atherosclerosis. This can cause hypertension, which if left untreated can lead to problems such as damage to blood vessels, heart attack and renal failure (<https://www.webmd.com/hypertension-high-blood-pressure/guide/high-pressure-of-the-blood>).

**D. Obesity:** Obesity is defined as an excess of body fat or adipose tissue and is often expressed in terms of body mass index. People with a BMI of  $> 30 \text{ kg / m}^2$  are considered obese. Obese people have a high risk of developing hypertension and CVD. A higher body mass index was found to be associated with an increased risk of hypertension and women with a body mass index of  $31 \text{ kg / m}^2$  had a multivariable risk. In fact, the prevalence of hypertension among overweight and obese people is higher than for people with normal weight. Epidemiological data suggest that obesity contributes to the development of hypertension early in life. It was found that the average systolic blood pressure increased with an increase in body mass index (Elhadi IE, 2007).

**E. Sodium Intake:** Some people are very sensitive to sodium and this sensitivity can lead to an increase in body fluids that lead to an increase in blood pressure. Taking more sodium than necessary can increase blood pressure. In the DASH (dietetic approach to Stop Hypertension) study, participants received meals with different salt levels for more than 4 weeks. For both DASH and traditional diets, the lower the salt intake, the lower the blood pressure. Salt reduction from an average of 10 to 5 g per day reduces blood pressure by about 5/2 mmHg with higher BP falls in the elderly and those with a higher initial level of blood pressure (Elhadi IE, 2007).

## II. DATA COLLECTION

### A. Subject Selection

The present study was conducted in the urban areas Baghpat district (Uttar Pradesh). For the study 2000 women age between 20 to 60 years were selected. All 2000 individuals were from four age groups and these age groups were 21 to 30 years (group 1), (group 2) 31 to 40 years, 41 to 50 years (group 3) and 51-60 years (group 4). Sample selection was done in such way so that each category should have at least 500 samples for making even sample distribution in all groups.

### B. Data Collection

Information about age, occupation and educational status was obtained from all subjects with the help of a questionnaire. Blood pressure was measured with a sphygmomanometer and a stethoscope (or electronically or directly in the arteries). The mercury sphygmomanometer with blood pressure was used to measure the blood pressure of the individuals included in the present study. All measurements were taken with the left hand when the subjects were sitting in position.

Each participant was asked to relax and rest for 10 minutes before taking the measurement. Systolic blood pressure was recorded as the first Korotkov sound. Diastolic blood pressure was taken as the disappearance of Korotkov sounds. The measurements were recorded three times and the average of the three was taken as a recorded measure. The digital blood pressure monitor (model M2, Omron Health Care Co. Ltd., Japan) was also used to verify the measurement. However, the type of mercury measurement for the present study was reported.

## III. RESULTS AND DISCUSSION

Hypertension, also known as high blood pressure, is a long-term medical condition in which the blood pressure in the arteries is constantly elevated. High blood pressure usually does not cause symptoms. Long-term high blood pressure, however, is an important risk factor for coronary artery disease, stroke, heart failure, arterial fibrillation and dementia. (<https://en.wikipedia.org/wiki/Hypertension>).

TABLE IV VARIATION OF BLOOD PRESSURE LEVEL AND T VALUE OF WOMEN IN VARIOUS AGE GROUPS

Variables	20-30years (group 1)	31-40years (group 2)	41-50 years (group 3)	51-60years (group 4)	t-test					
	mean±sd	mean±sd	mean±sd	mean±sd	1 vs.2	1vs.3	1vs.4	2vs3	2vs.4	3vs.4
Systolic(mmHg)	121.00±4.83	122.6±8.51	125.68±14.3	129.5±18.2	3.63*	6.89*	10.13*	4.12*	7.73*	4.74*
Diastolic(mmHg)	80.23±1.8	81.08±3.59	82.63±5.99	84.6±8.17	4.74*	8.49*	11.67*	4.86*	8.79*	4.38*

Normal blood pressure in adults is defined as a blood pressure of 120 mmHg. When the heart beats (systolic) and a blood pressure of 80 mmHg when the heart relaxes (diastolic). When the systolic blood pressure is equal to or

greater than 90 mmHg, the blood pressure is considered to increase (<https://www.cdc.gov/bloodpressure/measure.htm>).

According to table value the age group are denoted as group 1(20-30), group 2(31-40), group3 (41-50) and group 4 (51-60) according to age. As age increasing; the mean scores of systolic and diastolic blood pressure were increasing. The lowest mean score of systolic blood pressure were  $121.00 \pm 4.83$  of group, whereas highest mean score were  $129 \pm 18.2$ , and the lowest mean scores of diastolic blood pressure were  $80.23 \pm 1.8$  of group 1 whereas highest mean score were  $84.6 \pm 8.17$  of group 4.

In these groups, group 1 has lowest systolic blood pressure and group 4 has higher systolic blood pressure. After comparing group 1 with group 2, group 3 and group 4; it was found that there was higher significant difference group 4 in comparison to group 1 and group 3 in both systolic and diastolic. Further after comparing group 2 with group 3 and group 4. It was found that there was high significant difference with group 4 in comparison of group 3. So the data shows that all groups have significant difference in systolic and diastolic blood pressure both.

TABLE II PERCENTAGE OF BLOOD PRESSURE LEVEL IN WOMEN OF VARIOUS AGE GROUPS

Age group	Blood pressure	
	Normal	Above normal
21-30 years	95.8%(479)	4.2% (21)
31-40 years	95.2%(476)	4.8%(24)
41-50 years	84%(420)	16%(80)
51-60 years	73.6%(368)	26.4%(132)

In the age group of 20-30 years; it was found that most of the 95.8% women having normal blood pressure whereas 4.2% women were having high blood pressure. In the age group 31-40 years was 95.2% women had normal blood pressure whereas 4.8% women were with high blood pressure. But in age group 3 and 4, 84% and 73.6% had normal and 16.2% and 26.4% were above normal. It was found that cases of high blood pressure (Hypertension) were increasing with age.

Globally, hypertension is estimated to cause 7.1 million deaths, about 13% of the total. Approximately 62% of cerebrovascular diseases and 49% of ischemic cardiopathies are attributable to suboptimal blood pressure (systolic > 115 mm Hg). Overweight and obesity increase the risks of high blood pressure, coronary heart disease, ischemic stroke, type II diabetes mellitus and some types of cancer. Around 58% of diabetes mellitus and 21% of ischemic heart disease worldwide are attributable to Body mass index above 21 kg / m<sup>2</sup> (Tsfaye F, 2007).

In developing countries, arterial hypertension is one of the risk factors for cardiovascular disease and the estimated 7.1 million deaths, especially among middle-aged and old-age adults, is due to increased pressure blood. Developing countries are increasingly faced with the double burden of hypertension and other cardiovascular diseases, along with

infections and malnutrition. The relationship between body mass index and blood pressure has long been the subject of epidemiological research. Positive associations body mass index and blood pressure were also reported among the Asian populations (Tsfaye F, 2007).

The burden of cardiovascular disease is high in South Asian countries, in their process of economic development. Several studies indicate that high blood pressure is associated with age and is also due to the modernization process. India in a process of rapid economic development and modernization with changes in lifestyle factors has a growing tendency to hypertension, especially among the urban population (Tsfaye F, 2007).

#### IV. CONCLUSION

The increase in blood pressure has been thought to be an inevitable consequence of aging. It is known, however, that in isolated communities and in rural and underdeveloped areas this is not the case. In addition, studies on populations migrating from underdeveloped areas to developed areas show a change towards increased blood pressure, probably due to changes in diet, reduced exercise and increased stress. In some communities a correlation was found between salt excretion, sodium levels in the diet and systolic blood pressure. These and other observations have suggested that a high saline diet can induce changes in vascular smooth muscle cells resulting in collagen accumulation in the large artery walls and consequent higher arterial stiffness. The increase in blood pressure with age is most likely due to complex and various factors, modeled and influenced by the individual environment and lifestyle. Increased blood pressure is an important risk factor for chronic heart disease, stroke and coronary heart disease. High blood pressure is positively correlated with the risk of stroke and coronary heart disease. In addition to coronary heart disease and stroke, its complications include heart failure, peripheral vascular disease, renal failure, retinal hemorrhage and visual impairment (Pinto E, 2007).

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