



RISK FACTORS AND ITS COMPLICATIONS OF BLOOD PRESSURE AMONG MARWARI'S OF KHURDA DISTRICT OF KHORDA DISTRICT, ODISHA : AN EPIDEMIOLOGICAL VARIATION.

Dr. Saubhagini Mohapatra, Lecturer, Department of Anthropology, Utkal University, Bhubaneswar, Odisha, India.

Abstract:

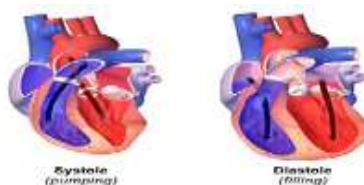
Hypertension is a major cause of premature death worldwide. Blood pressure is an important tool, led to many complications and risk factors. Globally and nationally the measurement of blood pressure is varied and related to various health problems. The epidemiology of blood pressure related to other complications of diseases, such as: cardiovascular diseases, renal diseases, etc. There are some epidemiological transitions among the peoples of India also suffered from chronic and non-communicable diseases. In the present study Blood pressure is determined among 'Marwari' community of Khorda dist, Odisha. In this study urban and semi-urban areas are included, such as: Khorda, Jatni and Bhubaneswar. There are 592 samples from which 295(49.8%) males and 297(50.2%) are randomly selected for comparing the status. With the help of conventional methodologies it is assessed that the ethnic Marwari's show the more prevalence of pre-hypertension and also associated with many diseases. Although they are clinically treated, middle aged group to higher age group suffered from pre-hypertension to hypertension.

Keywords: Blood pressure (SBP/DBP), High blood pressure/Hypertension (HBP/HPT), Epidemiology, Risk factors, Marwari.

Blood Pressure:

Blood pressure is an important tool for diagnostic index especially of circulating function and it is also the pressure of circulating blood on the walls of blood vessels (Ogedegbe et al., 2010). It is the principal vital sign, which becomes abnormally low or high, usually indicates the greater health problems. Blood pressure is the pressure of the blood in the circulatory system, often measured for diagnosis since it is closely related to the force and rate of the heartbeat and the diameter and elasticity of the arterial walls. When the heart beats, as the blood moves, it pushes against the sides of the blood vessels. The strength of the pushing is referring to as blood pressure. So it varies with the strength of the heartbeat, the elasticity of the arterial walls, the volume and viscosity of the blood, health, age, and physical conditions of the persons'.

It refers to the pressure of the blood against the walls of the blood vessels, especially the arteries. It is expressed in two figures, said to be one "over" the other : the systolic (maximum) pressure , the left ventricles of the heart contracts to push the blood through the body or the blood flow. When the heart beats (the pressure when the first sound is heard) and the diastolic (minimum) pressure, the ventricles relaxes and fills with blood or the pressure between heart beats (the pressure when the last sound is heard).



Systolic and Diastolic Blood Pressure

(Source: Health science technology, 2004)

Epidemiological view:

Firstly, Epidemiology is derived from Greek word epi meaning “upon among”, demos meaning “people and district”, and logos meaning “study” or discourse, suggesting that it applies into human population and also what “comes upon” groups of people. Epidemiology is the science or independent discipline which defined as “the study of the distribution and determinants of diseases and injuries in human populations” (Mausner et al., 1985). Epidemiology is defined as “the study of the distribution and determinants of health related status or events in specified population and the application of this study is to control the health problems” (Last, 2001). It is also the science that studies the patterns, causes, and effects of health and disease conditions in defined populations and also studies the frequency distribution and determinants of diseases in human populations (Porta, 2014).

Epidemiology of blood pressure:

Epidemiology of blood pressure is usually referred as hypertension, refers to arterial pressure being abnormally high, when the normal blood pressure relates to the force of blood pushing against walls of arteries. High blood pressure is a major risk factor for coronary artery disease, stroke, heart failure, peripheral disease, vision loss and chronic kidney disease (Lackland, 2015 and Mendis, 2011).

In recent years, the epidemiological study mainly gives the emphasis on the variation of metabolic disorders, such as hypertension, coronary heart disease, cancer, obesity, etc.

Epidemiological transition:

It is a concept first proposed by Abdel Omran in the 1971 refers to the changes in the predominant forms of disease and mortality burdening a population that occurs as its economy and health system develops. Prior to epidemiologic transition is the ‘Demographic transition’. It is the transition of high to low fertility and mortality rates in a country. Epidemiologic transition was formerly thought to be related to technological changes and industrialization but probably more directly related to female literacy and status of women than many other factors.

Stages of epidemiological transition:

There are four phases of epidemiological transition which a population goes

A: The age of “pestilence and famine”.

- The Age of Pestilence and Famine when morality is high and fluctuating. Average life expectancy at birth is low and variable, in the range of 20 to 40 years.
- Poor use of ecological resources.
- High death rates.

B: The age of “receding pandemics”.

- Population growth is sustained and begins to describe an exponential curve.
- The average life expectancy at birth increases steadily from about 30 to 50 years.
- However, there are still problems with pandemics, (diseases that occur over a wide area).

C: The age of “degenerative and manmade diseases” (Increased fat and caloric intake and decreased physical activity-rise of chronic, non communicable diseases).

- The age of Degenerative disease is when morality continues to decline and eventually approaches stability at a relative low level.

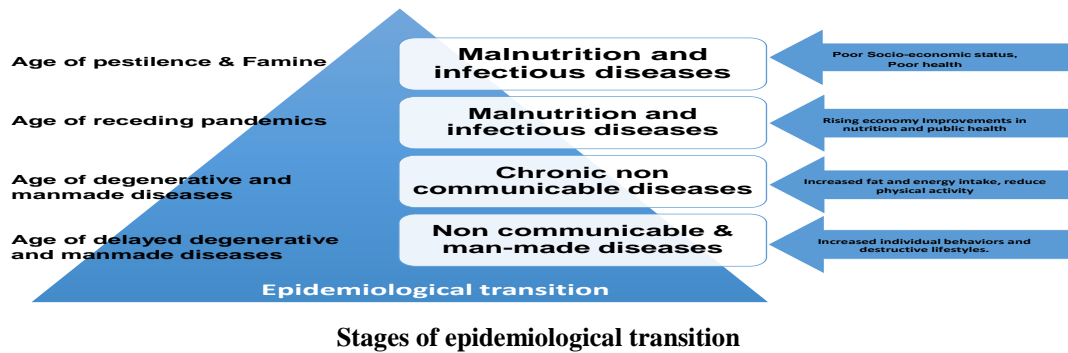
The average life expectancy at birth rises gradually until it exceeds 50 years.

- Major Health issue – Hypertension, Brain Stroke, Heart attacks and cancer
- A decline in infectious diseases.

D: The age of “delayed degenerative and manmade diseases” (Individual behaviors, destructive lifestyles and non communicable diseases).

- During this stage, morbidity and mortality are affected by man-made diseases, individual behaviors, and destructive lifestyles.

- This is the stage in which almost every developed country is at.
- In this stage most if the population is elderly and middle aged, with few children.



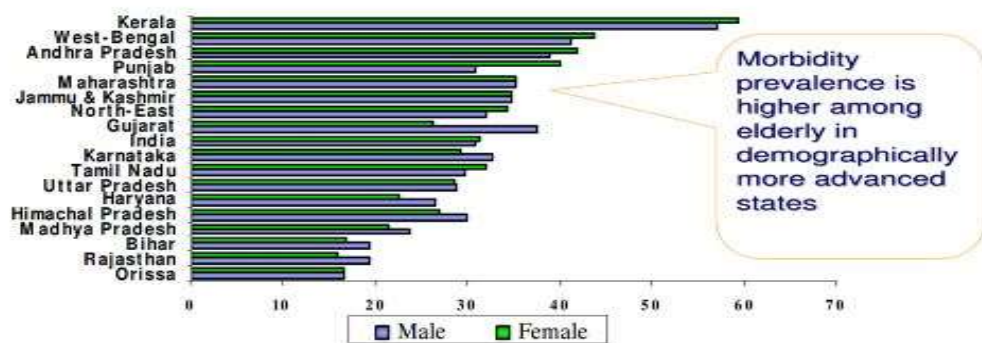
(Source: Revised model of Asiya Aston, 2015)

Transition from first phase to third phase through second phase is called epidemiologic transition (Omran, 1971). But in recent times four phases of epidemiological transition are analyzed, all the stages of the epidemiological transition model coincide with the demographic transition model. Every country undergoes this transition. Different countries take different time periods to reach the third phase from the first phase. On an average, developed countries took a shorter course than the developing countries. The developed world is now facing the epidemiological transition, i.e., a transition from infectious diseases like measles, diphtheria, pneumonia, etc., to chronic lifestyle-related diseases like heart diseases, cancer, stroke, hypertension and diabetes.

In underdeveloped countries at the early stages of epidemiological transition, infectious diseases predominate, but as the economy, development status, and health systems of these countries improve, the population moves to a later stage of epidemiological transition, and chronic non-communicable diseases become the predominant causes of death and disease (Gaziano et al., 2006).

Epidemiologic transition in India:

Currently, developing countries like India are experiencing the double burden of diseases. On the one hand, infectious diseases are still highly prevalent amongst people of the other hand, non-communicable diseases are on the rise amongst the upper class of society, as they adopt similar lifestyles as those of the developed world (Nongkynrih et al, 2004). This means that India is under a dual stage of epidemiologic transition. 80% of the India lives in villages and these rural regions having a low poor economy are straddling between the first and second stages of epidemiologic transition majority remaining in the first epidemiologic stage. Hence, it is likely that they still have a high prevalence of communicable diseases and a low prevalence of non-communicable diseases. On the other hand, urban India having a high economy is then likely to be in the third stage of epidemiologic transition and therefore, there is a rise in the non-communicable diseases in them. Therefore, India is facing double burden of diseases. National Health Survey (NHS, 2004) showed that morbidity due to chronic diseases among elderly is higher in demographically more advanced stages found to be highest in Kerala, followed by West Bengal, Andhra Pradesh, Punjab, Maharashtra, Jammu & Kashmir, North-East, Gujarat, Karnataka, Tamil Nadu, Uttar Pradesh, Haryana, Himachal Pradesh, Bihar, Rajasthan and lowest being in Odisha. It is noted that there is shift in rate from women to men from demographically more advanced stages to less advanced states with Odisha showing equal rates in both the sexes.



State wise Prevalence of chronic disease among elders

(Source: National Sample Survey, 60th round, 2004)

High blood pressure dangers:

High blood pressure is a risk factor for more than heart disease. High blood pressure (hypertension) can quietly damage the body for years before symptoms develop. Left uncontrolled, you may wind up with a disability, a poor quality of life or even a fatal heart attack. Fortunately, with treatment and lifestyle changes, high blood pressure can be controlled to reduce the risk of life-threatening complications.

Here's a look at the complications high blood pressure can cause when it's not effectively controlled.

Healthy arteries are flexible, strong and elastic. Their inner lining is smooth so that blood flows freely, supplying vital organs and tissues with adequate nutrients and oxygen. If you have high blood pressure, the increased pressure of blood flowing through your arteries gradually can cause a variety of problems.

Artery damage and narrowing

High blood pressure can damage the cells of your arteries' inner lining. That launches a cascade of events that make artery walls thick and stiff, a disease called arteriosclerosis (ahr-teer-e-o-skluh-ROE-sis), or hardening of the arteries. Fats from your diet enter your bloodstream, pass through the damaged cells and collect to start atherosclerosis (ath-ur-o-skluh-ROE-sis). These changes can affect arteries throughout your body, blocking blood flow to your heart, kidneys, brain, arms and legs. The damage can cause many problems, including chest pain (angina), heart attack, heart failure, kidney failure, stroke, blocked arteries in your legs or arms (peripheral artery disease), eye damage, and aneurysms.

Aneurysm

Over time, the constant pressure of blood moving through a weakened artery can cause a section of its wall to enlarge and form a bulge (aneurysm). An aneurysm (An-yoo-riz-um) can potentially rupture and cause life-threatening internal bleeding. Aneurysms can form in any artery throughout your body, but they're most common in the aorta, your body's largest artery.

Damage to our heart

Our heart pumps blood to our entire body. Uncontrolled high blood pressure can damage our heart in a number of ways, such as:

Coronary artery disease

Coronary artery disease affects the arteries that supply blood to your heart muscles. Arteries narrowed by coronary artery disease don't allow blood to flow freely through our arteries. When blood can't flow freely to our heart, we can experience chest pain, a heart attack or irregular heart rhythms (arrhythmias).'

Enlarged left heart

High blood pressure forces your heart to work harder than necessary in order to pump blood to the rest of your body. This causes the left ventricle to thicken or stiffen (left ventricular hypertrophy). These changes limit the ventricle's ability to pump blood to your body. This condition increases your risk of heart attack, heart failure and sudden cardiac death.

Heart failure

If our heart is not able to pump as well as it should, this is called heart failure. Heart failure can cause extra fluid to build up in the body, and can also cause an irregular heartbeat. It does not mean that your heart is about to stop working, but it is a serious condition. Over time, the strain on your heart caused by high blood pressure can cause your heart muscle to weaken and work less efficiently. Eventually, our overwhelmed heart simply begins to wear out and fail. Damage from heart attacks adds to this problem.

Damage to our brain

Just like our heart, our brain depends on a nourishing blood supply to work properly and survive. But high blood pressure can cause several problems, as follows.

Transient ischemic attack (TIA)

Sometimes called a mini-stroke, a transient ischemic (is-KEE-mik) attack is a brief, temporary disruption of blood supply to our brain. It's often caused by atherosclerosis or a blood clot both of which can arise from high blood pressure. A transient ischemic attack is often a warning that we're at risk of a full-blown stroke.

Stroke

A stroke occurs when part of our brain is deprived of oxygen and nutrients, causing brain cells to die. Uncontrolled high blood pressure can lead to stroke by damaging and weakening our brain's blood vessels, causing them to narrow, rupture or leak. High blood pressure can also cause blood clots to form in the arteries leading to your brain, blocking blood flow and potentially causing a stroke.

Dementia

Dementia is a brain disease resulting in problems with thinking, speaking, reasoning, memory, vision and movement. There are a number of causes of dementia. One cause, vascular dementia, can result from narrowing and blockage of the arteries that supply blood to the brain. It can also result from strokes caused by an interruption of blood flow to the brain. In either case, high blood pressure may be the culprit.

Mild cognitive impairment

Mild cognitive impairment is a transition stage between the changes in understanding and memory that come with aging and the more-serious problems caused by Alzheimer's disease. Like dementia, it can result from blocked blood flow to the brain when high blood pressure damages arteries.

Damage to our kidneys

Our kidneys filter excess fluid and waste from our blood, a process that depends on healthy blood vessels. High blood pressure can injure both the blood vessels in and leading to our kidneys, causing several types of kidney disease (nephropathy). Having diabetes in addition to high blood pressure can worsen the damage.

Kidney failure

High blood pressure is one of the most common causes of kidney failure. That's because it can damage both the large arteries leading to our kidneys and the tiny blood vessels within the kidneys. Damage to either makes it so that our kidneys can't effectively filter waste from our blood. As a result, dangerous levels of fluid and waste can accumulate. We might ultimately require dialysis or kidney transplantation.

Kidney Scarring (Glomerulosclerosis)

Glomerulosclerosis (gloe-mer-u-loe-skluh-ROE-sis) is a type of kidney damage caused by scarring of the glomeruli (gloe-MER-u-li). The glomeruli are tiny clusters of blood vessels within your kidneys that filter fluid and waste from our blood. Glomerulosclerosis can leave our kidneys unable to filter waste effectively, leading to kidney failure.

Kidney Artery Aneurysm

An aneurysm is a bulge in the wall of a blood vessel. When it occurs in an artery leading to the kidney, it's known as a kidney (renal) artery aneurysm. One potential cause is atherosclerosis, which weakens and damages the artery wall. Over time, high blood pressure in a weakened artery can cause a section to enlarge and form a bulge — the aneurysm. Aneurysms can rupture and cause life-threatening internal bleeding.

Damage to our eyes

Tiny, delicate blood vessels supply blood to our eyes. Like other vessels, they too, can be damage by high blood pressure.

Eye blood vessel damage (Retinopathy)

High blood pressure can damage the vessels supplying blood to our retina, causing retinopathy. This condition can lead to bleeding in the eye, blurred vision and complete loss of vision. If you also have both diabetes and high blood pressure, you're at an even greater risk.

Fluid build-up under the retina (Choroidopathy)

In this condition, fluid builds up under your retina because of a leaky blood vessel in a layer of blood vessels located under the retina. Choroidopathy (kor-oid-OP-uh-thee) can result in distorted vision or in some cases scarring that impair vision.

Nerve damage (optic neuropathy)

This is a condition in which blocked blood flow damages the optic nerve. It can kill nerve cells in our eyes, which may cause bleeding within our eye or vision loss.

Bone loss

High blood pressure can increase the amount of calcium that's in our urine. Excessive elimination of calcium may lead to loss of bone density (osteoporosis), which in turn can lead to broken bones. The risk is especially increased in older women.

Trouble sleeping

Obstructive sleep apnea - a condition in which your throat muscles relax causing you to snore loudly - occurs in more than half of those with high blood pressure. It's now thought that high blood pressure itself may help trigger sleep apnea. Also, sleep deprivation resulting from sleep apnea can raise your blood pressure.

The effects of high blood pressure:**Pregnancy**

Although many pregnant women with high blood pressure have healthy babies without serious problems, high blood pressure can be dangerous for both the mother and the fetus. Women with pre-existing, or chronic, high blood pressure are more likely to have certain complications during pregnancy than those with normal blood pressure. However, some women develop high blood pressure while they are pregnant (often called gestational hypertension). The effects of high blood pressure range from mild to severe. High blood pressure can harm the mother's kidneys and other organs, and it can cause low birth weight and early delivery. In the most serious cases, the mother develops preeclampsia - or "toxemia of pregnancy"-which can threaten the lives of both the mother and the fetus.

Preeclampsia

Preeclampsia is a condition that typically starts after the 20th week of pregnancy and is related to increased blood pressure and protein in the mother's urine (as a result of kidney problems). Preeclampsia affects the placenta, the mother's kidney and liver. When preeclampsia causes seizures, the condition is known as eclampsia the second is the cause of maternal death in the U.S. Preeclampsia is also a leading cause of fetal complications, which include low birth weight, premature birth, and stillbirth. There is no proven way to prevent preeclampsia. Most women who develop signs of preeclampsia, however, are closely monitored to lessen or avoid related problems. The only way to "cure" preeclampsia is to deliver the baby.

Diabetes

If you have diabetes, you are at high risk for heart attack and stroke. Sometimes people with diabetes focus on getting their blood sugar under control and forget that controlling blood pressure and cholesterol are just as important. Since hypertension lies a complex path physiology involving multiple pathways that modulate blood pressure, it is being increasingly observed that genetics of hypertension is not based on single gene of major effect, rather epistatic interactions among multiple genes with mild to moderate effects may contribute to its path physiology.

It appears that there is no single significance for hypertension gene; rather many genes act conjointly to confer a significant risk of high blood pressure. It is being proposed that a risk score comprising the most significantly associated variants for each blood pressure phenotype may be developed and evaluated for epistatic effect amounts to several millimeters mercury of blood pressure. In spite of availability of genomic tools that allow fast and reliable genotyping of hundreds of thousands of variants across the human genome, translation of the observed genetic information to be clinically relevant remains elusive. Several factors such as lack of quantification of gene-environment interactions; involvement of yet unknown biologic pathways, under powered studies and polygenic nature of blood pressure trait may be the limitations as seen in other complex diseases, however, these limitations may change in the future. Large scale genome wide association studies, replication studies in larger and different ethnic populations and formation of blood pressure consortiums will help in better understanding of the genetics of blood pressure and hypertension with potential benefits for prediction, diagnosis, and treatment.

Key facts of blood pressure (who):

- An estimated 1.28 billion adults aged 30-79 years Worldwide have hypertension, most (two-thirds) living in low and middle-income countries.
- Less than half of adults (42%) with hypertension are diagnosed and treated.
- Approximately 1 in 5 adults (21%) have it under control.

- Hypertension is a major cause of pre-mature death worldwide.
- One of the global targets for non communicable diseases is to reduce the prevalence of hypertension by 33% between 2010 and 2030.

Who classification of blood pressure:

As per the WHO classification 2008, (Table 1) and those with compelling indications that include diabetes, cardiovascular disease, and renal disease.

Table 1 WHO Classification of Blood Pressure (2008)

Category	SBP (mmHg)	DBP(mmHg)
Optimal	< 120	< 80
Normal	130-139	85-89
Grade 1 Hypertension	140 – 159	90 – 99
Grade 2 Hypertension	160 – 179	100 – 109
Grade 3 Hypertension	≥180	≥ 110
Isolated Systolic Hypertension	≥ 140	< 90

Materials and methods:

The study was conducted among a group of Marwari populations residing in the Bhubaneswar city, Jatni and Khorda town in Khorda district, Odisha. The numerical strength of Marwari's community is a large migrant community in this district since 200 years ago approximately. The members of Marwari community are found to be distributed in all parts of Khorda district such as Bhubaneswar, Jatni and Khorda.

The data were collected from primary and secondary sources on the blood pressure among Marwari community under study which belongs to the urban and semi-urban area, comprises 252 families consist of 592 individuals (295 Male and 297 Female) are randomly collected (aged from more than 15 to 100 or equal to 90). A substantial proportion (49.8% of male, 50.2% of female) possess higher value for the systolic and diastolic blood pressure.

Results and discussion:

Blood pressure is a risk factor of adverse health effect which has been recognized since the early part of 19th century. It kills nearly 1.5 million people every year in South-East Asia and it has been measured in India as early as the late 1940s. High blood pressure or Hypertension is a non-communicable chronic disorder is mostly prevalent in India and also in Odisha.

Indian urban population studies in the mid-1950s reported hypertension prevalence of 1.2-4.0%, increasing prevalence from 5% in 1960s to 12-15% in 1990s. Hypertension prevalence is lower in the rural Indian population, although there has been a steady increase over time here as well. There is a strong correlation between changing lifestyle factors and increase in hypertension in India. The nature of genetic contribution and gene-environment interaction in accelerating the hypertension epidemic in India needs more studies. Cardiovascular diseases caused 2.3 million deaths in India in the year 1990; this is projected to double by the year 2020. Hypertension is directly responsible for 57% of all stroke deaths and 24% of all coronary heart disease deaths in India (Gupta, 2004). Increased age is associated with a significant increase in the prevalence of hypertension and especially of systolic hypertension after age 60 years. Increased obesity between ages 30-50 years is associated with significant increases in diastolic blood pressure and this trend is also seen in African-Americans who are heavier than whites. Increased age is associated with an increased prevalence of secondary forms of hypertension including atherosclerotic endovascular hypertension, renal insufficiency and primary hypothyroidism (Anderson, 1990). Nirmala and Reddy (1992) reported that males showed higher incidence of hypertension than females in a population at Andhra Pradesh. On average, systolic blood pressure (SBP) rises with age, while diastolic blood pressure (DBP) increases to age 50 and then declines (Williams, 2008). Studies also made that the incidence of blood pressure is also increasing in both rural and urban area in Odisha (Kshatriya, 2016 and Mohapatra, 2015).

Table 2: Variation of blood pressure according to Age and Sex

Age Group (Years)	Male					Female				
	N (%)	Mean SBP (mmHg)	SD	Mean DBP (mmHg)	SD	N (%)	Mean SBP (mmHg)	SD	Mean DBP (mmHg)	SD
16-25	18 (6.10)	130.28	7.03	88	4.78	30 (10.10)	122.3	9.17	81.43	5.87
26-35	80 (27.12)	134.11	14.88	87.58	7.71	80 (26.94)	128.68	15.20	84.21	8.49
36-45	110 (37.29)	134.85	14.26	87.43	7.66	98 (33.0)	127.56	11.01	83.50	7.04
46-55	48 (16.27)	135.71	14.78	88.92	7.84	47 (15.82)	128.55	18.07	82.60	7.69
56-65	27 (9.15)	131.81	17.31	86.48	7.93	28 (9.43)	131.29	17.58	86.46	9.87
66-75	9 (3.05)	131.11	15.16	88.33	7.07	9 (3.03)	122.22	9.72	81.67	5.59
>75	3 (1.01)	143.33	22.55	92.67	4.62	5 (1.68)	125	10	82.00	5.70
TOTAL	295 (100)	134.45	15.13	88.48	6.80	297 (100)	126.51	12.96	83.12	7.17

Table 2 represents the mean value of systolic and diastolic blood pressure of different age group among male and female category. Among Marwari's male people are higher at the age group 35 – 45, but at this age they are prone to mean pre-hypertension. The mean value is higher at the age group 75 above. Most female samples are found at the age 35 – 45 are belonging to pre-hypertension. Blood pressure value is lower at 65 – 75 among female. Most females are found in mean pre-hypertension condition at the age 55 – 65. The mean value of diastolic pressure is highest within the age group 46-55. But the highest mean value of systolic pressure tends within the age group 56-65 in case of female and the mean value of diastolic pressure in higher within the age group 66-75. It is observed from the results of many studies that the mean values of blood pressure of same age group of male and female are different since the biological and environmental factors influencing blood pressure differ considerably sex-wise.

Table 3: Category of Hypertension among Marwari Population

Category	Male	Female	Mean SBP (mmHg)	Mean DBP (mmHg)
	N (%)	N (%)		
Normal	110(37.29)	107(36.03)	117.33	79.52
Pre Hypertension	104(35.25)	108(36.36)	130.25	85.94
Stage 1 Hypertension	62(21.02)	62(20.88)	144.35	91.96
Stage 2 Hypertension	19(6.44)	20(6.73)	167.23	97.79
Total	295(100)	297(100)	139.79	88.80

Table 3 shows the category of hypertension among Marwari population. From the four categories of blood pressure among Marwari's, people found with normal blood pressure are high and people found with stage 2 hypertension are low. Highest numbers of people are found with normal category, because some of them are treated for hypertension.

Table 4: Variation of Blood Pressure according to Different Area / Location

Area	Normal			Pre hypertension			Hypertension stage 1			Hypertension stage 2		
	N (%)	Mean SBP (mmHg) ±S.D.	Mean DBP (mmHg) ±S.D.	N (%)	Mean SBP (mmHg) ±S.D.	Mean DBP (mmHg) ±S.D.	N (%)	Mean SBP (mmHg) ± S.D.	Mean DBP (mmHg) ±S.D.	N (%)	Mean SBP (mmHg) ±_S.D.	Mean DBP (mmHg) ±S.D.
Bhubaneswar	37 (6.25)	114.17 ±4.32	74.86 ±2.84	185 (31.2)	126.39 ±5.54	81.96 ± 2.82	29 (4.89)	166.81 ±11.89	92.12 ± 2.57	7 (1.2)	166.82 ±11.89	100.5 ±1.58
Jatni	26 (4.39)	111.39 ±3.05	74.83 ±2.33	103 (17.4)	126 ± 5.49	81.96 ±2.7	37 (6.25)	144.42 ±4.7	91.93 ±2.67	9 (1.5)	165 ±7.07	100.33 ± 5.77
Khurda	21 (3.54)	111.19 ±3.95	74 ±4.32	85 (14.3)	123.5 ± 5.68	82.1 ±2.9	31 (5.23)	144.89 ±4.84	96.33 ±1.52	22 (3.7)	168.95 ± 9.85	103.28 ±4.68
Total	84 (14.2)	112.25 ±3.77	74.56 ±3.16	301.3 (63.0)	125.29 ± 5.57	82.00 ± 2.8	91 (16.4)	152.04 ± 7.14	93.46 ± 2.25	38 (6.4)	166.92 ± 9.60	101.37 ±4.01

Table 4 shows the variation of blood pressure according to different area/location. It shows that the mean of systolic pressure is high in the stage- 2 hypertensive in Bhubaneswar city, but the mean value of diastolic blood pressure is high in the stage – 1 hypertension. In the Jatni area, the mean value of systolic and diastolic blood pressure is high in case stage-2 hypertension.

Table 5: Blood Pressure Related to Heart Disease

Heart disease (in year)	Male					Female				
	N (%)	Mean SBP (mmHg)	SD	Mean DBP (mmHg)	SD	N (%)	Mean SBP (mmHg)	SD	Mean DBP (mmHg)	SD
15-25	0(0.0)	0	0	0	0	0(0.00)	0	0	0	0
26-35	0(0.0)	0	0	0	0	1(0.16)	120	0	80	0
36-45	1(0.16)	120	0	80	0	2(0.33)	127.5	17.67	87.5	10.6
46-55	1(0.16)	130	0	85	0	0(0.00)	0	0	0	0
56-65	1(0.16)	120	0	80	0	5(0.84)	136.4	17.38	88.4	7.92
66-75	0(0.00)	0	0	0	0	0(0.00)	0	0	0	0
>75	1(0.16)	130	0	84	0	0(0.00)	0	0	0	0
Total	4 (0.64)	125	0	82.25	0	8 (1.33)	127.9	11.68	85.3	6.17

Table 5 shows the hypertension related to heart disease among Marwari's. This table shows the heart disease among Marwari's population related to hypertension. In case of male, small samples are found at the age 35-45, 55-65, above 75 (33.3%). In case of female, the highest samples are found at the age 55-65(62.50%) where the mean systolic and diastolic blood pressure is 136.4 and 88.4 respectively.

Table 6: Blood pressure related to diabetic mellitus among Marwari community

Types of Blood pressure	Male			Female		
	N (%)	Mean (SBP/DBP) (mmHg)	SD	N (%)	Mean (SBP/DBP) (mmHg)	SD
Normal	1(0.16)	118/75	0	4(0.67)	112.5/74.33	3.53/4.04
Pre hypertension	10(1.68)	126.75/82.5	5.37/3.53	44(7.43)	126.83/83.6	5.56/3.04
Hypertension stage I	8(1.35)	145/93.7	5/3.21	6(1.01)	147.5/92	6.45/2.64
Hypertension stage II	0(0.00)	0	0	4(0.67)	173.33/105	15.27/7.07
Total	19 (3.19)	129.91/8.73	5.18/2.24	58 (9.78)	140.04/88.73	7.70/4.19

Table 6 shows the population affected with blood sugar (diabetic mellitus) have the relation with blood pressure distributed in sex wise. Highest people are affected with diabetic at pre-hypertension stage (mean systolic and diastolic blood pressure is 126.75/82.5). But mean systolic and diastolic pressure is highest (145/93.7) in hypertension stage I condition. In case of female, highest people (44) are affected with diabetic condition at pre-hypertension category, the mean systolic and diastolic blood pressure is 126.83/83.6. But the mean systolic and diastolic pressure is highest (173.33/105) in stage-II hypertension, at this stage 4 persons are affected with diabetic condition.

Table 7: Blood pressure related to other diseases among Marwari community

Other Disease	Male					Female				
	N (%)	Mean SBP	SD	Mean DBP	SD	N (%)	Mean SBP	SD	Mean DBP	SD
Allergic	-	-	-	-	-	1(0.16)	135.00	0.00	92.00	0.00
Cholesterol & brain tumor	1(0.16)	150	-	95	-	1(0.16)	110.00	0.00	80.00	0.00
Cholesterol & misbalancing sugar	6(1.01)	131.67	16.93	88.17	6.24	5(0.84)	123.00	9.08	84.00	7.47
Cholesterol & kidney problem	2(0.33)	130.00	11.09	80.00	9.13	-	-	-	-	-
Cholesterol & renal disease	1(0.16)	150.00	0.00	100.00	0.00	-	-	-	-	-
Cold & breathing	1(0.16)	120.00	0.00	80.00	0.00	2(0.33)	130.00	0.00	80.00	0.00

Appendix	1(0.16)	130.00	0.00	90.00	0.00	-	-	-	-	-
Cataract	1(0.16)	120.00	0.00	80.00	0.00	-	-	-	-	-
Cholesterol and breathing problem	3(0.50)	122.67	6.43	84.33	9.29	4(0.67)	121.67	7.46	81.33	7.09
Coldness	2(0.33)	130.00	6.29	85.00	5.38	1(0.16)	120.00	0.00	80.00	0.00
Gastric	1(0.16)	130.00	0.00	85.00	0.00	1(0.16)	120.00	0.00	80.00	0.00
Gene defect	2(0.33)	130.00	14.14	87.50	10.61	-	-	-	-	-
Hemoglobin	1(0.16)	145.00	0.00	85.00	0.00	-	-	-	-	-
Hemoglobin & platelet	1(0.16)	122.00	0.00	82.00	0.00	-	-	-	-	-
Kidney problem	1(0.16)	120.00	0.00	75.00	0.00	2(0.33)	127	11.08	85.26	9.03
Neurological problem	2(0.33)	140.50	7.78	92.00	4.24	2(0.33)	140.00	28.28	84.50	6.36
Rheumatism	-	-	-	-	-	1(0.16)	115.00	0.00	75.00	0.00
Stomach infection	1(0.16)	125.00	0.00	85.00	0.00	-	-	-	-	-
Thyroid	2(0.33)	138.33	7.64	90.00	10.00	5(0.84)	120.50	1.00	83.95	4.79
Thyroid & cancer	-	-	-	-	-	1(0.16)	135.00	0.00	89.00	0.00
Thyroid & cholesterol	-	-	-	-	-	1(0.16)	125.00	0.00	80.00	0.00
Ulcer	-	-	-	-	-	1(0.16)	122.00	0.00	80.00	0.00
Diabetic & Urinary infection	1(0.16)	135.00	0.00	90.00	0.00	4(0.67)	157.50	17.68	97.50	17.68
Total	30 (5.07)	131.67	3.9	86.33	3.04	32 (5.40)	126.77	7.97	83.5	3.49

Table 7 shows the relation of blood pressure with other diseases, such as, diabetic cholesterol, heart disease, thyroid, filarial, malaria, fever, rheumatism, allergy, ulcer, cancer among Marwari's. Most people are suffered with cholesterol and imbalanced sugar. Although other patients have normal systolic and diastolic blood pressure, they have treated for many other diseases.

Conclusion:

In the present study among Marwari's of Khorda district in Odisha it was observed that the increase in blood pressure with age as well as the difference between both the sexes were also found. A substantial proportion (49.8% of male and 50.2% of female) possesses higher value for the systolic and diastolic blood pressure. Male people are higher at the age group 36-45 accesses pre-hypertension. This mean value is higher at the age group 75 above. Most females are found at the age group 36-45 are belonging to pre-hypertension. Blood pressure value is lower at age group 65-75 among female. Most females are suffered with pre-hypertension condition at the age 55-65. The mean value of diastolic pressure is highest within the age group 46-55. But the highest mean value of systolic pressure tends within the age group 56-65 in case of female and the mean value of diastolic pressure is higher within the age group 66-75.

From the above findings, it is observed that the mean values of blood pressure of same age group of male and female are different since the biological and environmental factors influencing blood pressure differ considerably sex-wise. Compared with previous hypertension guidelines, the Joint National Committee 8 (JNC8) guideline (2013), the patient having 60 years or older who do not have diabetes or chronic kidney disease, the goal of blood pressure level is now <150/90 mmHg. In patient 18 to 59 years of age without major co-morbidities and patient 60 years or older who have diabetes, Chronic Kidney Disease (CKD) or both conditions, the new goal blood pressure level is <140/90 mmHg. Hypertension affects approximately one billion individuals worldwide as per Joint National Committee 7 (JNC7, 2003). Rates of Hypertension have been shown to increase in traditional population undergoing modernization and also among migrants show the higher percentage of pre-hypertension and hypertension. When the normal systolic pressure is ≤ 120 and diastolic pressure is ≤ 80 , pre- hypertension systolic pressure is 120-139 and diastolic pressure is 80-89, stage 1 hypertension is 140-159 or 0-99, stage 2 hypertension ≥ 160 or ≥ 120 . As per JNC classification present study shows that blood pressure (both systolic and diastolic) of males and females are found in a systematic increasing order from normal category to stage 2 hypertension category. From the four categories of blood pressure among Marwari's, people are with normal blood pressure are high and people with stage 2 hypertension are low. From the percentage of people with normal category, are clinically treated undergone. In the present study people with hypertension condition shows the variation in three areas such as: Khordha, Jatni and Bhubaneswar town. However there is no area wise variation with respect to hypertension among the ethnic Marwari's in urban and semi-urban areas.

Hypertension shows the epidemiological variation also relates to rapidly incassation Worldwide. This disease is partially explained by Genetics and it is known to run in families (Watkins and Farrall, 2006). However, life style and environmental factors, social factors such

as diet, migration history, modernization, etc. also contribute to high blood pressure or hypertension. Present study correlates the distribution of various determinants of blood pressure and associated risk factors with causes and effects among the ethnic Marwari community settled in Khorda district of Odisha. With the help of conventional methodologies it is understand the distribution and variation of hypertension with association risk factors. The present Marwari community shows the more prevalence of pre-hypertension and hypertension than normal blood pressure (both systolic and diastolic blood pressure). They are migrants living in Odisha revealing moderate and high status of living shows the sedentary way of life.

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