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# Evaluation of the relation of Low levels of HDL as a risk factor forEnd organ damage in the first time detected Systemic Hypertension

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***Abstract***
***Background:*** *Systemic Hypertension is a chronic medical condition with various causes which could be primary or secondary. There are various risk factors for Hypertension. The early screening in patients with risk factors is essential for diagnosis and prevention of complications associated with Hypertension. Hypertension is one of the most common worldwide diseases afflicting humans and is a major risk factor for stroke, myocardial infarction, vascular disease, and chronic kidney disease. Complications of hypertension are clinical outcomes that result from persistent elevation of blood pressure.[(9)]Hypertension is a risk factor for all clinical manifestations of atherosclerosis since it is a risk factor for atherosclerosis itself.[(10)].I t is an independent predisposing factor for heart failure,[(11)] coronary artery disease,[(12)] stroke,[(9)] renal disease, and peripheral arterial disease. It is the most important risk factor for cardiovascular morbidity and mortality, in industrialized countries.* [(13)]
***Method:*** *A Cross Sectional Study is made on a total of 70 patients newly diagnosed as having systemic Hypertension based on the JNC guidelines 2013. Their detailed history taken for the probable risk factors associated. Their detailed examination and investigation done based on the European Society of Cardiology Guidelines 2013 to bring out the end organ damage at this juncture. The details obtained are studied and categorized to bring out the relation of low level of HDL with incidence of End organ damage in first time detected Systemic Hypertension and the common type of complication seen in the case.*
***Result:*** *A total of 56 patients among the study group of 65 were found to have a lower level of HDL. These patients were all diagnosed with Systemic Hypertension for the first time.*
*% of patients who were found to have first time detected hypertension had very low levels of HDL (less than 40). The largest number of complications are seen in those with a low level of HDL(less than 40 ). Even a low range of HDL (40 – 49) is associated with a large number of complications. It is seen that there are minimum complications seen in patients with HDL level of more than 50. The commonest complication associated with Low levels of HDL was Nephropathy.*
***Conclusion:*** *There are definite risk factors associated with the onset of Hypertension and its associated complications. It is important to keep the levels of Total Cholesterol, HDL and the systolic Blood Pressure in the optimum range while treating Hypertension to delay the onset of complications.*
*It is understood clearly that there are several patients who are unaware of being hypertensive and end up with serious complications. It is necessary to advocate screening for hypertension especially in those who have various risk factors associated*
***Keywords:*** *Hypertension, Total Cholesterol, HDL (High density Lipid), end organ damage*

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## I. Introduction

Hypertension (HTN) or high blood pressure, sometimes called arterial hypertension, is a chronic medical condition in which the blood pressure in the arteries is elevated. Blood pressure is summarized by two measurements, systolic and diastolic, which depend on whether the heart muscle is contracting (systole) or relaxed between beats (diastole). This equals the maximum and minimum pressure, respectively.

There are different definitions of the normal range of blood pressure. Normal blood pressure at rest is within the range of 100–140 mmHg systolic (top reading) and 60–90 mmHg diastolic (bottom reading). High blood pressure is said to be present if it is often at or above 140/90 mmHg. [(1)]

Blood pressure is the force of blood pressing against the walls of the arteries. When it's too high, it raises the heart's workload and can cause serious damage to the arteries. Over time, uncontrolled high pressure increases the risk of heart disease, stroke, and kidney disease.

High blood pressure is sometimes called a silent killer because it may have no outward symptoms for years. In fact, one in five people with the condition don't know they have it. Internally, it can quietly damage the heart, lungs, blood vessels, brain, and kidneys if left untreated. It's a major risk factor for strokes and heart attacks.

Hypertension is classified as either primary (essential) hypertension or secondary hypertension. About 90–95% of cases are categorized as "primary hypertension" which means high blood pressure with no obvious underlying medical cause.[1] The remaining 5–10% of cases (secondary hypertension) are caused by other conditions that affect the kidneys, arteries, heart or endocrine system.

Hypertension is one of the most common worldwide diseases afflicting humans and is a major risk factor for stroke, myocardial infarction, vascular disease, and chronic kidney disease. Despite extensive research over the past several decades, the aetiology of most cases of adult hypertension is still unknown, and control of blood pressure is suboptimal in the general population. Due to the associated morbidity and mortality and cost to society, preventing and treating hypertension is an important public health challenge. Fortunately, recent advances and trials in hypertension research are leading to an increased understanding of the pathophysiology of hypertension and the promise for novel pharmacologic and interventional treatments for this widespread disease.

## II. Material and Methods

**Study**: **Evaluation of the relation of Low levels of HDL as a risk factor for end organ damage in the first time detected Systemic Hypertension**

**Material:**

**Source area:** VS hospital: Indoor and patients presenting in the medical outpatient department.

**Sampling method**: 70 newly detected hypertensives in accordance to the inclusion and exclusion criteria

**Inclusion Criteria:**1st time detected Hypertensivesabove the age of 18 years

**Exclusion Criteria:** Known cases of hypertensives, Previously known cases of Diabetes Mellites, chronic Kidney Disease, previous history of Cerebrovascular Accidents, Ischemic heart disease.Known cases of Retinopathy

**Diagnostic Tool:** JNC 7 guidelines, Clinical assessment, Laboratory and Radiological Findings

## III. Methodology:

***Type of study:***Prospective, Descriptive, Non randomized study

***Statistical Method and tool:*** The statistical method used was proportion and the statistical tool used was MS Excel. Data was compiled and entered in MS Excel. Proportions and Percentages were calculated.

A Cross Sectional Study is made on a total of 70 patients newly diagnosed as having systemic Hypertension based on the JNC guidelines 2013. Their detailed history taken for the probable risk factors associated. Their detailed examination and investigation done based on the European Society of Cardiology Guidelines 2013 to bring out the end organ damage at this juncture.

The details obtained are studied and categorized to bring out the relation of low level of HDL with incidence of End organ damage in first time detected Systemic Hypertension and the common type of complication seen in the case.

## IV. Results

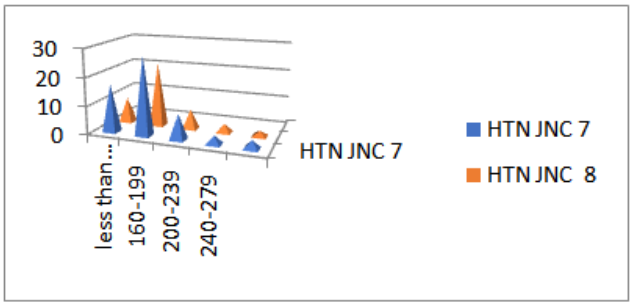
This study consists of 65 patients who have newly detected Hypertension, that presented to the VS hospital in the out- patient department and those that were admitted to the Hospital. This study is conducted from the period November 2012 to October 2014. The results and findings are as given below:

1. **RELATION OF TOTAL CHOLESTEROL WITH HYPERTENSION:**

Hyperlipidaemia is a known risk factor for hypertension and its associated complications. In this study we see that 60 patients of the total 65 were found to have their total cholesterol towards the higher side. This accounts for 92 % people who fall in this category and were found to be first time detected hypertensives.

The JNC 8 guidelines shows a slight decrease in the percentage i.e. 88 % patients of the hypertensives were having a higher level of total cholesterol.

| Risk Factor | HTN (JNC 7) | HTN (JNC 8) |
|---|---|---|
| TOTAL CHOLESTEROL: | | |
| Less than 160 | 17 | 9 |
| 160-199 | 28 | 23 |
| 200-239 | 9 | 7 |
| 240-279 | 3 | 3 |
| More than 280 | 3 | 2 |
| TOTAL | 60 | 44 |
| Percentage | 92 | 88 |



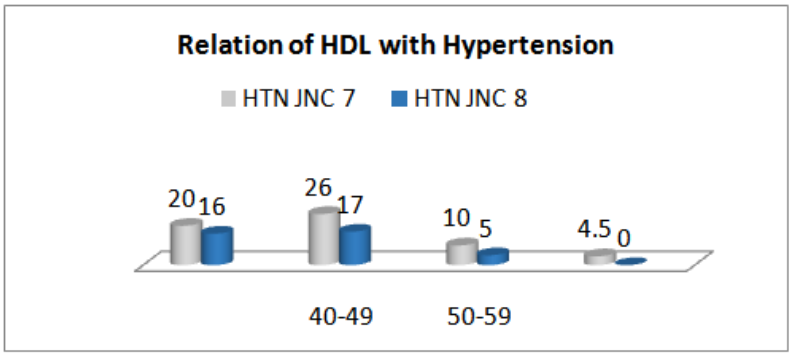

## 2. RELATION OF HDL WITH HYPERTENSION:

Low HDL is also a known risk factor for hypertension. In this study it is observed that with a level of HDL below 50 maximum patients were detected with hypertension.

A total of 56 patients among the study group of 65 were found to have a lower level of HDL. These patients were all diagnosed with Systemic Hypertension for the first time.

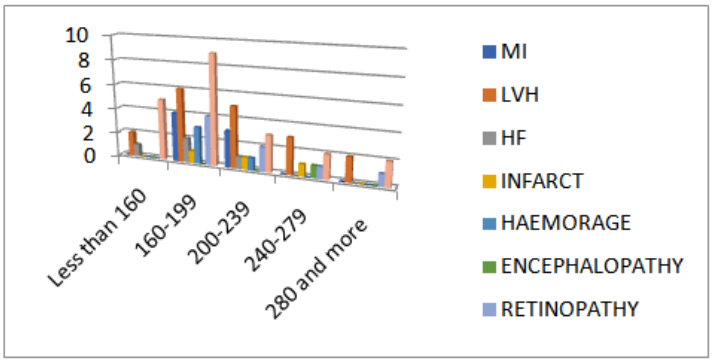
30 % of patients who were found to have first time detected hypertension had very low levels of HDL (less than 40)

| HDL | HTN (JNC 7) | HTN (JNC 8) |
|---|---|---|
| Less than 40 | 20 | 16 |
| 40-49 | 26 | 17 |
| 50-59 | 10 | 5 |
| More than 60 | - | - |
| TOTAL | 56 | 48 |



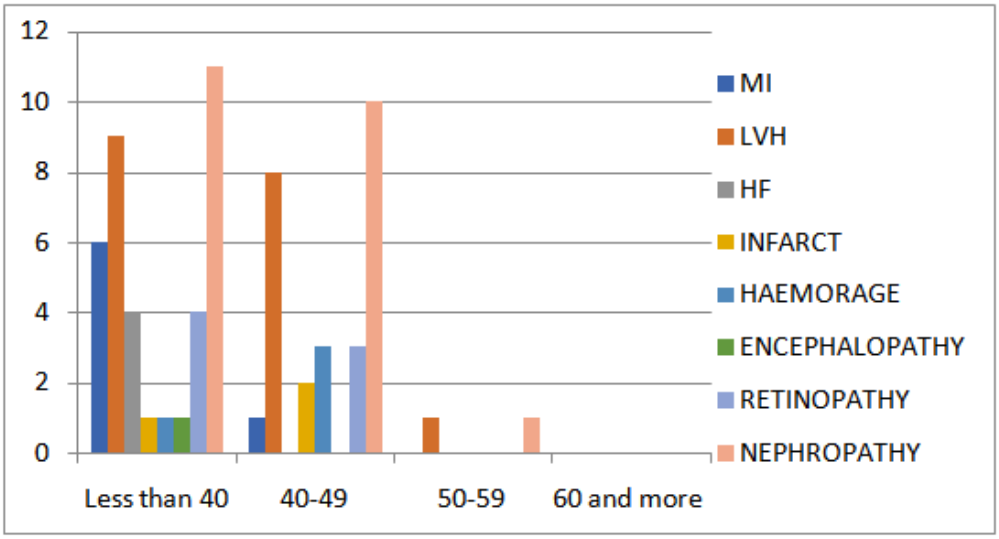

## 3. RELATION OF TOTAL CHOLESTEROL WITH COMPLICATIONS:

As discussed earlier there is a definite increased risk in patients with higher level of total cholesterol to have hypertension. This study also helps to see that the incidence of complications seen in the newly detected hypertension is also high in those with higher levels of total cholesterol. Apparently, in this study the patients have higher complications whose total cholesterol was in the range from 160-240. The more commonly affected organ in the complications seen is the heart. Nephropathy is also seen in a large number of patients with high levels of total cholesterol.



4. **RELATION OF HDL WITH COMPLICAITONS:**

As discussed earlier, the lower the level of HDL has increased incidence of hypertension. Similar is the case with complications. The largest number of complications are seen in those with a low level of HDL (less than 40). Even a low range of HDL (40 – 49) is associated with a large number of complications. It is seen that there are minimum complications seen in patients with HDL level of more than 50. The commonest complication associated with Low levels of HDL was Nephropathy.




## V. Discussion

In a series of reports between 1925 and 1979,[2-5] the Actuarial Society of America described the population-based distribution of blood pressure, the age-related increases of blood pressure, and the relationships of blood pressure to both body size and mortality. The 1925 report also described increasing systolic and diastolic (fifth phase) blood pressures with age. At the younger ages, systolic and diastolic blood pressures were lower for women than for men. Pulse pressure also increased progressively with age in both men and women. "Above average" systolic and diastolic blood pressures and pulse pressure were associated with a higher mortality, the only exception being lower mortality in young adults with above average systolic blood pressures: "The ratio of deaths due to organic diseases of the heart, Bright's disease, cerebral hemorrhage, and apoplexy per 10,000 exposed to risk tended to increase with blood pressure at the older age and usually at the middle ages."[2] Variations of diastolic blood pressure were of more importance than variations of pulse pressure in predicting mortality.

The conclusions of the 1925 report were appropriately cautious[2]:

"(1) the mortality is lower than the average when systolic or diastolic pressure taken by itself is below the average, but no information is yet available regarding the effect of very low blood pressures; (2) the good effect of a systolic or diastolic pressure slightly below average is likely to be greater at younger than at older ages; (3) mortality increases rapidly with the increase in blood pressure over the average; and (4) substantial departures for the average blood pressure are less significant for pulse pressure than for either systolic or diastolic pressure."

The 1959 Build and Blood Pressure Studies again documented the increments of systolic and diastolic blood pressures with age and weight in men and women. [4] That report also confirmed a sharp increase in mortality associated with relatively small increases in blood pressure. The rise in mortality was most pronounced for issue ages 30 to 59, and the rise was greater for a given increase in diastolic than for the same increase in systolic pressure. The extra mortality associated with hypertension was less for women than for men, particularly at issue ages ≥40 years.

In 1988, Raven[6] described "syndrome X" as (1) resistance to insulin-stimulated glucose uptake; (2) glucose intolerance; (3) hyperinsulinemia; (4) increased very low-density lipoprotein triglycerides; (5) decreased high-density lipoprotein cholesterol; and (6) hypertension. He described relationships among these variables and suggested that insulin resistance is the basic underlying abnormality. This syndrome has been observed in many populations and in both children and adults.

In 1993, the cohort of >350 000 men screened for participation in the Multiple Risk Factor Intervention Trial confirmed a continuous and graded influence of both systolic and diastolic blood pressures on coronary heart disease mortality and end-stage renal disease, extending down to systolic blood pressures of 120 mm Hg.[7]

In 2001, data from the Framingham Heart Study corroborated the observation that increments in systolic or diastolic blood pressure are associated with incremental increases in mortality.[8] In the Framingham study, cardiovascular disease risk increased 2.5-fold in women and 1.6-fold in men with "high normal" blood pressures (systolic blood pressure 130 to 139 mm Hg or diastolic blood pressure 85 to 90 mm Hg). In individuals over age 50 years, both the Multiple Risk Factor Intervention Trial and the Framingham study highlighted the importance of systolic blood pressure and pulse pressure for subsequent cardiovascular and renal disease. Notably, in the Multiple Risk Factor Intervention Trial, the great majority of excess deaths occurred in men with high normal blood pressures (systolic: 130 to 139 mm Hg) or with "stage 1 hypertension" (systolic: 140 to 159 mm Hg).

## VI. Conclusion

There are definite risk factors associated with the onset of Hypertension and its associated complications. It is important to keep the levels of Total Cholesterol, HDL and the systolic Blood Pressure in the optimum range while treating Hypertension to delay the onset of complications.

It is understood clearly that there are several patients who are unaware of being hypertensive and end up with serious complications. It is necessary to advocate screening for hypertension especially in those who have various risk factors associated.

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