REVIEW OF LITERATURE
Hypertension is classified into two groups—primary or essential hypertension and secondary hypertension. Primary hypertension is defined as a "rise of blood pressure of unknown causes". Secondary hypertension is the "increase in blood pressure caused by diseases of kidney, endocrine or some other organs". 

**Pathogenesis of hypertension:**

The pathogenesis of essential hypertension is multifactorial and highly complex. Multiple factors modulate the blood pressure for adequate tissue perfusion and include humoral mediators, vascular reactivity, circulating blood volume, vascular caliber, blood viscosity, cardiac output, blood vessel elasticity and neural stimulation.

**Correlation of vitamin D with hypertension:**

Gagan Velayudhan, Sasidaran PK (2014) et al showed in their study that the mean 25 (OH) D levels for hypertensive were found to be 17.07 ± 9.72ng/ml while in the normotensive controls were 22 ± 10 ng/ml (p= 0.027). Only 20% of the total population had sufficient levels above 30 ng/ml. Higher dietary intake > 200 IU/day were found to have lesser incidence of hypertension.[26]

M. Narayanaswamy, Nagappa H. Handargal (2014) et al showed that serum vitamin D levels were lower in hypertensive patients when compared to non hypertensive controls. The levels of vitamin D were also inversely
correlated to age, duration of hypertension and systolic and diastolic blood pressure. There was significant inverse correlation between vitamin D and hypertension (p< 0.001) \[27\].

Karani S Vimeshwaran, Alana Cavadino, Diane J Berry (2013) et al showed that increased 25(OH) D concentration were associated with reduced systolic blood pressure and reduced odds of hypertension; however, they did not see an association between 25 (OH) D concentration and diastolic blood pressure. Despite evidence for heterogeneity in the phenotypic association between 25(OH) D concentration and the out comes within the studies done in adults, the observed association between 25 (OH) D concentration and systolic blood pressure, diastolic blood pressure or hypertension between studies did not vary by age (meta-regression p≥ 0.09 for all comparisons), sex (meta-regression p≥ 0.65), method of blood pressure measurement (meta-regression p≥ 0.14). However, for all the association between 25(OH) D concentration and diastolic blood pressure, there was variation across the proportion of hypertensive participant (meta-regression p=0.01) \[28\].

**Correlation of blood glucose with hypertension:**

Blood glucose level in hypertensive cases are also included to find out the association of hyperglycemia with hypertension. The reason for increased rate of hypertension include life style changes, sugar rich diet, high fat processed foods and sedentary behavior (Kearney et al.,2005) \[29\].
N Lakshmana Kumar, J Deepthi et al (2010) showed that the fasting blood glucose of hypertensive cases (101.62mg/dl ± 33.78) is higher than that of controls (82.46mg/dl ± 10.8). This increase is statistically significant (p<0.001). But this increase may be due to the presence of 12% diabetes in the study group. Even then, there is a tendency of developing impaired glucose tolerance in hypertensive subjects. The blood pressure is noted separately as SBP and DBP. The systolic blood pressure was more significant than the diastolic blood pressure with increasing age groups [30].

**Correlation of lipid profile with hypertension:**

Raksha goyal & nandini sarwate (2014) has showed that the prevalence of hypertension is highest in age group 40-49 years of male and female. Several studies in developed and developing countries have consistently shown a positive relationship between age and blood pressure. The significantly higher plasma total cholesterol, triglycerides and LDL-cholesterol in hypertensive than in the normotensive patients in the present study is in corroboration with earlier studies [31].

ShrinivasPai K, Sanjay Bhagoji, Anupam Biswas(2014) has showed that all the lipid fraction TC, TGL, LDL-C, VLDL, HDL-C ratio were higher in the hypertensive than those in the healthy controls which is in accordance with most of the previous reports by various workers. In this study all the lipid fraction were elevated except HDL-C, which was normal in most of the case.
The increase in TC, LDL and HDL ratio was statistically very highly significant in hypertensive subjects compared to healthy controls while the increase level of TG & LDL was highly significant in hypertensive subject [32].

**Kamrun Nahar Choudhury, AKM Mainuddin et al (2014)** has been showed that the mean systolic blood pressure and diastolic blood pressure of the participants were 137.94± 9.58 and 94.42± 8.81, respectively, which were higher in the hypertensive patients (p<0.001). The serum level of TC,TG and LDL were higher while HDL level were lower in hypertensive subjects compare to normotensives, which was statistically significant (p<0.001). age, waist circumference, and body mass index showed significant association with hypertensive patients (p<0.001) but not with normotensives. The logistic regression analysis showed that hypertensive patients had 1.1 times higher TC and TG, 1.2 times higher LDL and 1.1 time lower HDL than normotensives, which was statistically significant (p<0.05)[33].

**Rost P.H., Devis B.R., et al (1996)** in the systolic hypertension in the Elderly Program (SHEP) supported the concept that plasma cholesterol, LDL-C and ratios of TC/HDL-C & LDL-C/HDL-C were significantly higher in CAD men and women [34].

**Bonna K.H, Thelle D.S (1991)** have supported that in both sexes total and non HDL-C level increased significantly with increasing systolic or diastolic blood pressure. The association between blood pressure and total
cholesterol level increased with age in women but decreased with age in men. Smoking physical activity and alcohol consumption had little influence on the association between blood pressure and serum lipids \([35]\).

**Chen Y-DI et al (1991)** in their study found that mildly hypertensive patients appears to have faster catabolic rate of Apo-AI/ HDL and lower HDL – C concentration \([36]\).

**Castilli W.P,Anderson K.A(1986)** has supported that blood pressure and serum cholesterol are correlated with ‘r’ factor of 0.12 suggesting that those with higher blood pressure values tend to have higher serum cholesterol in Framinghan heart study coronary heart disease developed with great consistency in patients with a ratio of total cholesterol to HDL-C of more than 4.5. half of the women and more than half of the men who presented with hypertension were already having abnormal lipid profile \([37]\).

**Correlation of serum uric acid with hypertension:**

**Chanchal Shrivastav, Suman Sharma, M. L. Suhalka, Manjinder Kaur et al (2016)** showed that the results of their study revealed that the mean serum uric acid level and the frequency of subjects with increased serum uric acid level were significantly higher in newly diagnosed cases of essential hypertension as compared to prehypertensive and normotensive controls \(p<\)
Serum uric acid correlated positively with systolic blood pressure (SBP) 
($r= + 0.23, \ p<0.05$) and diastolic blood pressure (DBP) ($r= + 0.09, \ p>0.05$). These results indicate a definite association between hyperuricaemia and essential hypertension$^{[38]}$.

**Dr. Rohith Poondu Reddy  Dr. Naresh Monigari  Dr. Manjunath Hande et al (2015)** showed that the mean serum uric acid levels were found to be $4.78 \ (2.32) \ mg/dl, \ 4.42 \ (1.38) \ mg/dl, \ 6.57 \ (1.55) \ mg/dl$ and $4.44 \ (1.44) \ mg/dl$ in controlled hypertension, stage 1 hypertension, stage 2 hypertension and isolated systolic hypertension respectively. In the total of 80 hypertensive, 41 of them were on treatment and 39 of them were not on treatment and the mean serum uric acid value was $4.98 \ (1.76) \ mg/dl$ and $5.67 \ (1.97)$ respectively. Data analysis done by one way Anova test showed significant difference between stage 2 hypertension with the stage 1 hypertensive, isolated systolic hypertensive and well controlled hypertensive with the p values of $0.001, \ 0.001$ and $0.002$ respectively$^{[39]}$.

**Abiodun M. Emokpae and Aliyu Abdu et al (2013)** showed that a total of 108 (62%) out of the 174 female patients had SUA above the upper limit of the reference range (162-339µmol/l). Statistically significant difference was observed when SUA, urea, creatinine and LDL cholesterol of the patients were compared with the patients whose uric acid was within the reference limit $p<0.001$ and $p<0.005$ respectively. Significantly positive correlation was observed for both between SUA and systolic blood pressure ($r=0.192; \ p<0.001$)
and between SUA and diastolic blood pressure \( (r=0.216; \ p<0.001) \). 

**Correlation of serum creatinine with hypertension:**

Dr. Rakhee Yadav, Dr. Jai Prakash Bhartiya, Dr. Sunil Kumar Verma  

Dr. Manoj Kumar Nandkeoliar et al (2014) The levels of blood urea, creatinine and uric acid were significantly higher in hypertensive patients as compared to healthy controls \( (p \text{ value}<0.001) \). We further evaluated the status of our study parameters in our hypertensive patients group by dividing them according to their stages based on the classification given by Joint National Committee (JNC) VII report. We found a positive correlation in the levels of blood urea, creatinine and uric acid with the severity of the disease\(^{[41]}\).

Pooja and Yashoda Mittal et al (2014) showed that the mean serum creatinine level of hypertensive cases was 1.13 \( (SD \pm 0.54 \text{ mg/dl}) \) and that of control was 0.78 \( (SD \pm 0.12 \text{ mg/dl}) \). The mean serum creatinine of hypertensive cases was higher than normal healthy controls \( (p < 0.000) \)\(^{[42]}\).

Divya R., Chandra S., Ashok et al (2014) showed that renal function tests were significantly elevated in hypertensive’s when compared to normotensives whose \( p<0.05 \); urea 0.048, creatinine 0.000 , uric acid 0.009, whereas creatinine clearance is not significantly elevated, \( p \ 0.362(p>0.05) \) which implies creatinine clearance is no found to be a significant indicator of renal function among hypertensives\(^{[43]}\).
Correlation of haematological parameters with hypertension:

K. Ranjith Babu, Nanda kumar (2015) et al showed that the mean values of the parameters of haemoglobin, Erythrocyte count, Hematocrit, MCH, and MCHC are increased in primary hypertension; while, the mean levels of MCV were found to be lower in the hypertensive group. This present study reports, in a general population sample, an independent significant association between Haemoglobin, Hematocrit, RBC count and blood pressure. Hematocrit is, on average, high in hypertensive individuals despite reduction of blood pressure suggesting that high hematocrit in hypertension is not secondary to high blood pressure \(^4\).  

F.a. Al-muhana, e.b. Larbi, a.k. Al-ali, a. Al-sultan (2006) et al showed in their study that the mean values of blood indices are presented in the hypertensive and normotensive group, the mean levels of haemoglobin, HCT and RBC were significantly higher in male compared to females\((p<0.05)\). However, the platelet level was higher in female than in the male \((p<0.05)\). There was no significant differences in the levels of WBC, MCV, MCH and MCHC between males and females \((p>0.05)\). while the mean levels of haemoglobin, WBC and platelets were significantly higher in the hypertensive group compared to normotensive \((p<0.05)\). there were no significant differences between these two group in the levels of RBC, MCV, HCT, MCH and MCHC \((p>0.05)\) \(^5\).
Dr. Ashish Kumar C. Zala, Dr. Ruchita (2005) et al showed in their study that Hb level and PCV are significantly lesser in hypertensive group compared to controls (p<0.05), while there is no significant difference in RBC count (p>0.05). No correlation was observed between any of these parameters with SBP and DBP in controls [46].