“Before you were formed, I dreamt of you…
Before I could see you, I loved you…
And a moment before you were born, I could have died for you.”

Pregnancy and motherhood is a gift of nature to a woman. It is the most beautiful event which can happen in woman's life. Having a baby is a joyous and fulfilling experience and safe for the great majority of women. But sometimes this gift is wrapped with some complications which can endanger her life. Pregnancy causes profound anatomical, physiological and metabolic changes in the maternal tissues, the most pronounced being its effect on the uterus, cardiovascular system and kidney. At some stage some of these well-orchestrated changes can results in complications endangering both mother and the fetus. One of the common and dreaded complications is hypertension in pregnancy i.e. pregnancy induce hypertension (PIH) and its complications like preeclampsia and eclampsia which make life of both mother and fetus at the stake.

1. PREECLAMPSIA: BACKGROUND

Preeclampsia is a complex, baffling and unpredictable idiopathic disorder unique to human pregnancy.\(^1\) Although the cause of this disorder is still unknown, current concepts of preeclampsia suggest that generalized dysfunction of the maternal vascular endothelium is a central pathogenic features caused by abnormal placentation.\(^2\) It is the clinical syndrome in which a previously normotensive woman, with no preexisting cardiovascular or renal disease, after the 20\(^{\text{th}}\) week of pregnancy, develops a blood pressure of at least 140/90 mm of Hg on two or more occasions (separated by greater than four hours) and proteinuria of at least > 0.3g (300mg) in a 24 hour collection of urine, in the absence of urinary tract infection.\(^3\)

2. PREECLAMPSIA: INCIDENCE AND PREVALENCE
Preeclampsia is a pregnancy-specific hypertensive disorder sometimes progressing into a multiorgan cluster of varying clinical features affecting some 5-8% of pregnant women worldwide⁴ and records one of the five causes of maternal death in the world.⁵ Despite many years of intensive research (almost 150 years later), preeclampsia is still a major obstetric problem and has remained a significant public health threat leading to significant maternal and perinatal morbidity and mortality globally in both developed and developing countries.⁶ In fact, complications from hypertension in pregnancy are the third leading cause of maternal death, surpassed only by embolism and hemorrhage.⁷ Preeclampsia has been defined as a disease of first pregnancies complicating 10-15% of first pregnancies.⁴ Preeclampsia has a bimodal frequency, being more common in young primiparous (nulliparous women) and older multiparous women.⁸

3. WORLD SCENARIO

3.1 Morbidity and mortality associated with Preeclampsia

The World Health Organization (WHO) estimates that worldwide, preeclampsia is estimated to be responsible for approximately 15 to 20% of maternal deaths per year (50,000-75,000).⁹ In 2002, there were approximately 4,152,000 cases of preeclampsia that resulted in 63,000 deaths worldwide.¹⁰ One of the United Nations Millennium Development Goals for 2015 is to reduce the maternal mortality ratio by three-quarters.¹¹ Preeclampsia is associated with a perinatal and neonatal mortality rate of 10% worldwide⁹ and represents 15% of the known causes of premature births, the increment being even up to three-fold compared to uncomplicated pregnancies.¹²

3.2 Incidence and prevalence of Preeclampsia in Developed Countries

The syndrome of preeclampsia remains one of the two most common causes of maternal mortality in the developed world.¹³ In the developed world, the burden of this disease falls on the neonates because of premature deliveries performed to preserve the health of the mother.¹⁴

Table 1: Extrapolated worldwide incidence of Preeclampsia.¹⁵
<table>
<thead>
<tr>
<th>S.No.</th>
<th>Country</th>
<th>Population Estimated</th>
<th>Extrapolated Incidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>USA</td>
<td>293,655,405</td>
<td>157,969</td>
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<tr>
<td>2</td>
<td>Britain (United Kingdom)</td>
<td>60,270,708</td>
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<td>3</td>
<td>France</td>
<td>60,424,213</td>
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<td>Germany</td>
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<td>Russia</td>
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<td>6</td>
<td>China</td>
<td>1,298,847,624</td>
<td>698,703</td>
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<td>7</td>
<td>Japan</td>
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<td>South Africa</td>
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<td>9</td>
<td>Australia</td>
<td>19,913,144</td>
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<tr>
<td>10</td>
<td>New Zealand</td>
<td>3,993,817</td>
<td>2,148</td>
</tr>
</tbody>
</table>

### 3.3 Incidence and prevalence of Preeclampsia in Developing Countries

However, in the developing world, like India, incidences are very common, varying from 1 in 30 to 1 in 500. It is still a major killer of women in developing countries. According to WHO estimates, the incidence rates of preeclampsia in developing countries (2.8% of live births) are seven times that of developed countries (0.4% of live birth).\(^\text{16}\) In developing countries or low-income countries, where inadequate prenatal care limits preeclampsia surveillance, maternal mortality is common affecting ninety-nine percent of maternal deaths and, accounting for >50,000 deaths yearly,\(^\text{10}\) and is the third commonest cause of maternal death after hemorrhage and infection.\(^\text{17}\) Besides it is associated with fivefold increase in perinatal mortality.\(^\text{13}\) However, the impact of the disease is felt more severely in developing countries,\(^\text{18}\) where, unlike other more prevalent causes of maternal mortality (such as hemorrhage and sepsis), medical interventions may be ineffective due to late presentation of cases.\(^\text{19}\)
3.4 Incidence and prevalence of Preeclampsia - INDIAN SCENARIO

In developing countries like India, preeclampsia impacts 30% of all deliveries with 50,000 cases of women experiencing this serious complication each year. As per the Registrar General of India, for every 1,00,000 live births, 407 mothers die every year due to pregnancy-related causes. This implies that more than 1 lakh women in India die every year during pregnancy and childbirth. The major causes of these deaths have been identified as anemia, hemorrhage (including APH, PPH and ruptured uterus), toxemia, obstructed labor, puerperal sepsis and unsafe abortions and hypertension (including preeclampsia/eclampsia).  

![Figure 1: Distribution of etiological factors causing maternal death.](image-url)

In India, the incidence of preeclampsia is reported to be 8-10% of the pregnancies, as the vast majority of patients are illiterate and have low-socioeconomic status. They come to the hospital only in case of serious problems, and in a large majority of cases, preeclampsia remains asymptomatic and remits spontaneously, since diagnosis of preeclampsia is often missed. The extrapolated incidence of preeclampsia in India is 572,945 from the estimated population which is 1.06 billion.  

15, 21
The MMR (maternal mortality rate) is 254 at present as per the latest reports of September 2010, Ministry of Health and Family Welfare Govt. of India. This recent improvement is because of innovative schemes and programmes like JSY (Janani Suraksha Yojna) which provides incentives for institutional delivery. Hence to reduce MMR further below 100 we need to deal with the problem comprehensively, medically as well as socially. Medical interventions include pre-conception health care, proper antenatal care, institutional delivery and contraception to space pregnancies and limit family. To deal with this social factor the all new JSSK (Janani Sishu Suraksha Karyakram) is being launched to facilitate and provide incentives for the above. Although the reduction of maternal mortality was adopted by the global development community as one of the Millennium Development Goals the lack of success in improving pregnancy outcomes has been a result of failing healthcare systems, as well as of insufficient political, financial, and social commitment to the issue.

Although new biochemical markers have been recruited to predict preeclampsia, the early diagnosis of preeclampsia has been uncertain and the clinical care has focused on maternal symptoms. The lack of accurate knowledge of its etiology and pathogenesis has made the prediction of preeclampsia and the development of new treatments for preeclampsia problematic.

Liver dysfunction is a feature of preeclampsia. The endothelial vascular damage in preeclampsia progress to hepatic impairment. Liver enzymes in preeclampsia are elevated due to leakage across the cell membrane. Alterations in serum calcium and magnesium levels have been suggested as effective factors in causing preeclampsia.

Decreased perfusion of the kidney results in decreased glomerular filtration, allowing protein, mainly albumin, to be lost into the urine. Oliguria develops as the disease worsens.

Normal pregnancy is a condition with an enhanced systemic inflammatory response that becomes markedly exaggerated in preeclampsia in response to excessive stimuli and
triggers the endothelial dysfunction and inflammation leading to the maternal symptoms.\textsuperscript{27}

The hematological complications of pregnancy are a major contributor to maternal morbidity and mortality associated with pregnancy. Women with pregnancy induced hypertension may develop a variety of hematological aberrations.\textsuperscript{28}

Preeclampsia is associated with major changes in all aspects of haemostasis including increasing concentrations of most clotting factors, decreasing concentrations of some of the natural anticoagulants and increase in fibrinolytic activity. Complete understanding of preeclampsia leads to maintenance of placental function during pregnancy and meeting delivery haemostatic challenge. Changes in blood coagulation and fibrinolysis during pregnancy create a state of hypercoagulability. This phenomenon protects the woman from fatal hemorrhage during delivery but predisposes her to thromboembolism. The overall balance shifts towards apparent hypercoagulability, which is most marked around term and the immediate post-partum period.\textsuperscript{29}

In the present study an attempt has been taken to study the coagulation factors, biochemical and hematological parameters in the preeclamptic women, along with healthy normotensive non-pregnant women and pregnant volunteers as the control group. The results may help in the better management of patients with pregnancy induced hypertension.