**Original Article**

# HYPERTENSIVE DISORDERS OF PREGNANCY: AN ONGOING HOLOCOUST

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## ABSTRACT

**Background**: Hypertensive disorders of pregnancy (H.D.P.) can lead to serious complications for both mother and fetus in her womb.

**Objective:** To determine prevalence and some epidemiological factors of hypertensive disordersof pregnancy.

**Material and Methods**: Present study conducted on pregnant women attending antenatal clinicin medical college.It was a cross- sectional study. Information was obtained by face-to-faceinterviews of study subjects.

**Results:**Out of 1566 randomly selected study subjects, 95(6%) were hypertensive. Out of 95hypertensive pregnant women 63.3% were diagnosed as pre-eclampsia, 21.1% as gestationalhypertension, 11.5% as eclampsia and 4.1% as chronic hypertension. H.D.P. is common inwomen with age group >33yrs (20%), who arelabourer(13.2%). It is more prevalent in third trimester(11.1%) of pregnancy and in grandmultiparas (21.6%).

**Conclusion**: Hypertensive disorders of pregnancy are one of the common medical complicationsworsening the outcome of pregnancy.

**Keywords:** pregnancy, hypertension, prevalence, disorder

## INTRODUCTION

Every day, approximately 1000 women die from preventable causes related to pregnancy and childbirth. 99% of all maternal deaths occur in developing countries, in sub- Saharan Africa and South Asia.Disparity in maternal mortality rate exists within and across countries and regions. One third of all maternal deaths occur in just two countries - almost 20 per cent of deaths (56,000) occur in India and 14 per cent (40,000) were in Nigeria[1].

The current Maternal Mortality Rate (MMR) of India is 178 per one lakh live births. The situation is worst in Assam and Uttar Pradesh. According to a survey released by Annual Survey Bulletin 2010-2011 in August 2011, the MMR of Faizabad division is 451 per lakh which is highest in the country, while Kerala has the lowest MMR of 81 per lakh. The national goal is to achieve the MMR of 109 per lakh by 2015[2].

Major causes of maternal mortality in India remain haemorrhage (38%), sepsis (11%), abortions (8%), hypertensive disorders (5%), obstructed labour (5%) and other conditions like anaemia (19%), medical disorders during pregnancy contributing to 34% of all maternal deaths[3]. Deaths due to haemorrhage andinfections are reducing and deaths due to hypertension in pregnancy increasing. In developingcountries there are echoes of situations. Hypertensive disorders of pregnancy affect 6-8% of allpregnancies, with wide variation as per different geographical areas[4].Considering allthis, the present study was planned to determine prevalence and to find out few epidemiologicalfactors of hypertensive disorders of pregnancy.

## METHODOLOGY

The present analytical cross-sectional study was conducted for the period of 1 year from 1stJan.2009 to 31 Dec.2009. It was conducted on pregnant women attending ANC clinic at Obstetric and Gynecology department of MIMSR'S medical college and hospital, Latur in Maharashtra. Institutional ethical clearance was obtained from college ethical committee. Pilot study was done for a period of one month. Proforma waspretested on 150 pregnant women and modified in the light of difficulties encountered during study. According to different previous studies, prevalence of hypertensive disorders of pregnancy was 6-8% so we have considered 6% as prevalence for calculating sample size by using formula:

$n=4pq/L^2 = 4(0.06)(0.94)/(0.012)^2=1566$. We have interviewed and examined 1566 pregnant women for hypertension. We selected these pregnant women by simple random sampling method.

Investigator used to visit antenatal clinic daily from 9 am to 12 noon for collection of information from pregnant women attending antenatal clinic. Before examining B.P., study subjects were allowed to relax for 5 minutes after that their B.P. was measured. Second reading was taken after 4hours.If both the readings of B.P. came<140/90 mmHg then she was allowed togo after giving health education about danger signs of toxaemia of pregnancy and importance ofregular antenatal check up. If B.P. was ≥ 140/90 mmHg on both occasions, then detailed proforma was filled by investigator .Investigator also visited wards in the evening to catch patients of eclampsia and sever pre-eclampsia who were admitted directly from casualty to ward.

Before filling detailed proforma study subject was informed about purpose, importance and usesof participating in the study. Patient's consent was taken and Study subject was informed aboutexamination. These women were interviewed and examined to fill pretested proforma.

**Selection criteria for cases**: Pregnant Women having B.P. ≥ 140/90 mm Hg on two occasions 4 hours apart with or without history of chronic hypertension.

**Exclusion criteria for cases**: Pregnant women who were having blood pressure <140/90mmHg.

Standard definitions and methods were used during collection of information[5, 6]. We divided pregnant women into mild and sever hypertensive disorders of pregnancy according to clinical classification[7].

A standard ISI marked mercury sphygmomanometer was used throughout the study to minimize instrumental error. Blood pressure readings were taken by a single investigator for every study subject as per the guidelines given by W.H.O.Training in all relevant techniques was obtained by investigator including care for avoiding expectation error and digit preference.Proteinuria was detected by commercially available dipsticks, ≥ 1 + was considered as positive for diagnosis ofproteinurea[7].The socio-economic status was determined according to the recent modification of B.G. Prasad's socio-economic status scale for month of Feb.2010.

**Statistical tests applied:** Percentages, mean, Chi-square test, chi-square for linear trend, univariate analysis was done with the help of SPSS software version 11.

## RESULTS

In the present study, 1566 pregnant women were screened in antenatal clinic. Out of them, 95(6%) were presented with hypertension during pregnancy.

**Table 1: Distribution of study subjects as per different types of hypertensive disorders of pregnancy.**

| Hypertensive disorders of pregnancy | Cases (%) |
|---|---|
| Pre-eclampsia | 60 (63.3) |
| Gestational hypertension | 20 (21.1) |
| Eclampsia | 11(11.5) |
| Chronic hypertension | 4 (4.1) |
| Total | 95 (100) |

Table no.1shows that most common type of hypertensive disorder of pregnancy presented by study subjects in our study was pre-eclampsia (63.3%), chronic hypertension was diagnosed in only 4.1% of study subjects.

Study subjects were classified in two groups mild hypertensive (70.5%) and sever hypertensive (29.5%). Maximum numbers of cases were of mild hypertensive.

**Table 2: Frequency of symptoms in cases**

| Symptoms | No. of cases (%) |
|---|---|
| **Swelling on legs & face** | 84 (47.2) |
| **Headache** | 39 (21.9) |
| **Breathlessness** | 18 (10.1) |
| **Convulsions** | 12 (6.7) |
| **Giddiness** | 13 (7.4) |
| **Vomiting** | 12 (6.7) |

In table no. 2, it was observed that most common symptom presented by cases was swelling on legs and face, it was presented by 47.2% cases, followed by headache; which was experienced by 21.9% cases, followed by breathlessness (10.1%), giddiness (7.4%), vomiting and convulsions (6.7%).

**Table 3: Distribution of study subjects according to age and age wise prevalence of hypertensive disorders of pregnancy**

| Age (years) | Subjects (%) | Hypertensive Subjects (%) | Age wise Prevalence (%) |
|---|---|---|---|
| 18-22 | 1014 (64.7) | 58(61) | 5.71 |
| 23-27 | 457 (29.2) | 28(29.5) | 6.1 |
| 28-32 | 70 (4.5) | 4(4.2) | 5.71 |
| >33 | 25 (1.6) | 5(5.3) | 20 |
| **Total** | 1566 (100) | 95(100) | 6 |

$X^2=8.75$,.P=0.033,.d.f.=3

As shown in table, maximum study subjects (64.7%) were of age 18 to 22 years. Prevalence of hypertension was maximum amongst women of age group > 33 yrs which was 20%. The difference was found to be statistically significant(P=0.033).So risk of developing hypertension in pregnancy is more amongst women with age more than 33 years and secondly in the age group 23-27yrs.

Maximum number of study subjects (57.9%) belongs to Hindu religion. Next religion which was common

across study subjects was Muslim (25.2%). Minimum numbers of study subjects (16.9%) were from Buddhist religion. Religion wise prevalence of hypertension showed that prevalence was maximum in Muslims (6.8%) followed by in Hindus (6.6%). The difference found was statistically not significant ($x^2$ = 5.16, p =0.076, d.f. = 2).

**Table 4: Distribution of study subjects according to their educational status**

| Education | Total subjects(%) | Hypertensive subjects (%) | Education wise prevalence(%) | Odds Ratio |
|---|---|---|---|---|
| Up to middle school | 627(40) | 46(48.4) | 7.3 | 0.52 (0.26-1.00) |
| Up to high school | 661(42.2) | 38(40) | 5.7 | 0.67 (0.34-1.33) |
| > High school | 278(17.8) | 11(11.6) | 4 | 1.00 |
| **Total** | 1566(100) | 95 (100) | | |

($X^2$ for linear trend= 4.05, p=0.131)

**Table 5: Distribution of study subjects according to their occupation**

| Occupation | Subjects | Hypertensive | Prevalence* |
|---|---|---|---|
| Housewife | 1203(76.8) | 66 (70.4) | 5.8 |
| Agricultural Labourer | 206 (13.2) | 24 (25.1) | 13.2 |
| NonAgricultural Labourer | 67 (4.3) | 3 (3.14) | 4.7 |
| Business | 57 (3.6) | 1 (1.1) | 3.1 |
| Service | 33 (2.1) | 1 (1.1) | 1.8 |
| Total | 1566 | 95 | 6 |

***Occupation wise prevalence of hypertension (%);**
$X^2$ =14.67,P = 0.005,d.f.= 4
Figure in parenthesis indicate percentage

Regarding educational status of study subjects, In the table we can see that prevalence of hypertension in pregnant women decreases with increasing educational status. But the difference observed is not statisticallysignificant ($X^2$ for linear trend=4.05, p=0.131).

It was observed that occupation wise prevalence of hypertension was maximum (13.2%) among pregnant women worked in the farm during pregnancy, whereas prevalence was minimum (1.8%) among women doing service either in private sector or govt. sector. The difference observed was found to be statistically significant.($X^2$ =14.67, p = 0.005, d.f. =4)

**Table 6: Distribution of study subjects according to age of gestation**

| Ageof Gestation | Ssubjects | Hypertensive | Prevalence* |
|---|---|---|---|
| 1st Trimester(<12 wk) | 152(9.7) | 2 (2.1) | 1.3 |
| 2nd Trimester(12-28wk) | 647(41.3) | 7 (7.4) | 1.1 |
| 3rd Trimester(29-40wk) | 767(49) | 86 (90.5) | 11.2 |
| Total | 1566(100) | 95 (100) | 6 |

*Age of gestation wise prevalence (%)
$X^2$=69.87, p=0.0001, df=2

It was observedthat out of 95 hypertensive cases only 2.1% cases were in the 1st trimester, 7.4% of cases were from 2nd trimester and 90.5% cases were from third trimester. The difference of hypertension in relation with age of gestation was found to be statistically significant ($X^2$=69.87, p=0.0001, d.f. = 2).

**Table 7: Distribution of study subjects according to parity**

| Parity | Ssubjects | Hypertensive* | Prevalence |
|---|---|---|---|
| P1 | 703(44.9) | 54 (56.8) | 8.3 |
| P2 | 550(42.1) | 18 (18.9) | 3.4 |
| P3 | 202(12.9) | 11 (11.6) | 5.8 |
| P4 | 66(4.2) | 4 (4.3) | 6.5 |
| ≥P5 | 45(2.9) | 8 (8.4) | 21.6 |
| **Total** | 1566(100) | 95 (100) | 6 |

*Parity wise prevalence of hypertension (%)
$X^2$ = 21.72,p = 0.0002,d.f. = 4
Figure in parenthesis indicate percentage

Prevalence of hypertension in pregnancy is maximum (21.6%) in grandmultipara followed by 8% prevalence in primigravida.The difference observed was found to be statistically significant ($X^2$ = 21.72,p =0002, d.f. = 4).

## DISCUSSION

Study shows that, out of 1566 study subjects screened, 95 (6%) study subjects developedhypertensive disorders of pregnancy. The overall prevalence of the hypertensive disorders ofpregnancy have been reported in different studies is 6-8% and may go as high as 10 - 15%.J.Nadkarni, J Bahl, P.Parekh (2001)[8]in their observational study conducted at Indore ,M.P.

India, determined prevalence of hypertensive disorders of pregnancy as 7.49% .Nuzhat ParveenKhwaja et al (2004)[9] in their descriptive study conducted at Lahore found that 3.2% womenwerepresented with hypertensive disorders of pregnancy, Roberts C L et al (2005)[10] in therepopulation based cross-sectional study at Sydney ( Australia) found that prevalence ofhypertensive disorders of pregnancy was 9.8% . J. Prakash et al (2006)[11] in their descriptivehospital based study at Varanasi, observed that prevalence of hypertensive disorders ofpregnancy was 5.38%.Thais Rocha Assis et al (2008)[12] conducted a case control study in Braziland found that 14.5% women presented with hypertensive disorders of pregnancy.Kuklina et al(2009)[13]conducted a cross-sectional study at United States from 1998 to 2006 and found thatprevalence of hypertensive disorders of pregnancy among hospitalized patient is significantlyincreased from 6.7% in 1998 to 8.1% in

2006.This study is consistent with the findings of J.Nadkarni et al, J.Prakash et al which are the studies conducted in India. While the prevalence ofhypertensive disorders of pregnancy in studies conducted outside India were different, may bedue to some genetic and environmental factors like climate, altitude, socioeconomic conditionsetc.

Preeclampsia (60.3%) is most common type of hypertensive disorder of pregnancy we could found in our study. AnnaLisa et al (1998)[14] conducted a cohort study in Finland and found that incidence of preeclampsia19%, that of gestational hypertension 11% and chronic hypertension 4.3%.Ali Amir et al(1998)[4]conducted a cross section at study at Aligarh. They observed that 71.2% of cases were ofpreeclampsia, followed by 22.2% cases were of essential hypertension and 6.46% of cases weredue to organic cause. J Nadkarni et al (2001)[8] conducted observational study; at Indore.M.P,India, they observed that 50.4% were pre-eclampsia and 10.6% of cases were diagnosed aseclampsia. Lalita Poonytha et al (2003)[15] conducted a data analysis from ministry of health andfound that 70% of cases were diagnosed as gestational hypertension, 24% of case were of preeclampsiaand 6% cases were due to chronic hypertension. Nuzhat Parveen Khwaja et al(2004)[9]conducted a descriptive study at, Lahor hospital. They found that 67.2% cases were ofgestational hypertension, 21% cases presented with pre-eclampsia, 9% cases presented withchronic hypertension and 3.7% cases were diagnosed as eclampsia. Roberts CL et al (2005)[10]conducted a cross sectional study at university of Sydney, Australia. They found that overallprevalence of hypertensive disorders of pregnancy is 9.8% among them 0.6% were presented aschronic hypertension, 4.2% were presented as having pre-eclampsia, 0.3% was diagnosed ashaving chronic hypertension with super imposed pre-eclampsia and 4.3% cases were diagnosedas gestational hypertension. J Prakash et al (2006)[11] conducted a descriptive study at Universityof Banaras Hindu University Varanasi, India. They found that 44.4% of cases presented withpre- eclampsia, 40% cases presented with eclampsia, 6.9% cases were presented with chronichypertension superimposed on preeclampsia, and 1.38% of cases were presented with chronichypertension. When study subjects were classified, it was observed that mild hypertension in pregnancy was more common than sever hypertension.

Table no.2 describes frequency of symptoms in cases.Similar findings can be seen incase of studies by Shruti S.Dubhashi et al (2008)[16]conducted a observational study at B.Y. Nairhospital in Mumbai ,India found frequency of symptoms as edema experienced by 54% ofpatients followed by headache (30%) followed by blurring of vision and oligouria (2%) .J.Prakash et al (2006)[11] observed that edema was the most common symptom, this was followedby headache (51.39) followed by eclamptic convulsions (40.28%), followed by epigastric pain(27.77%) followed by blurring of vision experienced by 5.5% of cases.

Table no. 3 shows age wise distribution and age wise prevalence of hypertensionin pregnancy. Majority of study subjects 984(62.8%) were of age group 18-22 yrs. Hypertensionduring pregnancy is common in age group 18-22 yr. This result is consistent with findings of AliAmir et al (1998)[4], Antonia Bugalho et al (2001)[17] and Shruti Dubhashi et al[16]. They found thathypertensive in pregnancy is common in age group 15-25 yrs. Age wise prevalence ofhypertension in pregnancy is maximum (20%) among study subjects with age >33yrs. Ourfinding is consistent with number of studies namely Anna Liisa et al (1998)[14], J.Prakash et al(2006)[11] and L Y C Poon et al (2010)[6]. They found that advanced maternal age is associatedwith increased risk for hypertensive disorders of pregnancy.We found that prevalence ofhypertension during pregnancy is high at extremes of reproductive age group. High prevalence ofhypertensive disorders of pregnancy in younger age group (15-25 yrs) can be explained by thefact, tendency of social neglect in this age group, such as poor antenatal care, improper nutrition and more number of concealed pregnancies. On the other hand, unmasking of latent hypertension in older women can increase prevalence of hypertension in age group > 33yrs.

Regarding educational status of study subjects, we could not found any association between educational status of pregnant women with causation of hypertension during pregnancy.

Table no. 5 shows that hypertension during pregnancy is more prevalent among agriculturalworkers who have to work at farm in addition to their daily domestic work as compared tohousewives. The finding in our study is consistent with finding of, Ali Amir (1998)[4], C-J Lee et al (2000)[18], J. Hinggins et al(2002) [19], Rose I et al (2005)[20]who found that prevalence ofhypertension during pregnancy is more among women who have to do more physical workduring pregnancy.

Table no.6shows distribution of study subjects according to age of gestation at the time ofdiagnosis of hypertension in pregnancy. Prevalence of hypertension during pregnancy ismaximum (11.2%) in third trimester as compared to second (1.3%) and first trimester (1.1%).Our finding is in accordance with findings of Ali Amir et al (1998)[4] documented that 89% ofstudy subjects were from 3rd trimester, J.Prakash et al (2006)[11] found that majority (84%) ofcases were from 3rd trimester and Antonia Bugalho et at (2001)[17] who observed 3rd trimester isthe time when maximum number of pregnant women suffer from hypertensive disorders ofpregnancy.

Table no.7 describes parity wise distribution of study subjects. It was observedthat 44.1% study subjects from non-hypertensive study subjects and 56.8% of study subjectsfrom hypertensive were primipara. Prevalence of hypertension during pregnancy is maximumamong grandmultipara (21.6%) followed by primipara(8.3%).The difference observed wasstatistically significant ($X2 = 21.72$, $p < 0.05$, d.f. = 4).This implies that hypertension inpregnancy is common

among primipara and next common in grandmultipara. Our finding is consistent with findings of other studies, Ali Amir et al (1998)[4], C- J Lee et al (2000)[18],J. Nadkarni et al (2001)[8],Rose I et al (2005)[20], J Prakash et al (2006)[11]. Primipara are at maximum risk of developing hypertension during pregnancy because this pregnancy is maternal first exposure to chorionic villi- specifically to trophoblast of fetal origin, to which body respond with strong immunological reaction in the form of hypertension during pregnancy. Next common group at increased risk of hypertension during pregnancy is of grandmultiparas. Most of the grandmultiparas are of age group more than 33 years; this age is itself an independent risk factor for hypertension during pregnancy.

## CONCLUSION

In our study, prevalence of hypertensive disorders of pregnancy was 6%. Out of 95 hypertensive pregnant women 63.3% were diagnosed as pre-eclampsia, 21.1% as gestational hypertension, 11.5% as eclampsia and 4.1% as chronic hypertension, 70.5% -mild hypertensive and 29.5% were severe hypertensive. Primiparity and grand multiparity, age >33yrs ,heavy work load during pregnancy, 3rd trimester of pregnancy are fewepidemiological risk factors associated with hypertensive disorders of pregnancy.

## RECOMMENDATIONS

Late pregnancies and grandmultiparas should be monitored carefully for hypertension. Long hours of laborious work should be avoided during pregnancy. Health education about danger signs of toxemia of pregnancy and symptoms of hypertensive disorders of pregnancy should be given to pregnant women who are from poor socio-economical class.

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Hypertensive Disorders of Pregnancy. LAWRENCE LEEMAN, MD, MPH, University of New Mexico School of Medicine, Albuquerque, New Mexico. LEE T. DRESANG, MD, University of Wisconsin School of Medicine and Public Health, Madison, Wisconsin.Â Preeclampsia is a multiorgan disease process characterized by hypertension and proteinuria or one of the following features, which are diagnostic when they develop in the setting of new-onset hypertension after 20 weeks' gestation: thrombocytopenia, renal insufficiency, impaired liver function, pulmonary edema, or cerebral or visual symptoms. Hypertensive disease of pregnancy, also known as maternal hypertensive disorder, is a group of high blood pressure disorders that include preeclampsia, eclampsia, gestational hypertension, and chronic hypertension. Maternal hypertensive disorders occurred in about 20.7 million women in 2013. About 10% of pregnancies globally are complicated by hypertensive diseases. In the United States hypertensive disease of pregnancy affect about 8% to 13% of pregnancies. Rates have increased in the developing