# HYPERTENSIVE DISORDERS OF PREGNANCY: PREVALENCE, CLASSIFICATION AND ADVERSE OUTCOMES IN NORTHWESTERN SAUDI ARABIA

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Hypertensive disorders of pregnancy (HDP) are important causes of maternal[1,2] and fetal[3,4] morbidity and mortality. It is believed that 10%-15% of maternal mortality in developing countries is due to HDP.[1] The mortality is closely associated with the severity of hypertension, being more evident in patients with eclampsia.[1] Moreover, HDP are associated with adverse obstetric outcome, with attendant increase in healthcare cost.[2] Pregnancy in itself has a detrimental effect on existing chronic hypertension, with increased prevalence of superimposed preeclampsia and eclampsia.[5-7]

There is controversy about the terminology and classification of these disorders. The American College of Obstetricians and Gynecologists (ACOG) proposed a classification in 1972, which was reaffirmed in 1990 by the National High Blood Pressure Education Working Group Report on High Blood Pressure in Pregnancy.[6] These hypertensive disorders were classified according to the following: 1) preeclampsia and eclampsia; 2) transient hypertension of pregnancy; 3) chronic hypertension; and 4) preeclampsia superimposed on chronic hypertension. The importance of differentiating between the various classes of HDP lies in the fact that each of these disorders has its own prognosis, fetal and maternal outcome, and hence a different management approach.[4,6,8]

The incidence and prevalence of HDP vary from one country to another, and might have some genetic predisposition. These disorders account for 6.4% of deliveries in African Americans, and for 4.8% of deliveries in other women in the United States of America.[5] The lowest prevalence is in Sweden, where only 1.5% of pregnancies are complicated by preeclampsia and hypertension.[9] The prevalence in Saudi Arabia was found to be less than that in the U.S. and higher than that in Sweden. In one study in the Asir region of Saudi Arabia,[10] HDP accounted for 2.4% of all pregnancies, with a higher prevalence in high altitudes than sea level areas. To the best of our knowledge, this is the first report in Saudi Arabia which defines these cases according to ACOG classifications and defines the effect of pregnancy on patients with chronic hypertension. This report also studied the overall effect of these disorders on maternal and perinatal mortality.

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## Patients and Methods

We carried out a retrospective chart review of all patients with hypertension during pregnancy who had delivered at the North Western Armed Forces Hospital Program in Tabuk, Saudi Arabia, from May 1992 to December 1993. The hospital is a population-based facility which provides primary, secondary and tertiary care to military personnel and their dependents. It also admits a limited number of civilians referred from other hospitals in the region for tertiary care.

The definitions for hypertensive disorders in pregnancy were adopted from the World Health Organization (WHO Technical Report Series #758) and the International Society for the Study of Hypertension in Pregnancy report (ISSHP 1988). Patients were traced through the hospital discharge diagnosis coding system. All patients who had systolic blood pressure (SBP) ≥140 mm Hg and diastolic blood pressure (DBP) ≥90 mm Hg after the 20th week of gestation were included in the study. Patients with pregestational chronic hypertension who were under treatment were included, irrespective of their BP readings during antenatal visits or at the time of delivery.

Patients were classified into four groups according to the ACOG classification (Table 1). The data of all patients who fulfilled the entry criteria were entered into database and statistical program Epi Info 6. The hospital's total deliveries during the same period were obtained from the hospital discharge survey and the prevalence of HDP was calculated. The perinatal mortality was defined as fetuses born dead (stillbirths) plus neonates who died within 28

TABLE 1. *Classifications and definitions of hypertensive disorders of pregnancy.*

| Class | Definition* |
|---|---|
| Preeclampsia/eclampsia | SBP≥140, DBP≥90 mm Hg and proteinuria >300 mg/L in 24 hours after 20 weeks of gestation |
| Transient hypertension of pregnancy | Same as above but no proteinuria |
| Chronic hypertension | Hypertension antedating pregnancy |
| Chronic hypertension with superimposed preeclampsia | Worsening blood pressure with proteinuria >300 mg/L in 24 hours |

*According to ACOG, NHBPEWGR and ISSHP.[6,11]

TABLE 2. *Summary analysis of the 208 patients with hypertensive disorders of pregnancy.*

| Variable | Mean | Range |
|---|---|---|
| Age | 27±6 | 15-42 years |
| Gravidity | 4.9±3.9 | 1-24 |
| Systolic BP | 142±12 | 110-200 mm Hg |
| Diastolic BP | 98±8 | 80-140 mm Hg |

TABLE 3. *Clinical presentations of patients with hypertensive disorders of pregnancy.*

| Presentation | Number | Percentage |
|---|---|---|
| Mild hypertension | 182 | 87.5% |
| Severe hypertension | 26 | 12.5% |
| Asymptomatic | 133 | 64% |
| Peripheral edema | 32 | 15% |
| Severe headache | 24 | 11.5% |
| Epigastric or right hypochondrial pain | 16 | 7.7% |
| Blurring of vision | 4 | 1.9% |
| Eclamptic seizures | 4 | 1.9% |
| Pulmonary edema | 1 | 0.5% |

TABLE 4. *Treatment of hypertensive disorders of pregnancy at North West Armed Forces Hospital Program.*

| Treatment | Number of Patients | Percentage |
|---|---|---|
| Oral antihypertensive medications | 74 | 35.6% |
| IV or IM diazepam during labor | 42 | 20.2% |
| IV or IM antihypertensives during labor | 22 | 10.6% |
| IV magnesium sulfate | 2 | 1% |
| Chlorpromazine+pethidine+ promethazine HCl | 2 | 1% |

days of life per 1000 total births.[12,13] Stillbirth was defined as the absence of signs of life in a baby born with a weight of about 500 g or after 22 weeks of gestation.[12,13]

## Results

During the 20-month study period, there were 208 patients who fulfilled the entry criteria for hypertension during pregnancy. The total number of deliveries during the same period was 6710. The prevalence of HDP was 3/100 deliveries. The mean age was 27±6 years, ranging from 15 to 42 years. Sixty-three patients (30.3%) were primigravida while 96 (46%) were grand multiparous (≥5). All the patients were Saudi nationals. Table 2 outlines the mean age, gravidity, SBP, and the DBP of the sample studied. The mean SBP was 142±12 mm Hg, while the mean DBP was 98±8 mm Hg. Only 26 patients (12.5%) had severe hypertension (DBP ≥110 mm Hg).

Based on the ACOG criteria,[6,11] the patients were classified into four groups according to the cause of hypertension during pregnancy. Preeclampsia and eclampsia occurred in 125 cases (60%), transient or gestational hypertension (non-proteinuric type) in 49 patients (23.6%), chronic hypertension in 18 patients (8.7%), and preeclampsia-complicating chronic hypertension in 16 patients (7.7%). Four patients developed eclampsia, with an overall prevalence of 0.06% of the deliveries.

The total number of patients with chronic hypertension was 34 patients, with a mean age of 31 years. Of these, 16 (47%) developed superimposed preeclampsia. There were four patients with renal disease, two with functioning renal transplant and hypertension, who developed superimposed preeclampsia which completely resolved after delivery. One patient who had membranous nephropathy and mild hypertension developed significant proteinuria and acceleration of hypertension, which significantly improved after delivery. One patient with focal segmental glomerular sclerosis was in remission before conception and remained so during pregnancy, apart from developing preeclampsia.

One hundred and thirty-three patients (64%) were asymptomatic. Peripheral edema was documented in only 31 patients with preeclampsia (15%). Eclamptic seizures were seen in four patients (1.9%). None of the patients developed HELLP syndrome (Table 3).

With regards to treatment, only 74 patients (35.6%) required oral antihypertensive medications during pregnancy. Forty-two patients (20%) received diazepam iv during labor, 22 patients (10.6%) received injectable antihypertensive medications, mostly hydralazine, two patients (1%) received a combination of chlorpromazine, pethidine and promethazine HCl, and only two patients (1%) received magnesium sulfate infusion (Table 4). One patient developed severe left ventricular failure, but none of the cases was complicated by renal failure or cerebral hemorrhage. Similarly, there was no maternal mortality during the study period.

From a total of 212 births from the hypertensive pregnancies, there were 10 perinatal deaths, resulting in a perinatal mortality of 47/1000 births. The perinatal morbidity was not studied.

## Discussion

This study determines the prevalence of hypertensive disorders of pregnancy and the perinatal mortality of the hypertensive pregnancies in a population-based hospital in Northwestern Saudi Arabia. It also classifies these disorders according to criteria agreed upon by both the American College of Obstetrics and Gynecology and WHO. In our study, we found the overall prevalence of hypertension during pregnancy to be 3% of deliveries. This agrees with a similar result by Mahfouz et al.,[10] who reported a prevalence of 2.6% in the Southwest region of Saudi Arabia. We are aware that our hospital is a military hospital with many patients originating from different parts of the country, but our speculation is that the prevalence of HDP in the whole country may not be considerably different from ours.

We determined the different classes of HDP and found that pregnancy-induced hypertension constituted the bulk of the sample surveyed. This meant that preeclampsia, eclampsia, and transient hypertension of pregnancy accounted for 91.3% of the total number of hypertensive pregnancies, which made up 2.8% of deliveries. Eclampsia was seen in only four patients (1.9% of the HDP). The overall prevalence of eclampsia was found to be 0.06% of all pregnancies. This was not different from the report by Saftlas et al.,[14] who reported a prevalence of 0.056% in the U.S. They also found a 36% decline in the prevalence of eclampsia during the study period, from 1979 to 1986. This was probably attained by improved antenatal care and more aggressive treatment of hypertensive disorders of pregnancy.

Pregnancy may have a detrimental effect on existing chronic hypertension. Development of preeclampsia and eclampsia was found to be four times higher in patients with chronic hypertension preceding pregnancy.[5] In another study from Canada,[15] preeclampsia complicated 21% of the pregnancies with chronic hypertension. In our study sample, only 34 patients (16%) had chronic hypertension preceding the pregnancy. Almost half of these developed superimposed preeclampsia, which was significantly higher than the reported prevalence in the U.S. and Canada.[5,15] Fortunately, there was no maternal mortality in the whole sample, though the morbidity and associated operative intervention were not studied.

Regarding the clinical presentation, we found lower limb edema in only 15% of the cases. Bearing in mind that 67.7% of our patients had preeclampsia, eclampsia and preeclampsia superimposed on chronic hypertension, the 15% prevalence of peripheral edema is significantly less than what would be expected. We believe that this might have been due to the inadequacy of retrospective data, where not all information is necessarily documented. Furthermore, peripheral edema is a soft clinical sign, and the diagnosis of preeclampsia after 20 weeks of gestation is better based on the combination of BP >140/90 and proteinuria greater than 300 mg/L in a 24-hour urine collection.[11]

Various studies have shown that these hypertensive pregnancies were associated with increased perinatal morbidity and mortality.[3,4,15,16] In our study, the perinatal mortality of hypertensive deliveries was 47/1000 births. This figure is comparable to the Canadian study,[15] which reported a rate of 45/1000. These rates are significantly higher than the overall perinatal mortality in the Canadian population, where it hardly reaches 12/1000 total births.[15] Similarly, in a recent study by Mansouri[17] from King Abdulaziz University Hospital in Jeddah, Saudi Arabia, the perinatal mortality was found to be 12/1000 total births. This figure compares to one from Riyadh Armed Forces Hospital which was 13.1/1000 total births.[18]

Many studies have shown that hypertensive pregnancies are associated with increased morbidity, prematurity, and small-for-gestational-age births.[3,4,7,15,16,19] We had five neonates (2.4%) requiring ICU support for prematurity, and they survived to discharge. Our study did not intend to study variables as birth weight and prematurity. We were mainly concerned with maternal and perinatal mortality, together with the overall prevalence of HDP in Northwestern Saudi Arabia.

We conclude that the prevalence of HDF in Northwestern Saudi Arabia is similar to that in the Southwestern region. We found that pregnancy aggravates chronic hypertension, with the development of preeclampsia in greater numbers than reported in the West. We also found that the perinatal mortality rate is significantly higher than the non-hypertensive births, a factor which should draw attention to this problem in an attempt to reduce this figure to the minimum. Further prospective studies and diligent documentation of the findings from different areas in the country are needed to establish the incidence, clinical pattern and the impact of this problem in order to guide healthcare planning.

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