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Outcomes of Pregnancy with Chronic Hypertension

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ABSTRACT

Objective: To determine maternal and perinatal outcomes associated with chronic hypertension complicating pregnancy.

Study design: A retrospective descriptive study.

Material and Method: The study was conducted by reviewing the medical records of pregnant women with chronic hypertension who delivered at the Faculty of Medicine Vajira Hospital, Navamindradhiraj University between August 2005 and March 2013. Data collection included maternal characteristics and pregnancy outcomes. The main outcome was the frequency of superimposed preeclampsia on chronic hypertension.

Results: The number of pregnancies with chronic hypertension included in the present study was 139 women representing the prevalence of 0.54%. Of the 139 cases, 44.6% had superimposed preeclampsia on chronic hypertension, 33.1% had preterm delivery, 6.5% had postpartum haemorrhage, 3.6% had HELLP syndrome, 1.4% had placental abruption and 0.7% had DIC. One maternal in-hospital death was recorded. Perinatal death occurred in 0.7% of deliveries. Low birth weight and small for gestational age were noted in 25.2% and 7.9% respectively.

Conclusions: Superimposed preeclampsia was a frequent complication in pregnant women with preexisting hypertension. Pregnancies with this complication had increased risks of maternal morbidities and detrimental neonatal outcomes.

Keywords: pregnancy, hypertension, preeclampsia

Introduction

Hypertensive disorders complicating pregnancy remain a public health concern throughout the world. Overall, chronic hypertension affects 0.5-5% of pregnant women, depending on the population studied[1,2]. Pregnant women with preexisting hypertension are associated with increased maternal and perinatal morbidity, including superimposed preeclampsia, placental abruption, fetal growth restriction, preterm delivery, and also increased primary cesarean delivery rate[3,4]. These risks are particularly found in patients with uncontrolled hypertension, in those with end organ damage, in those who are depleted with prenatal care and in those who developed superimposed preeclampsia[5]. Superimposed preeclampsia on chronic hypertension, a common complication of pregnancy with chronic hypertension may impede in about 14-34% with variable incidence among ethnicity,

nationality and countries[3,5-9]. This complication which is considered to be at very high risk may cause life-threatening maternal complications such as hypertensive encephalopathy, pulmonary edema, cerebral hemorrhage and perinatal mortality as well[5,10]. The present study was undertaken to determine the incidence of superimposed preeclampsia on chronic hypertension. The secondary objective was to study the pregnancy outcomes in women with chronic hypertension who delivered at the Faculty of Medicine Vajira Hospital, Navamindradhiraj University.

Material and Method

A retrospective chart review was performed among singleton pregnant women who had chronic hypertension and delivered at the Faculty of Medicine Vajira Hospital, Navamindradhiraj University between August 2005 and March 2013. Chronic hypertension was defined as elevated blood pressure of 140/90 mm Hg or higher prior to pregnancy or before 20 weeks of gestation not attributable to gestational trophoblastic disease[10]. Pregnant women carrying multiple or anomalous fetuses or pregnancies with incomplete data were excluded. Data on patients' characteristics including age, parity, body mass index (BMI), onset of hypertension, end organ involvement, prior hypertensive disorders complicating pregnancy, smoking before or during pregnancy, level of blood pressure at booking and during pregnancy, number of antihypertensive agents use before pregnancy, number of prenatal visits and coexisting medical diseases were collected. The primary outcome was the incidence of superimposed preeclampsia on chronic hypertension which diagnosed by a new-onset presenting of proteinuria of 300 mg or greater in 24 hours in hypertensive women with absence proteinuria before 20 weeks of gestation[10]. In addition, superimposed preeclampsia on chronic hypertension would be made if a sudden increase in proteinuria or blood pressure or platelet counts less than 100,000/μL in women with hypertension and proteinuria before 20 weeks of gestation occurred[10]. The following maternal and neonatal outcomes were determined: gestational age at delivery, mode of delivery, placental abruption, HELLP syndrome (hemolysis, elevated liver enzymes and low platelets), eclampsia, pulmonary edema, renal failure, disseminated intravascular coagulation (DIC), cerebrovascular hemorrhage, postpartum hemorrhage and maternal in-hospital death. The following perinatal outcomes were also considered: low birth weight (<2,500 grams), very low birth weight (<1,500 grams), extremely low birth weight (<1,000 grams), small for gestational age (SGA, birth weight below the 10thcentile for gestational age), dead fetus in utero (DFIU), stillbirth, Apgar score, early neonatal death (death at under seven days of life), neonatal complications e.g. respiratory distress syndrome (RDS), intraventricular hemorrhage (IVH), etc. and neonatal intensive care unit (NICU) admission. The present study was approved by Vajira Institutional Review Board, Navamindradhiraj University. Data were analyzed with software SPSS 17.0 and presented as mean, standard deviation and percentage.

Results

During the present study period, a total of 27,425 women delivered at Vajira Hospital. Of those deliveries, 148 cases had preexisting hypertension. The prevalence of chronic hypertension was 0.54%. Two cases with twin pregnancy and 7 patients with incomplete information were excluded, leaving 139 women included in the present study.

The patients' characteristics were summarized (Table 1). Mean age of the subjects was 33.3 ± 5.9 years, range from 19 to 46 years and 47% of those were considered to be of advanced age (age ≥ 35 years). Mean prepregnancy BMI was 27.4 ± 6.5kg/m^2. About two third of women were multiparous and 16% of these had preeclampsia in prior pregnancy. Fifty-five percent of patients were diagnosed chronic hypertension antecedent pregnancy; however, only 4.3% of these had an evidence of end organ involvement. About half of the known cases of chronic hypertension (51.1%) used one or more antihypertensive drug(s) and hydrochlorothiazide, atenolol and hydralazine were the common agents prescribed to control blood pressure. Booking blood pressure ranged between 140/90 and 160/110 mmHg were noted in 47.5% of women. During pregnancy, blood pressure of the majority of patients (77%) did not exceed 160/110 mmHg. Diabetes was the

most frequent coexisting medical disease and was found in 16.5% for gestational diabetes and 5.8% for pregestational diabetes. Almost half (47.5%) of the women presented 10 visits or more for prenatal care.

Table 1. Patients' characteristics

Age (mean±SD, years)	**33.3 ± 5.9**
Diagnosis of chronic hypertension	
- Before pregnancy	76 (54.7%)
- During pregnancy	63 (45.3%)
Diabetes	
- None	108 (77.7%)
- Pregestational diabetes	8 (5.8%)
- Gestational diabetes	23 (16.5%)
Smoking before or during pregnancy	6 (4.3%)
Prenatal visit	
- No	9 (6.5%)
- 1-3	10 (7.2%)
- 4-9	54 (38.8%)
- ≥10	66 (47.5%)
Number of antihypertensive use before pregnancy	
- 0	68 (48.9%)
- 1	55 (39.6%)
- ≥1	16 (11.5%)
Week of gestation at first prenatal visit (mean±SD)	15.3 ± 6.1
Booking blood pressure (mmHg)	
- <140/90	59 (42.4%)
- 140/90≤BP<160/110	66 (47.5%)
- ≥160/110	5 (3.6%)
- No prenatal visit	9 (6.5%)
Blood pressure during pregnancy (mmHg)	
- <140/90	26 (18.7%)
- 140/90≤BP<160/110	81 (58.3%)
- ≥160/110	23 (16.5%)
- No prenatal visit	9 (6.5%)

BP, blood pressure

Maternal and perinatal outcomes were demonstrated (Table 2). Superimposed preeclampsia on chronic hypertension affected 44.6% of women and 80.6% of events appeared later than 34 weeks of gestation. Mean gestational age at delivery was 37.2 ± 2.5 weeks. Preterm delivery presented in 33.1% (n=46) of patients; however, a majority of these (36/46, 78.3%) were late preterm births (between 34 and 37 weeks of gestation). The figure of cesarean delivery rate was 57.5% and the most prevalent indication was unfavorable cervix / failed induction. Of the 139 patients, 6.5% (n=9) had postpartum haemorrhage, 3.6% (n=5) had HELLP syndrome, 1.4% (n=2) had placental abruption, 0.7% (n=1) had DIC and unfortunately one maternal

in-hospital death (0.7%) was noted. Eclampsia, pulmonary edema, renal failure and cerebrovascular hemorrhage were not found. Maternal death was recorded in a profile of advanced age with huge myoma, poor-controlled hypertensive and gestational diabetic women with noncompliant prenatal visits. This patient developed superimposed preeclampsia at 36 weeks of gestation. Six hours after magnesium sulfate administration in order to prevent convulsion, cesarean delivery was performed due to non-reassuring fetal heart rate pattern and transverse lie. Immediate postpartum hemorrhage as a result of uterine atony was noted. Autopsy was not allowed to provide. DIC, the consequences of massive bleeding was considered as her cause of death.

Table 2. Maternal and perinatal outcomes

Superimposed preeclampsia	62 (44.6%)
- Week of gestation (mean±SD)	35.9 ± 4.4
Gestational age at delivery (weeks)	
- <28	1 (0.7%)
- 28≤GA<34	9 (6.5%)
- 34≤GA<37	36 (25.9%)
- ≥37	93 (66.9%)
Mode of delivery	
- Vaginal	59 (42.5%)
- Cesarean delivery	80 (57.5%)
Indication for caesarean delivery	
- Unfavorable cervix / Failed induction	34 (42.5%)
- Previous cesarean section	20 (25.0%)
- Non reassuring FHR pattern	4 (5.0%)
- Others	22 (27.5%)
HELLP syndrome	5 (3.6%)
Placental abruption	2 (1.4%)
Disseminated intravascular coagulation	1 (0.7%)
Postpartum hemorrhage	9 (6.5%)
Maternal in-hospital death	1 (0.7%)
Birth weight (mean±SD, grams)	2,824.7 ± 668.5
- < 1,000	3 (2.2%)
- 1,000-1,499	3 (2.2%)
- 1,500-1,999	7 (5.0%)
- 2,000-2,499	22 (15.8%)
- ≥ 2,500	104 (74.8%)
Small for gestational age	11 (7.9%)
Death fetus in utero	1 (0.7%)
Apgar score <7 at 5 minutes	2 (1.4%)
Respiratory distress syndrome	10 (7.2%)
Intraventricular hemorrhage	1 (0.7%)
Neonatal intensive care unit admission	8 (5.8%)

GA, gestational age; FHR, fetal heart rate; HELLP syndrome (hemolysis, elevated liver enzymes and low platelets)

Mean birth weight was 2,824.7 ± 668.5 grams and 7.9% of babies were classified as SGA. Twenty-five percent, 4.4%, and 2.2% were classified as low birth weight, very low birth weightand extremely low birth weight respectively. Apgar score of less than 7 at 5 minutes was observed in 1.4%, RDS manifested in 7.2% and NICU admission was required in 5.8%. One case of DFIU (0.7%) was revealed in an advanced-age patient without superimposed preeclampsia. She came to the hospital at 30 weeks of gestation with a complaint of absence fetal movement for three days. A macerated fetus, weighing 718 grams was delivered with two rounds of nuchal cord. Autopsy was not permitted to perform and no gross anomaly was noted.

Discussion

The prevalence of chronic hypertension in the present study was consistent with the prior reports which diverged from 0.5 to 5%[1,2]. The patients' characteristics e.g. mean and range of maternal age, parity were very similar to the results from Chiangmai, northern part of Thailand[7]. However, the data revealed a noticeably higher rate of superimposed preeclampsia on chronic hypertension (44.6%) than those from the preceding studies that varying from 14 to 34% [New Zealand (14%)[6], Thailand (19%)[7], Canada (21%)[3], United Kingdom (22%)[8], United States (25-34%)[5,9]]. The elevated frequency of superimposed preeclampsia may come from the ethnic difference in cardiovascular disease[11], the diagnostic criteria used for superimposed preeclampsia, or coexisting of pregestational or gestational diabetes that was found in 22.3% of cases in the present study which diabetes itself could maximize risk of preeclampsia. Although there was high frequency of superimposed preeclampsia, 80.6% of events developed later than 34 week of gestation. A large prior prospective study from United Kingdom indicated that nearly half of women developed superimposed preeclampsia earlier than 34 weeks of gestation while the current study demonstrated only about one fifth[8].

The overall incidence of maternal complications other than superimposed preeclampsia, for instance, HELLP syndrome, placental abruption, preterm delivery and postpartum hemorrhage was comparable to the previous studies[7,12]. Maternal mortality rate in this study is higher than that cited in prior researches which varied from 0 to 0.09%[7,8,12]. Her cause of death, DIC, the consequences of massive bleeding from postpartum hemorrhage could be originated from many factors which may or may not directly relate to chronic hypertension: huge myoma, cesarean delivery and magnesium sulfate administration, for instance. We also observed a higher rate of cesarean delivery than that revealed in the literatures by others[7,8,12]. The raised cesarean delivery rate possibly related to a high prevalent of superimposed preeclampsia in our population since this complication often requires an urgent delivery.

Apart from SGA, the inclusive proportion of neonatal complications e.g. DFIU, low birth weight, RDS, IVH was parallel to the previous studies[7,8]. However, the incidence of SGA, 7.9%, was found to be lower than that demonstrated formerly ranging between 11 and 27%[7,8]. It may stem from the presence of only a few cases of maternal smoking, well controlled blood pressure (BP<160/110) in about three fourth of patients and late occurrence of superimposed preeclampsia in this study.

The advantage of this study was the reflection of pregnancy outcomes in women with chronic hypertension delivered in tertiary center, Bangkok, Thailand. The data which has never been obtained in our institute could be applied for preconception counseling among women with chronic hypertension. However, the present study had some limitations due to the nature of retrospective study as well as a small sample size or inclusion deliveries from a single institution that may cause an insufficient power to detect the factors associated with the occurrence of superimposed preeclampsia, a common complication. Besides, some cases had to be omitted due to the difficulty in differentiating between preeclampsia and superimposed preeclampsia on chronic hypertension in women with late booking; consequently, some patients with true chronic hypertension may be lost.

In conclusion, superimposed preeclampsia is prevalent in study population and increases adverse

maternal and neonatal outcomes. Women with chronic hypertension should be offered the preconception counseling as well as the careful antenatal monitoring to early recognition of superimposed preeclampsia and other associated complications. Future research should focus on a large prospective study to identify important risk factors of the development of superimposed preeclampsia in pregnant women with preexisting hypertension. Such data may improve the physicians to deliberately consider when planning hypertensive women care and counseling.

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ผลลัพธ์ของการตั้งครรภ์ในสตรีตั้งครรภ์ที่มีความดันโลหิตสูงเรื้อรัง

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วัตถุประสงค์ *: เพื่อศึกษาผลลัพธ์ด้านมารดาและทารกของสตรีตั้งครรภ์ที่มีภาวะความดันโลหิตสูงเรื้อรัง*

รูปแบบการศึกษา *: การวิจัยเชิงพรรณนาแบบย้อนหลัง*

วัสดุและวิธีการ *: ทำการศึกษาโดยทบทวนเวชระเบียนของสตรีตั้งครรภ์ที่มีความดันโลหิตสูงเรื้อรังที่มาคลอด ณ คณะแพทยศาสตร์วชิรพยาบาล มหาวิทยาลัยนวมินทราธิราช ระหว่างเดือนสิงหาคม พ.ศ.2548 ถึงเดือนมีนาคม พ.ศ.2556 โดยการรวบรวมข้อมูลคุณลักษณะของสตรีตั้งครรภ์และผลลัพธ์ของการตั้งครรภ์ ซึ่งมีวัตถุประสงหลักเพื่อศึกษาอัตราการเกิดภาวะครรภ์เป็นพิษแทรกซ้อนความดันโลหิตสูงเรื้อรัง*

ผลการศึกษา *: จำนวนสตรีตั้งครรภ์ที่มีความดันโลหิตสูงเรื้อรัง ซึ่งได้รับการคัดเลือกเข้าสู่การศึกษาเท่ากับ 139 คน คิดเป็นความชุกร้อยละ 0.54 จากการศึกษาพบอัตราการเกิดภาวะครรภ์เป็นพิษแทรกซ้อนความดันโลหิตสูงเรื้อรังร้อยละ 44.6, คลอดก่อนกำหนดร้อยละ 33.1, ตกเลือดหลังคลอดร้อยละ 6.5, กลุ่มอาการ HELLP ร้อยละ 3.6, รกลอกตัวก่อนกำหนดร้อยละ 1.4, ภาวะเลือดแข็งตัวในหลอดเลือดแบบแพร่กระจายร้อยละ 0.7 และพบมารดาเสียชีวิต 1 รายสำหรับผลลัพธ์ด้านทารก พบอัตราตายปริกำเนิดร้อยละ 0.7 ของการคลอด อัตราทารกที่มีน้ำหนักน้อยและน้ำหนักต่ำกว่าเกณฑ์ในแต่ละอายุครรภ์คิดเป็นร้อยละ 25.2 และร้อยละ 7.9 ตามลำดับ*

สรุป*: ภาวะครรภ์เป็นพิษแทรกซ้อนความดันโลหิตสูงเรื้อรังเป็นภาวะแทรกซ้อนที่พบบ่อยในสตรีตั้งครรภ์ที่มีความดันโลหิตสูงเรื้อรังและสตรีกลุ่มที่เกิดภาวะแทรกซ้อนดังกล่าวนั้นเพิ่มความเสี่ยงต่อการเกิดทุพพลภาพและการเกิดอันตรายต่อทารกแรกคลอด*