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CLINICAL ARTICLE

# Maternal outcomes of hypertensive disorders in pregnancy at Korle Bu Teaching Hospital, Ghana

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ABSTRACT

*Objective:* To determine maternal outcomes of hypertensive disorders in pregnancy at Korle Bu Teaching Hospital (KBTH) in Accra, Ghana. *Methods:* A cross-sectional study was conducted between January 1 and February 28, 2013. All women delivering at KBTH whose pregnancies were complicated by hypertensive disorders were identified. A structured questionnaire was administered, and the women were followed up on a daily basis until discharge from hospital. Medical records were also reviewed to identify any complications of hypertensive disorders. *Results:* A total of 368 women were analyzed. Of 10 maternal deaths, 3 (30.0%) were due to hypertensive disorders in pregnancy, and specifically pre-eclampsia. Overall, 168 (45.7%) women with hypertensive disorders in pregnancy delivered by cesarean, 16 (4.3%) had placental abruption, 11 (3.0%) had pulmonary edema, 3 (0.8%) had HELLP syndrome, 2 (0.5%) had acute renal failure, 3 (0.8%) had an intracerebral hemorrhage or cerebrovascular accident, 21 (5.7%) were admitted to the intensive care unit, 7 (1.9%) had disseminated intravascular coagulation, and 58 (15.8%) had eclampsia. Cesarean delivery, admission to intensive care unit, and eclampsia were significantly more common in women with pre-eclampsia than in those with other hypertensive disorders. *Conclusion:* Hypertensive disorders in pregnancy are associated with high incidences of adverse maternal outcomes in Ghana, with significantly increased frequencies in women with pre-eclampsia.
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## 1. Introduction'

Maternal morbidity and mortality remain a major public health issue, especially in low-income countries, despite joint international efforts to improve maternal health [1]. Globally, maternal death is the only public health statistic with the largest disparity between high-income and low-income countries [2]. In Ghana, the current countrywide maternal mortality ratio of 350 deaths per 100 000 live births is still excessively high, although most of the causes of death are avoidable [3]. At Korle Bu Teaching Hospital (KBTH)—the largest tertiary referral center in Ghana, with approximately 10 000 deliveries per year—the maternal mortality ratio has ranged between 734 and 915 deaths per 100 000 live births in the past 20 years, with obstetric hemorrhage and hypertensive disorders in pregnancy being the major contributors [4–6].

Hypertensive disorders in pregnancy are now the leading cause of maternal mortality in the major tertiary health institutions in Ghana, having relegated obstetric hemorrhage to second position [6,7]. A recent study [6] showed that eclampsia, acute renal failure, intracerebral hemorrhage, pulmonary edema, and HELLP syndrome (hemolysis, elevated liver enzymes, and low platelet count) are the common immediate causes of maternal deaths due to hypertensive disorders in pregnancy in Ghana. However, most major complications of hypertensive disorders leading to severe maternal outcomes, including deaths and severe morbidities, are preventable and treatable. Maternal deaths and severe morbidities associated with hypertensive disorders in pregnancy are usually due to mismanagement of these problems and complications [6].

The outcomes of women with hypertensive disorders in pregnancy at KBTH have not yet been documented, but clinical experience shows that hypertension is a common and serious problem associated with significant maternal complications. Therefore, the aim of the present study was to determine outcomes among women with hypertensive disorders who received prenatal and delivery services at KBTH.

## 2. Materials and methods

A cross-sectional study was conducted at the maternity unit of KBTH in Accra between January 1 and February 28, 2013. All women delivering at KBTH whose pregnancies were complicated by hypertensive

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disorders were identified. The study excluded women with hypertensive disorders who delivered in a peripheral health institution before referral to KBTH. Women with multiple pregnancies were also excluded to avoid their potential confounding effect on the adverse obstetric outcomes associated with hypertensive disorders in pregnancy. Before data collection, the purpose of the study was explained to women individually. They were also informed that failure to take part in the study would not in any way affect the quality of their care. Participants themselves provided written informed consent when possible; if women were unable to provide consent because of their health status or if they were younger than 18 years, informed consent was obtained from their next of kin, carer, or guardian. The study protocol was approved by the Ethical and Protocol Review Committee of the University of Ghana Medical School.

Women who had delivered during the previous 24 hours at the two labor wards in the hospital were identified each morning. A data entry form was used to extract baseline data from all patients' folders and admission and discharge books on the labor and recovery wards. Women whose pregnancies had been complicated by hypertensive disorders were subsequently identified; their folder numbers and assigned study identification numbers were noted and kept securely.

These identified patients were traced to the specific maternity wards to which they had been admitted after delivery. A structured questionnaire was administered to them after obtaining informed consent. Their medical records were also reviewed to determine if they had developed any complication. These women were followed up on daily basis until they were discharged from the hospital to establish whether they had developed any complication. The data obtained included sociodemographic information (e.g. age, educational status, and marital status), obstetric data (e.g. gravidity, parity, and gestational age at booking and delivery), indicators, or maternal outcomes (including mode of delivery, blood pressure at diagnosis, occurrence of eclampsia, acute renal failure, coagulation dysfunction, and placental abruption).

Any maternal deaths that occurred during the study period were noted and the cause of death recorded to determine those that were due to hypertensive disorders. Maternal mortality was defined as the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes [8]. In the present study, hypertensive disorders in pregnancy were classified as pre-eclampsia, gestational or transient hypertension, chronic hypertension, and pre-eclampsia superimposed on chronic hypertension [9]. Hypertension in pregnancy was defined as a systolic blood pressure of at least 140 mm Hg and/or a diastolic blood pressure of at least 90 mm Hg [9,10]. Proteinuria was determined using a semiquantitative dipstick test: proteinuria of at least 1 + in a random urine sample was deemed significant in the presence of hypertension without evidence of urinary tract infection [9].

The data were analyzed using SPSS version 20.0 (IBM, Armonk, NY, USA). Descriptive analysis was done and appropriate measures of centrality (mean) and dispersion (standard deviation) were calculated as well as percentages when appropriate. The obstetric and clinical characteristics of women with the various categories of hypertensive disorders were compared using analysis of variance followed by a post hoc analysis using the Bonferroni test. The mean gestational age, and systolic and diastolic blood pressure at diagnosis for patients with pre-eclampsia and gestational hypertension were determined using independent student *t* test. Univariate and multivariate analyses were also performed. $P < 0.05$ was considered statistically significant.

## 3. Results

A total of 1856 deliveries occurred during the study period, resulting in 1924 births, of which 1848 were live births and 76 stillbirths. Among 1458 women without hypertensive disorders, 56 had twin pregnancies and so were excluded from the analysis. Therefore, 1402 normotensive pregnant women were included in the analysis. Of 398 identified women with hypertensive disorders in pregnancy, two did not give informed consent and were excluded from the study. Another 16 women were excluded, because they were lost to follow-up after delivery and could not be correctly classified into the appropriate hypertensive group. Additionally, 12 women delivered twins, so were excluded. Therefore, 368 women with hypertensive disorders were included.

Ten maternal deaths occurred, resulting in a maternal mortality ratio of 541 deaths per 100,000 live births. Three (30.0%) of the 10 maternal deaths were due to hypertensive disorders in pregnancy, and specifically pre-eclampsia, which affected 140 women (case fatality rate 2.1%). All three of these deaths occurred within 24 hours of admission.

The sociodemographic characteristics of the women with and without hypertensive disorders are presented in Table 1. The basic obstetric and clinical characteristics of women with hypertensive disorders are presented in Table 2. Post hoc analysis showed specific significant differences between the various hypertensive disorders (Table 2). The mean gestational age at diagnosis of pre-eclampsia was 34.85 ± 5.25 weeks, compared with 35.38 ± 7.15 weeks in women diagnosed with gestational hypertension ($P = 0.090$). The mean systolic blood pressure at diagnosis was significantly higher in women with pre-eclampsia than in those with gestational hypertension (166.65 ± 21.02 versus 148 ± 14.24 mm Hg; $P<0.001$), as was diastolic blood pressure (106.07 ± 13.38 versus 96.04 ± 8.94 mm Hg; $P<0.001$). Among the 368 women with hypertensive disorders, 65 (17.7%) had had a previous cesarean delivery.

The frequency of the various maternal outcome indicators among the different categories of hypertensive disorders are presented in Table 3. Of the 368 women with hypertensive disorders in pregnancy, 339 (92.1%) had been referred to KBTH for delivery.

Univariate analysis showed increased risk of cesarean delivery, admission to the intensive care unit, pulmonary edema, and eclampsia in women with pre-eclampsia (Table 4). Acute renal failure, disseminated intravascular coagulation, and intracranial hemorrhage were not included in the univariate analysis, because all these complications occurred only in the pre-eclamptic group (Table 3). Multivariate analysis was performed and adjustments were made for maternal age, parity, number of prenatal visits, gestational age at delivery, and history of previous cesarean delivery. The risks of cesarean delivery, admission to the intensive care unit, and eclampsia were still greater in women with pre-eclampsia than in those with other hypertensive disorders (Table 4). However, the risk of pulmonary edema was no longer significantly higher in women with pre-eclampsia than in those with other hypertensive disorders (Table 4).

**Table 1**
Sociodemographic characteristics.[a]

| Variable | Hypertensive disorders in pregnancy (n = 368) | Normotensive pregnancy (n = 1402) | Total (n = 1770) |
|---|---|---|---|
| Age group, y | | | |
| <20 | 20 (5.4) | 74 (5.3) | 94 (5.3) |
| 20–35 | 276 (75.0) | 1158 (82.6) | 1434 (81.0) |
| >35 | 72 (19.6) | 170 (12.1) | 242 (13.7) |
| Parity | | | |
| Nulliparous | 130 (35.3) | 498 (35.5) | 628 (35.5) |
| Primiparous | 78 (21.2) | 442 (31.5) | 520 (29.4) |
| Multiparous | 160 (43.5) | 462 (33.0) | 622 (35.1) |
| Marital status | | | |
| Married/cohabitation | 295 (80.2) | 1039 (74.1) | 1334 (75.4) |
| Single | 73 (19.8) | 363 (25.9) | 436 (24.6) |
| Education | | | |
| None | 37 (10.1) | 183 (13.1) | 220 (12.4) |
| Primary school | 47 (12.8) | 153 (10.9) | 200 (11.3) |
| Secondary school | 242 (65.8) | 889 (63.4) | 1131 (63.9) |
| Tertiary | 42 (11.4) | 177 (12.6) | 219 (12.4) |

[a] Values are given as number (percentage).

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