

Yucatan, First National Place in Maternal Morbidity Due to Hypertensive Disease: Experience Analysis

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ABSTRACT

Background: Hypertensive disorders increase maternal-fetal morbidity and mortality. In Mexico, hypertensive disease is the main predictor of maternal morbidity (62.7%) (1). According to the National Epidemiological Surveillance System, the states with the highest maternal morbidity rates are Yucatán (30.2), Jalisco (20.8), and Guerrero (14.2). Yucatán ranks first nationally in maternal morbidity but is among the states with the lowest obstetric severity index (1.69%), indicating success in risk identification, diagnosis, and management. **Objective:** To determine the prevalence of hypertensive disorders during pregnancy, associated risk factors, and morbidity. **Methods:** Observational, retrospective, and descriptive study. Review of medical records of patients diagnosed with hypertensive disorders and meeting criteria for severe maternal morbidity, between June 1, 2019, and January 1, 2025. **Results:** Total of 1,842 patients were included. Mean age: 26.3 years. Median number of pregnancies: 3; deliveries: 2; abortions: 1; cesarean sections: 1.5. Average gestational age at diagnosis: 31.5 weeks. Recurrence of hypertensive disease in previous pregnancy with severe preeclampsia: 62%. Associated morbidity in 82% of patients. Risk factors: previous pregnancy with preeclampsia (OR 12.949) and obesity (OR 1.828, $p = 0.029$). **Conclusion:** Accurate detection of complications associated with hypertensive disorders highlights the importance of prevention, early diagnosis, and timely treatment as key strategies to reduce maternal morbidity.

Keywords: Hypertensive Disorders, Maternal Morbidity, Preeclampsia, Pregnancy, Obstetrics.

INTRODUCTION

Hypertensive disorders constitute a specific condition during pregnancy that increases maternal-fetal morbidity and mortality and may be diagnosed through elevated blood pressure or biochemical alterations [1,2]. Their prevalence has increased due to the rising incidence of cardiometabolic

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diseases in women of reproductive age [3]. These disorders are the second leading cause of maternal mortality and a significant factor in maternal and fetal morbidity, making them a critical issue in obstetrics [4].

Hypertensive disorders of pregnancy include chronic hypertension, gestational hypertension, preeclampsia, and preeclampsia superimposed on chronic hypertension. Complications include preeclampsia, eclampsia, and HELLP syndrome [5]. Preeclampsia has been described as a two-stage disorder involving abnormal uteroplacental perfusion, possibly with defective trophoblastic invasion, followed by generalized endothelial dysfunction and vascular inflammation, leading to systemic preeclampsia and end-organ damage [6].

Risk factors and predictors for preeclampsia reflect the complexity of the condition. Risk assessment tools such as odds ratios can classify these factors into familial, demographic, pathological, pregnancy-related, paternal, biochemical, and imaging findings [7]. Accurate blood pressure measurement, diagnosis, and treatment during pregnancy and postpartum are critical for improving outcomes [8].

Despite updates to general hypertension guidelines, pregnancy hypertension is still defined as systolic ≥ 140 mmHg and/or diastolic ≥ 90 mmHg measured on two occasions [9]. Women with chronic hypertension have a higher incidence of superimposed preeclampsia, cesarean delivery, preterm birth before 37 weeks, low birth weight, NICU admission, and perinatal death. They also have increased long-term cardiovascular risk [10]. Low-dose aspirin is recommended for women at moderate to high risk of preeclampsia [11].

Doppler ultrasound and biomarkers like mean arterial pressure (MAP), uterine artery pulsatility index (UtA-PI), and pregnancy-associated plasma protein-A (PAPP-A) can help predict preeclampsia [12]. Among extreme maternal morbidity predictors, hypertensive disorders remain the leading national condition (62.7%) [1]. According to the National Epidemiological Surveillance System, the highest maternal morbidity ratios were reported in Yucatán (30.2), Jalisco (20.8), and Guerrero (14.2) [1].

For every maternal death, 100 cases of extreme maternal morbidity occur, representing a public health problema [13]. The obstetric severity index reflects outcomes in managing severe obstetric events. Yucatán, although leading

in maternal morbidity, has a low obstetric severity index (1.69%), reflecting success in risk identification and timely management [1].

MATERIALS AND METHODS

An observational, cross-sectional, and descriptive study was conducted from June 1, 2019, to January 1, 2025, to determine the prevalence of hypertensive disorders in pregnancy and to analyze the associated risk factors and morbidity in obstetric patients diagnosed with hypertensive disorders and severe maternal morbidity. The study was carried out at the General Hospital Agustín O'Horán, Ministry of Health, Mérida, Yucatán, Mexico.

Patients who did not meet the World Health Organization (WHO) criteria for severe maternal morbidity or lacked established criteria for hypertensive disorders of pregnancy were excluded. Cases with incomplete clinical records were also eliminated.

Authorization was obtained from the hospital's Research Committee. The study variables included:

- **Severe maternal morbidity (SMM):** defined by WHO as women who survived life-threatening conditions during pregnancy, childbirth, or within 42 days postpartum [2]. WHO 2009 criteria were applied, encompassing clinical, biochemical, and intervention-based indicators grouped by affected systems: cardiovascular, respiratory, renal, hematological, hepatic, neurological, and uterine [2,13].

Clinical records were reviewed to register cases meeting the inclusion criteria. Variables collected included age, parity, gestational age at diagnosis, and recurrence of hypertensive disorders, particularly severe preeclampsia in previous pregnancies. Associated comorbidities (e.g., obstetric hemorrhage, HELLP syndrome, preterm delivery, intrauterine growth restriction, placental abruption, fetal death) and risk factors (e.g., obesity, diabetes, multiparity, family history of preeclampsia, maternal age >35 , previous preeclampsia) were analyzed.

Data were compiled in Microsoft Excel and analyzed using measures of central tendency. Risk factor analysis was performed using odds ratios, comparing affected patients to a control group with healthy pregnancies.

RESULTS

The observed population sample included 1,842 patients

diagnosed with hypertensive disorders of pregnancy who met the criteria for severe maternal morbidity. The mean age was 26.3 years. The median number of pregnancies was three; the median number of deliveries was two; the median number of abortions was one; and the median number of cesarean sections was 1.5. The average gestational age at the onset of hypertensive disorder was 31.5 weeks.

The recurrence rate of hypertensive disorders in previous pregnancies, specifically severe preeclampsia, was 62% (n = 1,142).

The prevalence of associated morbidities in this population was as follows: obstetric hemorrhage 14% (n = 253), HELLP

syndrome 14% (n = 258), preterm delivery 30% (n = 546), intrauterine growth restriction 23% (n = 432), placental abruption 10% (n = 182), and fetal death 1% (n = 23). These findings underscore the presence of complications in 82% of the patients, representing a significant and alarming clinical issue.

Risk factor analysis using odds ratios revealed a significant association in patients with a history of preeclampsia in a previous pregnancy (OR 12.949) and obesity (OR 1.828; p = 0.029). These results support the importance of early identification of high-risk patients during prenatal consultations (Figures 1-4 & Table 1).



Figure 1. Maternal morbidity ratio by state of residence. Mexico 2024. Source: SINAVE.

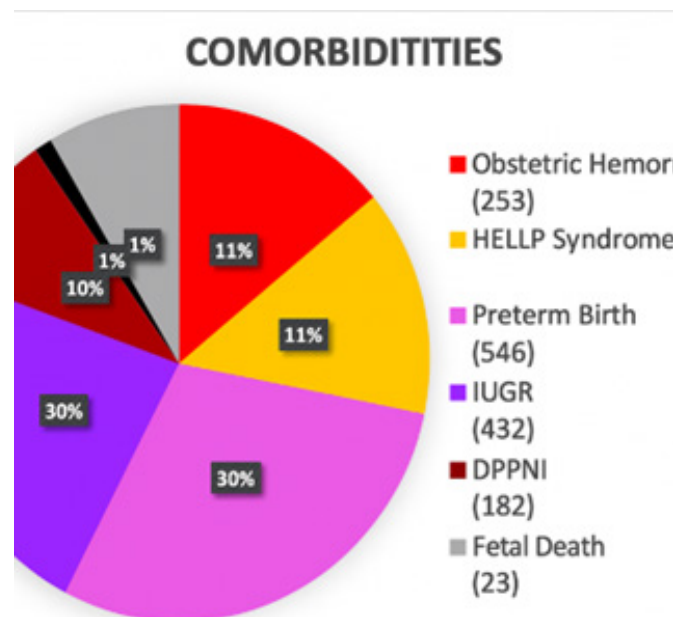


Figure 2. Associated comorbidities in patients with hypertensive disorders.



Figure 3. Obstetric hemorrhage in patient with severe preeclampsia at Hospital Dr. Agustín O'Horán.

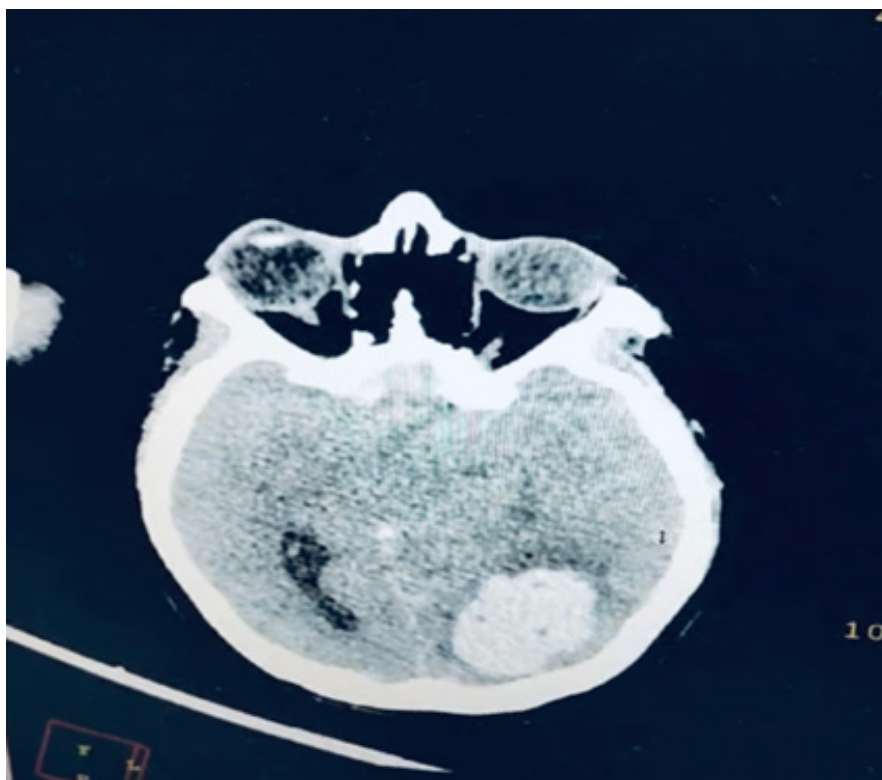


Figure 4. Right parieto-occipital intraparenchymal hemorrhage secondary to eclampsia in a 17-year-old primigravida at Hospital Dr. Agustín O'Horán.

Table 1. Risk factor analysis for maternal morbidity associated with hypertensive disorders

Variable	p	OR
Obesity	0.029	1.828
Diabetes	0.658	1.165
Multiparity	0.957	0.985
Family history of preeclampsia	0.001	12.949
Previous preeclampsia	0.301	1.112
Age > 35 years	0.008	0.222

DISCUSSION

The World Health Organization defines extreme maternal morbidity as life-threatening conditions that significantly impact a woman's health [2].

The patients analyzed in this study met the clinical and biochemical criteria established by the WHO [2].

According to the annual report from the National Epidemiological Surveillance System, more than 10,000 cases of extreme maternal morbidity due to hypertensive disease are reported annually in Mexico, with Yucatán consistently ranking at the top [1].

The majority of maternal deaths occur in low- and middle-income countries [14]. The leading direct causes include hemorrhage, hypertensive disorders of pregnancy, sepsis, complications from abortion, and thromboembolism [14]. Preventing maternal mortality depends not only on improved clinical management but also on addressing the social and economic barriers that limit access to quality care [14].

This study identified risk factors consistent with the findings of Yang et al., who reported a significant association between preeclampsia and conditions such as obesity and nulliparity [15]. These results are relevant for early identification of high-risk pregnancies.

There is limited literature and statistical data on extreme maternal morbidity in the Mexican population due to a lack of comprehensive studies.

A major strength of this study is the sample size of patients who met the criteria for extreme maternal morbidity due to hypertensive disorders. Timely identification and integrated management of these patients help reduce obstetric severity.

Limitations of this study include the absence of variables such as prenatal care follow-up, socioeconomic status, and

substance use. However, the data sources follow internal quality control procedures. Additionally, this study provides valuable insight due to the large population analyzed and the lack of previous state-level data, allowing extrapolation of findings within Mexico.

This population is from a developing country, and the results may reflect future trends and highlight the importance of preventive measures. The incidence and association of risk factors for hypertensive disorders in pregnancy in Yucatán, Mexico, provide a current overview of public health measures and potential consequences for affected women.

CONCLUSION

The identification of risk factors represents a primary prevention method. It is essential to perform a comprehensive, accurate, and detailed assessment of each risk factor to properly classify the patient and implement closer follow-up for those presenting multiple factors simultaneously.

The accurate detection of complications associated with hypertensive disorders in pregnancy underscores the importance of prevention, timely diagnosis, and treatment as key strategies to reduce maternal morbidity and mortality.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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