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Prevalence of pregnancy hypertensive disorders in Mongolia

Nathalie E. Marchand MS [a,*,1], Ganmaa Davaasambuu PhD, MD [a,b,1], Thomas F. McElrath PhD, MD [c], Enkhmaa Davaasambuu MD [d], Tsedmaa Baatar MD [d], Rebecca Troisi ScD [e]

[a] Department of Nutrition, Harvard T.H. Chan School of Public Health, 677 Huntington Blvd., Boston, MA 02115, United States
[b] Channing Division of Network Medicine, Department of Medicine, Brigham and Women's Hospital, Harvard Medical School, 181 Longwood Avenue, Boston, MA 02115, United States
[c] Department of Obstetrics and Gynecology, Division of Maternal Fetal Medicine, Brigham and Women's Hospital, Harvard Medical School, 75 Francis Street, Boston, MA 02115, United States
[d] National Center for Maternal and Child Health, Khuvisgalchdin Street, Bayangol District, Ulaanbaatar, Mongolia
[e] Divisions of Cancer Epidemiology and Genetics, National Cancer Institute, National Institutes of Health, Department of Health and Human Services, 9609 Medical Center Drive, Rockville, MD 20850, United States

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ABSTRACT

Objective: To estimate the prevalence of preeclampsia in a contemporary population of Mongolian women living in urban and rural areas. We determined the sensitivity and specificity of diagnosis based on established diagnostic criteria and assessed whether local diagnostic criteria were similar to those used in the US.

Study design: Cross-sectional study of urban and nomadic pregnant women recruited in Ulaanbaatar (n = 136) and rural provinces (n = 85).

Main outcome measures: Preeclampsia defined as hypertension new to pregnancy after 20 weeks and proteinuria (or protein creatinine ratio ⩾0.3 and dipstick reading > +1) or in the absence of proteinuria, hypertension and onset of: renal insufficiency, impaired liver function, thrombocytopenia, pulmonary edema, cerebral/visual symptoms. Prevalence of preeclampsia based on established criteria was compared with prevalence based on local physician's diagnosis.

Results: Prevalence of local physician diagnosed preeclampsia was 9.5% (13.2% urban, 3.5% rural). Prevalence based on established diagnostic criteria was 4.1% (4.4% urban, 3.5% rural). Sensitivity of physician's diagnosis was 23.8%, specificity was 98.0%, false negative rate was 2.0% and false positive rate was 76.2%. While prevalence based on local physician's diagnosis was over double that based on diagnostic criteria, overdiagnosis did not result in adverse effects. Women fulfilling diagnostic criteria for preeclampsia had babies with higher birth weights than women who did not (p-value = 0.006).

Conclusion: The 4.1% prevalence of preeclampsia in Mongolia was consistent with global estimates of 2–8%, suggesting the pathophysiology of preeclampsia here may be similar to that found globally. Sensitivity of physician's diagnosis was low, specificity was high.

1. Introduction

The global prevalence of preeclampsia, pregnancy associated hypertension and proteinuria, has been estimated at between 2% and 8%, and is one of the main contributors to maternal and perinatal morbidity and mortality [1–3]. In a cross-sectional study of 24 countries using the WHO Global Survey on Maternal and Perinatal Health, the prevalence of preeclampsia (based on newly diagnosed hypertension after the 20th gestational week and proteinuria) in low and middle income countries in Africa ranged between 0.9% in Angola to 3.7% in Uganda, in Latin America between 3.2% in Argentina to 8.2% in Brazil, and in Asia between 1.2% in Vietnam to 5.6% in the Philippines [2]. In developing countries, preeclampsia is currently responsible for approximately 8 million pre-term births and 20 million low birth weight infants [2]. Gathering adequate statistics on preeclampsia has been hindered in part by lack of adequate maternal care in the developing world. Thus, the true prevalence of preeclampsia in the developing

* Corresponding author at: Department of Nutrition, Harvard T.H. Chan School of Public Health, 677 Huntington Blvd., Boston, MA 02115, United States.
E-mail addresses: nmarchand@mail.harvard.edu (N.E. Marchand), gdavaasa@hsph.harvard.edu (G. Davaasambuu), tmcelrath@partners.org (T.F. McElrath), enkhee.khar@yahoo.com (E. Davaasambuu), tsedmaabaatar@gmail.com (T. Baatar), troisir@mail.nih.gov (R. Troisi).
[1] Co-authors.

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world is likely known with less precision than in more developed countries.

We present unique data on the prevalence of preeclampsia based on clinical and laboratory measures in a population of Mongolian women living in urban and rural areas. In addition, we present data on the sensitivity and specificity of the local physician's diagnosis, and the maternal and perinatal characteristics of pregnancies that were and were not diagnosed with preeclampsia.

2. Materials and methods

The data derive from a cross-sectional study that was designed to assess pregnancy hormone concentrations in urban and nomadic pregnant Mongolian women. The study was conducted at two maternity hospitals in Ulaanbaatar, Mongolia's capital, and two secondary care hospitals in the Mongolian rural provinces of Selenge and Bulgan. The protocol was approved by the Ethical Review Board of the Ministry of Health and the Ethics Review Board at the National University of Mongolia, as well as the Institutional Review Boards at the Harvard T.H. Chan School of Public Health and the National Cancer Institute. Eligibility criteria for the study included being at least 18 years of age, having a naturally conceived, singleton, uncomplicated (at the time of recruitment) pregnancy and receiving care at the maternity hospital in Ulaanbaatar, the Bulgan General Hospital or the Mandal soum's general hospital, Selenge aimag. Women were excluded if they had a diagnosis of preeclampsia, or had other complications, during the time of recruitment. None of the women were excluded because of preeclampsia being diagnosed in prior pregnancies. A local study coordinator at each site, in addition to obstetricians and other health personnel collected the data. Eligible pregnant women were recruited by an obstetrician or nurse during one of their third trimester visits; 100% of the women agreed to participate. Of the 413 Mongolian women who participated in this study, 207 were from Ulaanbaatar and 205 were from either Selenge or Bulgan. During a routine third trimester visit, height and weight were measured and the women were interviewed to ascertain information on gravidity, parity, age at first pregnancy, history of pregnancy complications, age at menarche, and smoking status. The decision to investigate the prevalence of preeclampsia in the current pregnancy was made halfway through the data collection for the original study, thus pregnancy charts were reviewed for only 53.5% of the women (n = 221; 136 from Ulaanbaatar, 61 from Selenge and 24 from Bulgan), regardless of their preeclampsia diagnosis status. Information was abstracted on the index pregnancy, including physician's diagnosis of preeclampsia, and the neonate, as well as routine blood chemistries.

The guidelines for the diagnosis of preeclampsia established by the American College of Obstetricians and Gynecologists (ACOG) and the International Society for the Study of Hypertension in Pregnancy (ISSHP) in 2013 were applied to calculate the prevalence of preeclampsia [4–6]. The diagnostic criteria were hypertension new to pregnancy after twenty weeks defined as a systolic blood pressure $\geqslant$140 mmhg or diastolic blood pressure $\geqslant$90 mmhg observed twice at least 4 h apart, or blood pressure at any time over 160/110, and proteinuria defined as $\geqslant$300 mg/24 h urine collection or protein creatinine ratio $\geqslant$0.3 and a dipstick reading > +1. In the absence of proteinuria, the diagnosis was made with hypertension as above and a new onset of any of the following: renal insufficiency (serum creatinine concentration >90 μmol/L), impaired liver function (elevated liver transaminases measured at twice the normal concentration), thrombocytopenia (platelet count <100,000/μL), pulmonary edema, or cerebral or visual symptoms. Despite existing guidelines, physician diagnosed preeclampsia may include a heterogeneous cluster of symptoms, as each woman with preeclampsia can present differently [7]. Whether women had complications after delivery was abstracted (yes, no, bleeding).

Birthweight Z-score was calculated using the formula: $Z = \frac{bw - \bar{bw}}{SD(bw)}$ where *bw* is each child's birthweight, $\bar{bw}$ is the mean birthweight for gestational age, and *SD(bw)* is the standard deviation of birthweight[8]. Small for gestational age was defined as being born weighing less than the 10th percentile of birth weight for gestational age. This was calculated using birth weights taken in a United States cohort [9]. Low birthweight was defined as <2500 g and pre-term birth was defined as $\leqslant$37 weeks gestation.

Descriptive statistics for maternal and perinatal characteristics were generated for preeclampsia defined by physician diagnosis and by established diagnostic criteria. Differences between means were compared using t-tests or using the Wilcoxon rank sum test when n < 30 for either group and between proportions by using chi-square tests or using Fisher's exact test when any cell size was less than 5. These data were presented by physician diagnosed preeclampsia, by fulfillment of established diagnostic criteria for preeclampsia, and by geographical area of residence. Data were analyzed using SAS version 9.3.

3. Results

The overall prevalence of preeclampsia based upon ACOG and ISSHP criteria was 4.1% (9/221), and was higher in Ulaanbaatar (4.4%, 6/136) than in the rural provinces of Selenge and Bulgan (3.5%, 3/85). The overall prevalence of preeclampsia based on the

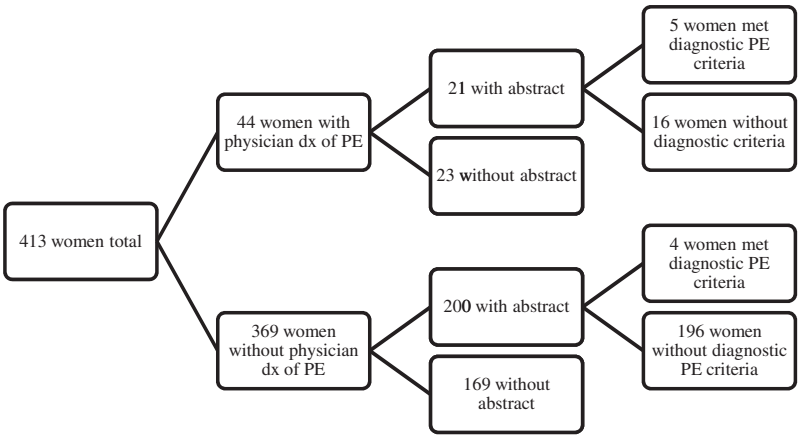

Fig. 1. Numbers of women with a physician's diagnosis of preeclampsia by whether they met ACOG diagnostic criteria.

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