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Original Research Article

Prevalence of preeclampsia and associated factors among pregnant women delivering in Vietnam: a cross-sectional study

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ABSTRACT

Background: Preeclampsia is a leading cause of maternal and fetal mortality and morbidity globally. This study aims to determine the prevalence of preeclampsia and identify associated factors among pregnant women presenting for delivery in Ho Chi Minh City, Vietnam.
Methods: A cross-sectional descriptive study was conducted on 386 pregnant women with a gestational age greater than 20 weeks presenting for delivery in Ho Chi Minh City, Vietnam. Data were collected via direct interviews and medical record reviews. Variables were analyzed using Chi-square and Fisher's exact tests.
Results: The prevalence of preeclampsia in the study group was 2.59% (10/386). Factors showing a statistically significant association ($p < 0.05$) with preeclampsia included: place of residence (non-urban areas had a higher risk), religion, mode of previous delivery, history of preterm birth, and history of miscarriage. No statistically significant association was found between preeclampsia and age group, occupation, education level, body mass index (BMI), smoking/alcohol habits, or family history.
Conclusions: The prevalence of preeclampsia among pregnant women delivering in Ho Chi Minh City is 2.59%. Identifying associated factors, such as adverse obstetric history and geographical factors, is essential to improve screening and pregnancy management.

Keywords: Preeclampsia, Prevalence, Risk factors, Vietnam

INTRODUCTION

Preeclampsia is a multisystem disorder characterized by the new onset of hypertension and proteinuria or end-organ dysfunction after the 20th week of gestation.[1] It is one of the primary causes of maternal and perinatal mortality worldwide, particularly in developing countries.[2,3] The pathophysiology of preeclampsia is complex, involving incomplete trophoblastic invasion of the spiral uterine arteries, leading to placental ischemia, diffuse endothelial dysfunction, and systemic inflammation.[4,5] This condition not only affects the current pregnancy but also increases the mother's future risk of chronic cardiovascular and renal diseases.[6,7]

The global prevalence of preeclampsia is estimated at approximately 2-8% of pregnancies.[8] In Asian countries such as China, the rate fluctuates between 2.3-2.85%, which is lower than in European countries like Sweden (2.9%).[9,10] In low-income and middle-income countries, the disease burden is significantly higher; for instance, the prevalence in Ethiopia can reach 15.7%, and in

Bangladesh, it is 14.4%.[11,12] In Vietnam, previous studies have recorded rates ranging from 2.8% to 5.5%.

Classical risk factors for preeclampsia include nulliparity, multifetal gestation, obesity, family history, and underlying conditions such as chronic hypertension or diabetes mellitus.[8,13,14] Furthermore, socio-demographic factors such as low education level and lack of access to antenatal care have been proven to increase the risk of the disease and associated complications.[15,16] Although low-dose aspirin has demonstrated efficacy in preventing preeclampsia in high-risk groups, the early identification of specific risk factors within each population remains pivotal in clinical management.[5,17] This study was conducted to update the prevalence of preeclampsia and identify associated factors in Ho Chi Minh City, Vietnam, in the context of epidemiological characteristics and pregnancy management having undergone significant changes over the past decade.

METHODS

Study design and population

A cross-sectional descriptive study was conducted in Ho Chi Minh City, Vietnam from December 27, 2021 to March 27, 2022. The study population comprised pregnant women with a gestation of >20 weeks presenting to the hospital for delivery, who were capable of communicating in Vietnamese and consented to participate in the study.

Sample size and sampling

The sample size was calculated based on the formula for estimating a proportion with a significance level of α=0.05, precision d=0.05, and an estimated proportion P=0.5 (to achieve the maximum sample size), determining a necessary sample size of 385 pregnant women. A systematic random sampling method was applied, with an average of 6 subjects selected daily from the hospital admission list.

Data collection

Data were collected through direct interviews using a structured questionnaire and extracted from medical records, including:

Epidemiological characteristics: Age, residence (urban/rural), ethnicity, religion, occupation, education level, economic status.

Obstetric history: Parity, mode of previous delivery, history of preterm birth, miscarriage, and induced abortion.

Current pregnancy characteristics: Pre-pregnancy BMI, number of fetuses, stress levels, comorbidities.

Diagnosis of preeclampsia was based on ACOG 2013 criteria (Blood pressure ≥140/90 mmHg accompanied by proteinuria or signs of end-organ damage).

Data processing and analysis

Data were entered using data collection forms and processed using SPSS software. Qualitative variables were described using frequencies and percentages. Chi-square (χ^2) or Fisher's exact tests were utilized to determine associations between independent variables and the prevalence of preeclampsia. The level of statistical significance was set at $p<0.05$.

RESULTS

Study population and prevalence of preeclampsia

A total of 386 pregnant women were included in the final analysis. The cohort was predominantly characterized by women aged <35 years (81.61%) and of Kinh ethnicity (97.93%). Preeclampsia was diagnosed in 10 participants, representing an overall prevalence of 2.59% in the study population.

Sociodemographic characteristics and risk factors

Univariate analysis revealed a statistically significant association between the area of residence and the incidence of preeclampsia (Table 1). Women residing in rural areas exhibited a significantly higher rate of preeclampsia compared to those in urban areas (4.60% vs. 0.94%; p=0.024). Additionally, a significant difference in preeclampsia rates was observed among different religious groups (p<0.001).

Table 1: Association between demographic characteristics and preeclampsia.

Characteristic	Preeclampsia (Yes) (n=10)	Percent	Preeclampsia (No) (n=376)	Percent	P value
Age group					
< 35 years	7	2.22	308	97.78	0.337
≥ 35 years	3	4.23	68	95.77	
Residence					
Urban	2	0.94	210	99.06	0.024
Rural	8	4.60	166	95.40	

Conversely, no statistically significant association was found between preeclampsia and maternal age groups (p=0.337), occupation, educational attainment, socioeconomic status, or history of tobacco and alcohol use (all p>0.05).

Obstetric history

Among the subset of 184 women with a history of prior pregnancy, specific obstetric factors were strongly associated with the development of preeclampsia (Table 2):

Adverse obstetric history

A history of preterm birth was identified as a major risk factor; the preeclampsia rate was 40.0% in women with a history of preterm birth compared to 2.79% in those without (p<0.001). Similarly, a history of miscarriage was significantly associated with an elevated risk of preeclampsia (25.00% vs. 2.84%; p=0.001).

Mode of prior delivery

Women with a history of vaginal delivery presented a higher rate of preeclampsia in the current pregnancy compared to the prior cesarean section group (12.50% vs. 0.74%; p<0.001).

Other obstetric characteristics, including gravidity (p=0.119) and age at first pregnancy (p=0.550), did not demonstrate a statistically significant relationship with preeclampsia. No association was found regarding a history of induced abortion (p=0.405).

Table 2: Characteristics of obstetric history.

Characteristic	Preeclampsia (Yes)	Percent	Preeclampsia (No)	Percent	P value
Age at first pregnancy	**(N=10)**		**(N=376)**		
< 35 years old	7	1.89	363	98.11	0.550
≥ 35 years old	3	18.75	13	81.25	
Gravidity					
1	3	1.49	199	98.51	0.119
2	3	2.52	116	97.48	
≥ 3	4	6.15	61	93.85	
History of preterm birth					
Yes	2	40.00	3	60.00	0.001
No	5	2.79	174	97.21	
History of miscarriage					
Yes	2	25.00	6	75.00	0.001
No	5	2.84	171	97.16	

Table 3: Characteristics of pre-pregnancy BMI.

Pre-pregnancy BMI (kg/m²)	PE (Yes) (n=10)	Rate (%)	PE (No) (n=376)	Rate (%)	P value
<18.5	0	0.00	59	100.0	0.254
18.5-22.9	7	2.70	252	97.30	
23-24.9	1	2.44	40	97.56	
>24.9	2	7.41	25	92.59	

Anthropometric and current pregnancy characteristics

Regarding pre-pregnancy Body Mass Index (BMI), although the preeclampsia prevalence was highest in the group with BMI >24.9 kg/m² (7.41%), the difference across BMI categories was not statistically significant (p=0.254) (Table 3). Furthermore, no significant correlations were observed between preeclampsia and maternal stress levels (p = 0.681), occupational intensity (p=0.472), or pre-existing medical comorbidities (p=0.103).

DISCUSSION

The prevalence of preeclampsia in this study was 2.59%. This result is comparable to rates in China (2.3-2.85%), but significantly lower than rates in Bangladesh (14.4%) and Ethiopia (15.7%).[9-12] This difference may reflect improvements in pregnancy management or differences in population characteristics and sampling criteria.

Regarding associated factors, the study recorded an association between non-urban residence and a higher risk of preeclampsia (p=0.024). This is consistent with international studies showing that women in rural areas often face greater difficulties in accessing high-quality

antenatal care, leading to a higher risk of pregnancy complications.[12,18] A lack of periodic antenatal check-ups has been proven to be an independent risk factor for adverse outcomes such as preeclampsia and stillbirth.[16,18]

Notably, this study did not find an association between BMI and preeclampsia (p=0.254), a result contrary to many major global studies affirming obesity as a strong risk factor for preeclampsia.[2,9,10] However, this may be due to the low prevalence of obesity in this study sample (only 6.99% had a BMI >24.9), or due to racial differences affecting the BMI risk threshold, as seen in differences between Chinese and Swedish populations.[10]

Adverse obstetric history (preterm birth, miscarriage) was identified as an important risk factor (p<0.001), consistent with world literature regarding the link between prior adverse pregnancy outcomes and the risk of hypertensive disorders in subsequent pregnancies.[2] Some studies also indicate that a history of preeclampsia or pregnancy complications is a strong predictor for recurrent preeclampsia.[8,19]

However, the result regarding the previous mode of delivery (vaginal birth carrying a higher risk than cesarean section) in this study requires cautious interpretation. Although some studies suggest cesarean section is a risk factor for postpartum preeclampsia or other adverse outcomes[18], the inverse relationship found in this study may be due to the small sample size in the subgroup analysis or uncontrolled confounding factors.[20,18,15,21]

Advanced maternal age (≥35 years) did not show a statistically significant association in this study (p=0.337), although this is a widely recognized risk factor.[3,9] This may be due to the limited sample size in this age group (18.39%). Conversely, some other studies have indicated a higher risk in the younger age group (<20 years) for eclampsia.[15,21]

This study has several limitations that should be acknowledged. First, the cross-sectional design allows for the identification of associations but prevents the establishment of causal relationships between risk factors and preeclampsia. Second, although the total sample size was sufficient for prevalence estimation, the number of preeclampsia cases was relatively small, which limited the statistical power to perform multivariate regression analyses to fully adjust for potential confounding factors. Finally, data regarding obstetric history relied partly on maternal recall, which may introduce recall bias.

CONCLUSION

The prevalence of preeclampsia among pregnant women in Ho Chi Minh City was found to be 2.59%, a figure comparable to other Asian populations but lower than in low-income regions. This study advances current knowledge by highlighting that despite modern improvements in healthcare, women residing in non-urban areas and those with a history of adverse obstetric outcomes (preterm birth, miscarriage) remain at significantly higher risk. These findings underscore the critical need for stratified screening strategies and strengthened antenatal management, particularly for women with geographical barriers to care and complex obstetric histories, to further reduce maternal and neonatal morbidity in Vietnam.

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REFERENCES

1. Yi J, Chen L, Meng X, Chen Y. Risk factors and foetal growth restriction associated with expectant treatment of early-onset preeclampsia. Ann Med. 2022;54(1):3249-56.
2. Haile TG, Assefa N, Alemayehu T, Mariye T, Geberemeskel GG, Bahrey D et al. Determinants of preeclampsia among women attending delivery services in public hospitals of central Tigray, northern Ethiopia: a case-control study. J Pregn. 2021;2021:1-8.
3. Lisonkova S, Bone JN, Muraca GM, Razaz N, Wang LQ, Sabr Y, et al. Incidence and risk factors for severe preeclampsia, hemolysis, elevated liver enzymes, and low platelet count syndrome, and eclampsia at preterm and term gestation: a population-based study. Am J Obstet Gynecol. 2021;225(5):538.e1-538.e19.
4. Cui J, Yang Z, Ma R, He W, Tao H, Li Y et al. Placenta-targeted treatment strategies for preeclampsia and fetal growth restriction: an opportunity and major challenge. Stem Cell Rev Rep. 2024;20(6):1501-11.
5. Parada-Niño L, Castillo-León LF, Morel A. Preeclampsia, natural history, genes, and miRNAs associated with the syndrome. J Pregn. 2022;2022(1):1-12.
6. Allard M, Grosch S, Jouret F, Masson V, Surinder T, Masset C. [Prevention of preeclampsia and its complications]. Rev Med Liege. 2024;79(5-6):448-54.
7. Srialluri N, Surapaneni A, Chang A, Mackeen AD, Paglia MJ, Grams ME. Preeclampsia and long-term kidney outcomes: an observational cohort study. Am J Kidney Dis. 2023;82(6):698-705.
8. Chang K-J, Seow K-M, Chen K-H. Preeclampsia: recent advances in predicting, preventing, and managing the maternal and fetal life-threatening condition. Int J Environ Res Publ Heal. 2023;20(4):2994.
9. Chai L, Li S, Yin B, Zhu X, Zhu B, Wu K. Prevalence, risk factors, and adverse perinatal outcomes in Chinese women with preeclampsia: a large retrospective cohort study. J Health Popul Nutr. 2025;44(1):32.

10. Yang Y, Le Ray I, Zhu J, Zhang J, Hua J, Reilly M. Preeclampsia Prevalence, Risk Factors, and Pregnancy Outcomes in Sweden and China. JAMA Netw Open. 2021;4(5):e218401.
11. Ayele AD, Tilahun ZA. Magnitude of preeclampsia and associated factors among women attending delivery service in Debre Tabor Specialized Hospital. Ethiop J Heal Sci. 2022;32(2).
12. Mou AD, Barman Z, Hasan M, Miah R, Hafsa JM, Das Trisha A, et al. Prevalence of preeclampsia and the associated risk factors among pregnant women in Bangladesh. Sci Rep. 2021;11(1):21339.
13. Farina A, Cavoretto PI, Syngelaki A, Morano D, Adjahou S, Nicolaides KH. The 36-week preeclampsia risk by the Fetal Medicine Foundation algorithm is associated with fetal compromise following induction of labor. Am J Obstet Gynecol. 2025;233(1):57.e1-57.e12.
14. Gunderson EP, Greenberg M, Najem M, Sun B, Alexeeff SE, Alexander J, et al. Severe maternal morbidity associated with chronic hypertension, preeclampsia, and gestational hypertension. JAMA Netw Open. 2025;8(1):e2451406.
15. Osman T, Keshk EA, Alghamdi AA, Alghamdi MA, Alghamdi MA, Alzahrani AA, et al. Awareness of Preeclampsia and Its Associated Factors Among Women in Al Baha Region, Saudi Arabia. Cureus. 2023;15(11).
16. Mekie M, Addisu D, Bezie M, Melkie A, Getaneh D, Bayih WA, et al. Knowledge and attitude of pregnant women towards preeclampsia and its associated factors in South Gondar Zone, Northwest Ethiopia: a multi-center facility-based cross-sectional study. BMC Pregn Childbirth. 2021;21:160.
17. Korkes HA, Cavalli RC, Oliveira LGD, Ramos JGL, Martins Costa SHDA, Sousa FLPD, et al. How can we reduce maternal mortality due to preeclampsia? The 4P rule. Rev Bras Ginecol E Obstetrícia. 2024;46:e-rbgo43.
18. Schuurmans J, Borgundvaag E, Finaldi P, Senat-Delva R, Desauguste F, Badjo C, et al. Risk factors for adverse outcomes in women with high-risk pregnancy and their neonates, Haiti. Revista Panamericana de Salud Públ. 2021;45:e147.
19. Amar S, Potter BJ, Paradis G, Lewin A, Maniraho A, Brousseau É, et al. Outcomes of Postpartum Preeclampsia: A Retrospective Cohort Study of 1.3 Million Pregnancies. BJOG Int J Obstet Gynaecol. 2025;132(6):752-9.
20. Fondjo LA, Amoah B, Tashie W, Annan JJ. Risk factors for the development of new-onset and persistent postpartum preeclampsia: A case-control study in Ghana. Womens Health. 2022;18:17455057221109362.
21. Nakimuli A, Jasper BA, Nakubulwa S, Adroma M, Akello J, Namagembe I, et al. Risk factors associated with progression from pre-eclampsia to eclampsia: A prospective cohort study and population-wide data analysis. Acta Obstet Gynecol Scand. 2025;104:1487-95.

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