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ORIGINAL ARTICLE

Relationship of Reported Clinical Features of Pre-eclampsia and Postpartum Haemorrhage to Demographic and other Variables

Corrélations entre les caractéristiques cliniques de la pré-éclampsie et de l'hémorragie du post-partum avec la démographie et les autres variables

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ABSTRACT

BACKGROUND: **Maternal death and disability remain significant problems in developing countries and are predominately caused by preeclampsia and postpartum haemorrhage. The diagnostic criteria for preeclampsia and postpartum haemorrhage require medical technologies not readily available in underdeveloped areas.**

OBJECTIVE: **To determine the correlates of pre-eclampsia and postpartum haemorrhage using symptoms in a rural setting.**

METHODS: **This was a cross-sectional study in which 577 women from the Kwahu South District of the Eastern Region of Ghana completed questionnaires that sought for signs and symptoms of pre-eclampsia and postpartum haemorrhage in their current or prior pregnancies. The study was conducted over a period of two months, symptoms of pre-eclampsia assessed included headache, visual disturbance, urination, breathing, leg swelling and seizures. For postpartum haemorrhage, the following features were assessed: placenta delivery, length of labour, difficult delivery of placenta, lacerations associated with delivery, size of newborn, headache, visual disturbance and amount of vaginal bleeding.**

RESULTS: **There was a significant association between education and the number of signs and symptoms of preeclampsia, ($\chi^2 = 9.059$, = 0.018; OR no education vs $\geq$7 years = 6.8). Mothers with no education were about seven times more likely to have all six signs and symptoms of preeclampsia than those with seven or more years of education. There was no significant association between education and postpartum haemorrhage, ($\chi^2 = 1.835$, = 0.400). However, the OR of 1.59, indicated an inverse association between the two variables.**

CONCLUSION: **The high number of symptoms associated with preeclampsia among women with no formal education strongly supports the need for educational outreach and basic prenatal care in rural Ghana. WAJM 2011; 30(2): 84–88.**

Keywords: **Preeclampsia, postpartum haemorrhage, pregnancy complications, maternal mortality, antenatal care, Ghana**

RÉSUMÉ

CONTEXTE: La mortalité maternelle et la morbidité liée à la grossesse restent un problème important dans les pays en voie de développement où elle relève plus souvent de l'éclampsie et de l'hémorragie du post-partum. Les critères diagnostiques nécessitent cependant des moyens médicaux qui ne sont pas toujours disponibles dans les pays sous développés.

OBJECTIF: Déterminer la correspondance entre la pré-éclampsie et l'hémorragie du post partum en se basant sur les symptômes en milieu rural.

METHODES: il s'agit d'une étude transversale réalisée sur 577 patientes du district de Kwahu Sud dans la région Est du Ghana. Un questionnaire complet évaluant les signes et symptômes de la pré-éclampsie et de l'hémorragie du post-partum lors des grossesses antérieures ou en cours était utilisé. L'étude était réalisée sur une période de 2 mois et a évalué les symptômes de la pré-éclampsie comme les céphalées, les troubles visuels, la diurèse, les troubles respiratoires, les œdèmes et les crises d'éclampsie. Pour l'hémorragie du post partum les paramètres analysés sont la délivrance et ses difficultés, la durée du travail, les lacérations associées à la délivrance, les dimensions du nouveau née, les céphalées, les troubles visuels et le saignement vaginal.

RESULTATS: Il existe une association significative entre le niveau d'éducation et les symptomes de la pré-éclampsie ($\chi^2 = 9.059$, = 0.018; OR sans éducation vs $\geq$7 ans = 6.8). Les patientes analphabètes ont sept fois plus de chance de développer les six signes de pré-éclampsie que celles qui ont plus de sept années d'éducation. Il n'existe cependant pas d'association significative avec le niveau d'éducation et la survenue d'une hémorragie du post-partum ($\chi^2 = 1.835$, = 0.400). Cependant un OR à 1,59 signifie qu'il existe une relation inverse entre les deux variables.

CONCLUSION: La fréquence des symptômes de la pré-éclampsie chez les femmes n'ayant pas reçu d'éducation formelle est une donnée importante pour promouvoir l'éducation et la sensibilisation sur les soins de santé prénataux en milieux rural au Ghana. WAJM 2011; 30(2): 84–88.

Mots Cles: Pré-éclampsie, hémorragie du post-partum, com-plications de la grossesse, mortalité maternelle, soins prénataux, Ghana

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Abbreviations: OR, Odds ratio; **PEC,** Pre-eclampsia; **PPH,** Postpartum haemorrhage present.

INTRODUCTION

According to the World Health Organization (WHO), maternal morbidity and mortality remain a major problem for developing countries, with 536,000 maternal deaths occurring worldwide, and 533,000 occurring in the developing world.[1] Estimates for Ghana from the Maternal and Neonatal Programme Effort Index "suggest that roughly between 1,400 and 3,900 women and girls die each year due to pregnancy-related complications".[2] In 2005, the adjusted maternal mortality rate in Ghana was 560 per 100,000 live births, which translates into a lifetime risk of maternal death of 1 in 45.[3]

From 2000–2007, the percentage of women with at least one antenatal care visit in Ghana was 92%, however the percentage drops to 69% when considering more than four visits.[3] Studies have shown that as the number of antenatal care visits increases, the number of pregnancy-related complications decreases.[4] Antenatal care visits can identify risk factors that threaten pregnancies, such as high blood pressure, bleeding, anaemia, and a history of obstructed labor, all of which are common in developing countries.[5]

Worldwide maternal deaths and disability are predominantly caused by the obstetrical complications of pre-eclampsia/eclampsia and postpartum haemorrhage.[1] Preeclampsia is a pregnancy-specific, multisystem disorder that is characterized by the development of hypertension and proteinuria after 20 weeks of gestation. It is described as a disorder of vascular malfunction and vasospasm that can lead to tissue and organ ischemia, seizures, strokes, haemorrhage, renal failure, and rupture of the placenta from the uterus. The minimum criteria for the diagnosis of preeclampsia are hypertension plus proteinuria with or without edema.[6] Significant proteinuria is defined by 24–hour urinary protein exceeding 300 mg per 24 hours, or persistent 30 mg/dL (1+ dipstick) in random urine samples. Preeclampsia complicated by generalized tonic-clonic convulsions is termed eclampsia. Once eclampsia occurs, the risk to both mother and fetus is substantial. Major complications include placental abruption, neurological deficits, aspiration pneumonia, pulmonary edema, cardiopulmonary arrest, acute renal failure, and maternal death.[7]

Postpartum haemorrhage (PPH) has classically been defined as the loss of 500 mL of blood or more after completion of the third stage of labor.[7] However, a practical definition of postpartum haemorrhage that is applicable in developing countries is any amount of blood loss that threatens the hemodynamic stability of women after a newborn is delivered. Some of the risk factors for postpartum haemorrhage include incomplete delivery of the placenta, prolonged labor, difficulty in delivering the placenta, lacerations during or after delivery, and delivery of a large newborn.[8]

Maternal mortality due to postpartum haemorrhage is 25% in developing countries. For pre-eclampsia and eclampsia, maternal mortality is approximately 14% worldwide, but rates are higher in developing countries.[9] These higher rates can be attributed to the widespread lack of medications and access to healthcare services. Additionally, risk factors for preeclampsia and postpartum haemorrhage should be identified early enough to prepare for potential complications. Nulliparous women with pre-eclampsia before 30 weeks of gestation have recurrence rates as high as 40% in future pregnancies, while multiparous women have even higher rates.[10] Thus, women with preeclampsia should be counseled about future pregnancies. Also, proven interventions for minimizing the effects of postpartum haemorrhage can reduce rates by 40%.[11] These strategies include identifying and correcting anaemia before delivery and prophylactic administration of oxytocin.[11] Early detection, careful monitoring and treatment of preeclampsia and postpartum haemorrhage are crucial in preventing mortality related to these disorders. Clinical features and modern technological tests are often needed to detect pre-eclampsia or PPH. In developing countries reliance may be on only assessment of clinical features in the absence of high tech facilities. In this study, we set out to assess the relationship between clinical features of pre-eclampsia and PPH with pregnancy rate, educational level and religion.

SUBJECTS, MATERIALS, AND METHODS

The research was conducted through the administration of a questionnaires to previously pregnant women and currently pregnant women. The 2009 New York Institute of Technology Institutional Review Board (NYIT IRB) and questionnaire were sent to a consultant chosen by the Noguchi Memorial Institute for Medical Research, University of Ghana, Legon–Accra (FWA00001824; IRB00001276) to evaluate the appropriateness of the questionnaire protocol. The consultant determined that there were no cultural or ethical issues that imposed risks for female subjects in discussing the questionnaire. The questionnaire was then translated at the School of Medical Sciences, Kwame Nkrumah University of Science and Technology into a standard version of the native language of the region, Twi.

The data were collected during a four-week period in June and July of 2009. The study was conducted in the villages surrounding the Oworobong Clinic, Kwahu South District, Eastern Ghana. The catchment size for the study was roughly estimated at 65,000 inhabitants, of whom approximately 51.5% were women.[12] The Kwahu South District is a heterogeneous community of Kwahus (66%), Ashantis (17%), Ewes (15%) and others.[13]

Questionnaires were given to all women who fit the inclusion criteria from the surrounding villages around the Oworobong clinic. The inclusion criteria were women who had prior pregnancy, whether or not the fetus was brought to full term, and/or currently pregnant. The exclusion criterion was that they had had no prior pregnancies. The sample size was determined based on a chi-square test with the assumption that the expected count within each cell of a contingency table must be at least 5 in order to get valid results.

The women were asked about their previous pregnancies with regard to symptoms of preeclampsia and postpartum haemorrhage. The research

team assessed for six symptoms of severe preeclampsia, which included persistent headache, visual disturbances, decreased urination, difficult breathing, sudden swelling of the legs, or seizures.[6] The research team also assessed for eight symptoms and risk factors for postpartum haemorrhage which included incomplete delivery of the placenta, prolonged labor, difficulty delivering placenta, lacerations during or after delivery, large newborn, persistent maternal headache, visual disturbance, or excessive vaginal bleeding.[8] Women were asked to report whether any of these symptoms were experienced during any of their pregnancies. Demographic information was collected regarding educational background, marital status, age, and religion.

Statistical Analysis

All analyses were conducted using the Statistical Package for the Social Sciences (SPSS), version 16.0.1. Basic frequency statistics were generated for the demographic information and the reported symptoms of preeclampsia and postpartum haemorrhage. Pearson's chi-square (χ^2) tests were performed at a significance level of 0.05 to test associations between two measures. These measures include comparing the complication status of preeclampsia/eclampsia or postpartum haemorrhage, as related to age, education, religion, and marital status. In each test, the value of χ^2, the degree of freedom, and the p-value were produced, and the odds ratio and contingency table were generated.

RESULTS

Among 593 women surveyed, 577 women fit the inclusion criteria in which they were either currently pregnant or had a prior pregnancy. Of these 92(15.9%) were current pregnant, while 560(97%) of the total survey population had prior pregnancies. The mean number of previous pregnancies was 4.56. Additionally, 519(90%) of the study population were over 20 years old, 208(36%) had no education and 225(39%) had seven or more years of education.

Upon surveying this population about the symptoms of preeclampsia during their current or prior pregnancy,

headache and visual disturbances were the most commonly reported (371(64.3% and 319(55.3%) respectively). For symptoms of postpartum haemorrhage, difficult delivery was most commonly reported 311(53.9%).

Our data also reveal that 92(15.9%) of the study population had 5–6 out of six symptoms of preeclampsia. These symptoms included persistent headache, visual disturbances, decreased urination, difficult breathing, sudden swelling of the legs, or seizures. There was a significant association between the level of education and symptoms of preeclampsia for women with all six symptoms of preeclampsia, (χ^2(2) = 9.059, p-value = 0.018 < 0.05). When comparing mothers with all six symptoms of preeclampsia, the odds ratio is 1.23 with mothers with no years of formal education versus mothers with one to six years. In comparing mothers with no years of formal education versus mothers with seven or more years of education, the odds ratio is 6.8 (Figure 1). Additionally, the odds ratio is 5.53 when comparing mothers with one to six years of education to mothers with seven or more years of education. Therefore, the population of mothers that had more

education had a lower risk for developing symptoms of preeclampsia. The results of comparing education and symptoms of preeclampsia are shown in Table 1.

Our data reveal that 46(8.04%) of the study population had 6–8 out of eight signs and symptoms of postpartum haemorrhage, which included incomplete delivery of the placenta, prolonged labor, difficulty delivering placenta, lacerations during or after delivery, large newborn, persistent maternal headache or visual disturbance, or excessive vaginal bleeding. The results also reveal that the odds ratio for postpartum haemorrhage was 1.59 when comparing mothers with no education and one to six years of education (Figure 1). The results for the contingency Table comparing education and symptoms of haemorrhage are shown in Table 2.

There is no significant association of preeclampsia/eclampsia or hemorrhage, as related to age, education, religion, previous pregnancies and marital status.

DISCUSSION

The incidence of preeclampsia in the United States is similar to that of Ghana, 5–8% and 6–8%, respectively.[14–16] In the Kwahu South District,
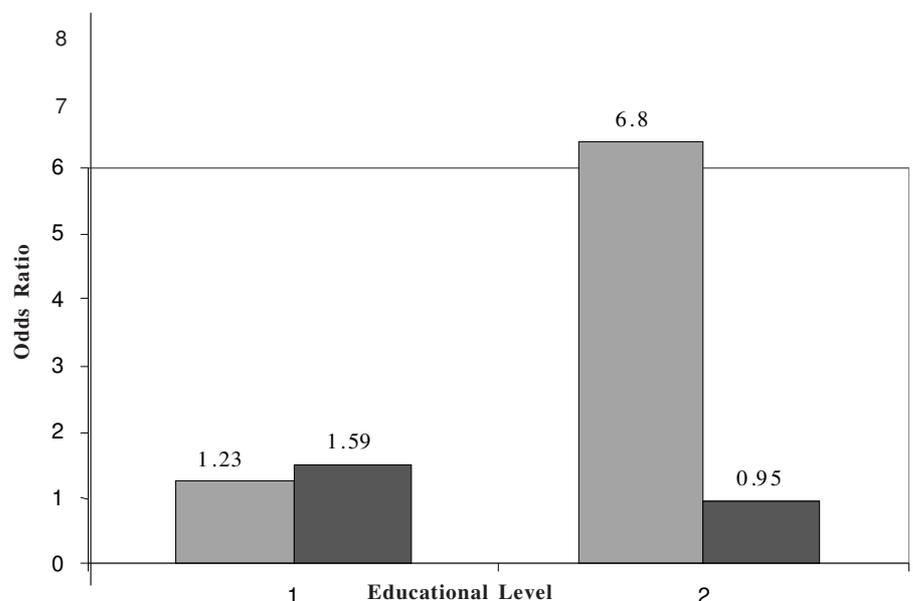

Fig. 1: Relationship between Educational Level and Risk of developing Pre-eclampsia or Postpartum Haemorrhage with all six symptoms of preeclampsia. The odds ratio is 1.23 in mothers with no years of formal education versus mothers with one to six years of education. The odds ratio is 6.8 in mothers with no years of formal education versus mothers with seven or more years of education. Educational Level: 1, None vs. 1–6 years; 2, None vs. 7+ years. ▢ Pre-eclampsia; ▢ Postpartum Haemorrhage.

based on clinical symptoms, there was a higher incidence of preeclampsia in our surveyed population (15%) compared to the rest of Ghana (6–8%).[15–17] Whether a higher number of nonspecific clinical symptoms correlate to the incidence of preeclampsia is debatable. The use of signs and symptoms of preeclampsia to diagnose these conditions could be complicated by the fact that proteinuria is a necessary diagnostic criterion in determining preeclampsia. Therefore, without confirmation of proteinuria, the diagnosis could be questionable. However, Cavkaytar *et al.*[17] states that

"clinical symptoms, such as headache, visual changes, epigastric pain, nausea and vomiting, are more predictive than laboratory parameters for adverse maternal outcomes in preeclampsia." If these signs and symptoms are predictive of preeclampsia, they can be used as an inexpensive indicator for the disorder in current and future pregnancies.[6] Although the symptoms are non-specific, we can postulate that a greater number of self-reported symptoms would prompt a pregnant woman to be evaluated by a health professional.

Although the results reveal a statistically significant inverse correlation between education and the signs and symptoms of preeclampsia, the relationship between education and postpartum haemorrhage was not statistically significant. The lack of association between education and postpartum haemorrhage may be attributed to a number of confounding factors, regardless of whether a patient is educated, to the risks of postpartum haemorrhage. These factors include the inadequate technical skills of community health care providers (such as managing lacerations and/or incomplete delivery of the placenta) and the lack of medical treatment and available tools. Nevertheless, the increase in maternal mortality throughout the developing world has led to a greater need for effective educational intervention programmemes that prompt women to seek early health professional care when complications arise[18,19], eg. recognizing prolonged labor that could lead to postpartum haemorrhage. Therefore, educational programmes towards identifying signs and symptoms of pregnancy complications can make strides in reducing maternal mortality in developing countries.

Study Limitations

Our research study could have been strengthened in numerous ways. As the average number of previous pregnancies in our survey population was 4.56, women might have had a difficult time recalling details from prior pregnancies. To avoid this problem, we could have limited the participants to provide us with information about pregnancies within the past three years ro so. Also, com-prehension of medical terminology may have been difficult for study participants even in the presence of trained translators. The questionnaire could have also addressed whether pregnancy complications were followed up with a medical facility or if diagnosis of preeclampsia, eclampsia, or postpartum haemorrhage was confirmed. This would have allowed us to see whether specific symptoms correlated with professional diagnoses and further demonstrate that these complications have been managed successfully. Finally, death due to preeclampsia and post-partum haemorrhage could not be evalua-

Table 1: Distribution of Preeclampsia Symptoms by Educational Level

Educational Level (Years)	Number of Symptoms of Pre-eclampsia			
		0–5	6	Total
None	**Count**	195	12	207
	Expected Count	199.5	7.5	207
	Percentage	94.2	5.8	100.0
1 – 6	**Count**	140	7	147
	Expected Count	141.6	5.4	147
	Percentage	95.2	4.8	100.0
7+	**Count**	221	2	223
	Expected Count	214.9	8.1	223
	Percentage	99.1	0.9	100.0
	Total Count	556	21	577
	Expected Count	556	21	577
	Percentage	96.4	3.6	100.0

There was a significant association between level of education and symptoms of preeclampsia with symptoms of preeclampsia, ($\chi^2 = 9.059$, $= 0.018$).

Table 2: Relationship between Educational Level and Occurrence of Postpartum Haemorrhage in Rural Eastern Ghana. There was no significant association between education and the complication status of haemorrhage in women with 6–8 risk factors or symptoms of postpartum hemorrhage. $\chi^2 = 1.835$, $= 0.400$, OR-- $_{1-}6$ years vs. 7+ yrs = 1.59.

Educational Level (Years)	Number (%)		
	POH + ve	PPH – ve	Total
None	181 (88.7)	23 (11.3)	204 (100.0)
1 – 6	133 (92.4)	11 (7.6)	144 (100.0)
7 or more	192 (88.1)	26 (11.9)	218 (100.0)
Total	**506 (89.4)**	**60 (10.6)**	**566 (100.0)**

PPH, Postpartum haemorrhage present (+ve) or absent (–ve).

ted due to the lack of adequate medical records available to the research team.

Conclusion

The high number of symptoms associated with preeclampsia among women with no formal education strongly supports the need for educational outreach and basic prenatal care. Since the formal diagnostic criteria for preeclampsia and postpartum haemorrhage require medical technologies not readily available to underdeveloped areas, an antenatal care programmeme could identify high-risk patients through their symptoms, thereby facilitating earlier referrals. A low-cost prenatal educational programme would address maternal complications and could have a tremendous impact on the health of women in rural Ghana and other similar underserved regions.

DUALITY OF INTEREST

The research team does not report any conflict of interest.

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