Magnitude, Pattern and Factors Associated with Ocular Manifestations in Pre-eclampsia/Eclampsia at Mulago National Referral Hospital, Uganda

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Abstract

Background: Preeclampsia is a condition where expectant mothers experience a sudden spike in blood pressures and in its severe form of eclampsia they tend to experience seizures. Over 25% of patients with severe pre-eclampsia and 50% of patients with eclampsia have visual symptoms of clinical significance, with 1-3% remaining with irreversible blindness due to involvement of the visual cortex. The ocular changes in preeclampsia usually occur from 20+ weeks of gestation and progress gradually. Hence, early screening of pre-eclampsia mothers can help in timely diagnosis and intervention. With limited data on the ocular conditions of mothers with preeclampsia, this study sought to determine the magnitude, pattern and factors associated with ocular manifestations of preeclampsia/eclampsia mothers at Mulago National Referral Hospital.

Methods: This was a descriptive cross-sectional study with 450 consenting pre-eclampsia mothers at Mulago National Referral Hospital from September to December. Ethical Approval was obtained, and pre-tested questionnaires were used to record relevant history and ocular examination findings. Data was cleaned and entered into a computer in EPI-DATA (epidemiology data) and analyzed with STATA 14.0.

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Results: The prevalence of ocular manifestations was 16.5 % CI (13.3-20.2%). The commonest patterns of ocular manifestations were optic disc edema 19 (26.7%), retinal hemorrhages 17(22.9%) and cotton wool spots 16(21.6%). The factors associated with ocular manifestation of preeclampsia/eclampsia were education (p-value=0.042), sub-urban residence (p-value=0.045), severe preeclampsia and eclampsia (p-values=0.008 and 0.00), abnormal liver function test (p-value=0.002) and abnormal visual acuity (p-value=0.000).

Conclusion: The prevalence of ocular manifestations of pre-eclampsia and eclampsia among women in Mulago National Referral hospital is high and warrants active screening programmes.

Keywords

Preeclampsia; Eclampsia; Hypertension; Hemorrhage

Introduction

Preeclampsia is the new onset of hypertension with either proteinuria, end-organ dysfunction or both after 20 weeks of gestation in a previously normotensive woman while eclampsia is development of grand mal seizures in a woman with pre-eclampsia, in the absence of other neurological conditions that could account for the seizures.

Globally eclampsia accounts for 12% maternal mortality mostly in the developing countries where the incidence of eclampsia is high and quality of care of pre-eclamptic women is low [1].

The exact prevalence of preeclampsia in Sub Saharan Africa (SSA) is unknown because detailed clinical records of all births are lacking. Using information from the Duke University Birth Database, African American women had higher rates of preeclampsia (10.2%) than the European (8%) or Hispanic women (6.2%).

The symptoms of pre-eclampsia include headache, fits and photophobia. These symptoms have been found to be associated with ocular changes including blurring of vision and ischemia in the retina. These ocular changes have been shown to predict poor outcomes including death, blindness among others in case treatment is delayed [2].

Pre-existing ocular and systemic diseases such as chronic systemic hypertension and diabetic retinopathy are risk factors for development of ocular complications in pre-eclampsia and eclampsia.

Ocular changes can be screened among pre-eclampsia mothers however in Mulago National Referral Hospital (MNRH), pre-eclampsia/eclampsia mothers are hardly screened for ocular changes.

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Therefore, this study sought to determine the magnitude, patterns and factors associated with ocular changes of pre-eclampsia/eclampsia in MNRH.

Methods

This was a hospital based descriptive cross-sectional study conducted between September and December at Mulago National Referral Hospital in Kampala, Uganda.

Data was collected from the pre-eclampsia wards (mild pre-eclampsia, severe pre-eclampsia and high dependence unit) which on average admit 36 preeclampsia patients per month.

All pregnant women diagnosed with preeclampsia/eclampsia of any parity admitted in the pre-eclampsia wards in the study period were consecutively consented for participation in the study.

Patient with history of hypertension, glaucoma, sickle cell disease, corneal scars, severe posterior synechia, dense cataracts, and vitreous opacities were excluded from the study.

Data was collected using pretested questionnaires. A short medical, full obstetric and ocular history was obtained from the patient. General examination and bilateral standard ocular examination was done. Visual acuity was assessed using a Snellen's chart. Best corrected visual acuity was assessed using a pin hole. The intraocular pressure was measured using an icare tonometer. Fundus photos were taken using an I-phone with an installed fundus camera, software called volk iNview. These were reviewed by the ophthalmologist to confirm diagnosis.

Investigations done included random blood sugar, liver function and renal function tests.

All data were entered into a computer using EPI-DATA. Analysis was done with STATA version 14.0. Logistic regression was used to determine the factors associated with ocular abnormalities among women with preeclampsia. All factors with $p\text{-value} < 0.05$ were considered significant.

Approval to conduct the study was obtained the School of Medicine Ethics and Research Committee (SOMREC) of Makerere University.

Results

A total of 450 pre-eclamptic/eclamptic mothers participated in the study. The age range was 18-42 years with a median of 27 years. The prevalence of ocular Manifestations was 16.5 % CI (13.3-20.2%) (Table 1).

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Ocular Manifestation	Frequency	Percentage (%)
Optic disc edema	19	26.7
Retinal hemorrhages	17	22.9
Cotton wool spots	16	21.6
Optic disc pallor	4	5.0
Aneurysms	3	4
Arteriolar narrowing	3	4.0
Others	12	16.1

Table 1: The distribution of ocular manifestations among 74 mothers with Pre-eclampsia /eclampsia.

There were 74 participants diagnosed with ocular manifestations of pre-eclampsia/eclampsia. The total number of participants with hypertensive retinopathy was 54 (78.3%).

The commonest ocular manifestations of pre-eclampsia/eclampsia were optic disc edema (25.68%), retinal hemorrhages (22.97%), cotton wool spots (21.62%), arteriolar narrowing (4.05%), aneurysms (4%) and optic disc pallor (5%).

59 % (44) of the mothers with ocular manifestations needed a review by an ophthalmologist while 22.9% would benefit from a close follow up (Table 2).

Variable	Odds Ratio	95% CI	P-value
Education			
None	1.00		
Educated	0.11	0.01 - 0.92	0.042*
Residence			
Rural	1.00		
Sub-urban	0.31	0.10 - 1.00	0.045*
Urban	0.53	0.21 - 1.37	0.193
Severity of Pre-eclampsia			
Mild	1.00		

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Eclampsia	34.53	7.54 - 158.18	0.000*
Severe	6.38	1.62 - 25.11	0.008*
Liver Function tests			
Normal	1.00		
Abnormal	4.13	1.71 - 10.00	0.002*
Visual Acuity			
Normal	1.00		
Abnormal	22.61	9.66 - 52.89	0.000*

Table 2: Factors associated with ocular manifestations in patients with preeclampsia/eclampsia.

Interaction was assessed among significant predictors using the likelihood ratio test. A p-value <0.05 confirmed the presence of interaction. There was no interaction.

There was a statistically significant relationship between the ocular manifestations of pre-eclampsia and education, severity of pre-eclampsia, liver function test, visual acuity and semi-urban residence.

Discussion

Among the 450 mothers with pre-eclampsia/eclampsia, the prevalence of ocular manifestations was 16.5%. The prevalence obtained in our study was lower compared to the 46% obtained in a study done in India by Reddy Sagili among 78 patients with pregnancy induced hypertension [3].

The prevalence obtained in our study was still lower than the 42.7% obtained in a study by Varija T, et al., in a cross-sectional study involving 423 mothers with pregnancy induced hypertension. The study was conducted in a hospital setting in Karnataka India. The difference in the results obtained may be due to the differences in the populations studied. The study in India involved participants who were older with an age range of 21-45 years compared to 18-42 years observed in our study. This may indicate that the mothers in Uganda present with less severe forms of pre-eclampsia at an earlier age compared to those in India. In addition only 30% of the population of mothers in our study were prime-gravidae compared to 66.7% of those studied by Varija, et al. This further points to a difference in the two populations [4].

Patterns of Ocular Manifestations

Most of ocular manifestations among patients with pre-eclampsia/eclampsia observed in our study were 25% optic disc edema, 22.2% hemorrhage and 21% cotton wool spots among others. The findings in our study are similar to those of Sharma, et al., where hemorrhage, optic edema and cotton wool spots were the common presentation of ocular abnormalities of pre-eclampsia/eclampsia [5]. In addition, findings from our study compare favourably with the results of an article about pregnancy and ocular manifestations done by Gordin, et al., in 2013 which emphasizes pre-eclampsia/ eclampsia as one of the causes of various ocular manifestations [6,7].

Our study however found no retinal detachment among all the participants investigated which is one of the ocular presentations of pre-eclampsia. This may be explained by the fact that most of the study participants had pre-eclampsia yet retinal detachment is common in eclampsia complicated by the HELLP syndrome [8].

Individuals with abnormal visual acuity were up to twenty-two times more likely to have ocular manifestations compared to those with normal visual acuity. Our finding of abnormal vision is in agreement with findings in a systematic review done by Roos to determine the visual disturbance of pre-eclampsia which found abnormal spontaneous inability to see in a 24 year old mother at 37 weeks [9].

A case study done by Tranos to determine visual acuity and other ocular manifestation in a prime gravida found normal visual acuity despite retinal detachment. These results show that some patients with pre-eclampsia also have normal visual acuity [10]. The results in our study had few mothers with visual impairment 20.7% compared with those of a study done in Muhimbili hospital, which found up to 35.4% visual impairment among mothers with pre-eclampsia/ eclampsia [11].

Eighty eight percent of the mothers had normal liver function test while 28(48.3%) had abnormal liver function test. Mothers with abnormal liver function were found to be four times (p -value = 0.002) more likely to develop ocular manifestations of pre-eclampsia compared to those with normal liver function tests. These findings were similar to findings by Gupta, et al., from a retrospective cohort study among 40 patients with pre-eclampsia where they found uric acid p -value of 0.022 in the pre-eclampsia group [12].

We observed an increase in the odds of ocular manifestations for a unit increase in the grade of preeclampsia/eclampsia of up to 6 times as the grade of pre-eclampsia/eclampsia increased from none to severe pre-eclampsia. These findings were comparable with findings from studies done among individuals with pregnancy induced hypertension and pre-eclampsia/eclampsia which found an increase in ocular manifestations of pre-eclampsia as the severity of pre-eclampsia/eclampsia increased [12].

Our findings were also in agreement with findings from studies done by Ling and James, among individuals with pre-eclampsia/eclampsia which found increased prevalence of

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intraocular manifestations e.g. Roth's spots. The odds of Roth's spots increased with increase in severity of pre-eclampsia/eclampsia [13].

A Study done by Kaliaperumal to obtain associations between pre-eclampsia/eclampsia and retinopathy have found an association between severity of pre-eclampsia and retinopathy. These findings are in tandem with findings from our study and indicate that retinopathy is associated with severity of pre-eclampsia [14].

Conclusion

The magnitude of ocular manifestations of pre-eclampsia and eclampsia among women in Mulago national Referral Hospital is high that warrants routine screening.

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