Ocular manifestations among patients with pre-eclampsia and eclampsia at Muhimbili National Hospital; magnitude and presentations

Mushumbusi EF[1], Mafwiri MM[1], Sanyiwa AJ[1], Kisimbi SJ[1], Mosenene S[1], Padhan DH[1], Mhina C[1], Sirili N[2]

[1]Department of Ophthalmology, Muhimbili University of Health and Allied Sciences, Tanzania
[2] Department of Development studies, Muhimbili University of Health and Allied Sciences, Tanzania

Corresponding author: Dr. Edmund F Mushumbusi. Email: eddferd@gmail.com

ABSTRACT

Background: To determine the prevalence and presentation of ocular manifestations among patients who presented with pre-eclampsia and eclampsia at a tertiary hospital.
Methods: A cross-sectional descriptive study was conducted at Muhimbili National Hospital (MNH). All patients with pre-eclampsia and eclampsia who met the inclusion criteria during the study period were included. A total of 113 patients were recruited. Data collection was done for six months which involved; case note review and ocular examination. Findings were recorded in structured questionnaires. Computer software SPSS version 20 was used for descriptive analysis of the gathered data. The results were summarized in frequency tables, bar and pie charts. inferential statistics were performed and a $p<0.05$ was considered significant.
Results: The patients age range was 18-49 years with a mean age of 29.26 years. Forty five (39.8%) patients had pre-eclampsia while 68 (60.2%) had eclampsia. The overall prevalence of visual disturbances was 51 (45.1%). Poor vision occured in 39 (35.4%) patients followed by photopsia 15.9% and diplopia 2.7%. Fundus findings were; papilledema 28.3%, retinal edema 19.5%, cotton-wool spots 18.6%, arteriolar narrowing 17.7%, flame-shaped haemorrhages 8% and macular edema 5.3%. On admision 39 (35.4%) patients had impaired vision with a corrected visual-acuity of <6/18. At discharge only 13.3% had impaired vision. The mean visual recovery time was 8.5±1.2 days.
Conclusion: The prevalence of visual disturbances among patients with pre-eclampsia and eclampsia at MNH was significantly high**.** Majority presented with blurred vision and it was temporary in 86.7% of patients.
Recommendation: Measures to create awareness among health personnel regarding sudden visual loss among pregnant women as an alarming sign of pre-eclampsia are recommended. Obstetricians need to assess vision and fundus examination in these patients and refer them for ophthalmic care accordingly.

Keywords: Pre-eclampsia, Eclampsia, Visual impairement, Ocular manifestations

INTRODUCTION

Pre-eclampsia and eclampsia are hypertensive disorders of pregnancy that are associated with various ocular and systemic manifestations. Poorly managed eclampsia accounts for 75% of all maternal deaths[1] and is responsible for irreversible blindness in 1-3% of affected cases[2].

Pre-eclampsia is the new onset of hypertension and proteinuria during the second half of pregnancy. The diagnosis of pre-eclampsia is made when the blood pressure is >140/90 mmHg on two occasions combined with urinary protein excretion >300 mg/day[3]. Eclampsia is an acute life-threatening complication of pregnancy characterized by the appearance of tonic-clonic seizures, and coma which is not due to pre-existing or organic brain disorders, usually develops in a patient who had pre-eclampsia.

Prevalence: The condition affects approximately 6-8% of all pregnancies worldwide, with onset of symptoms in the late second or third trimester, most commonly after the 32nd week of gestation[4]. In developing countries the prevalence of pre-eclampsia ranges from 1.8% - 16.7%[5].

The incidence of eclampsia has been relatively stable at a rate of 1 in 2000 pregnancies in Europe and other developed countries[6]. A recent study in Australia showed an incidence of eclampsia of 8.6/10,000 births or 2.6% of pre-eclampsia cases[7]. In developing countries, however, the incidence varies widely from 6 to 157 cases per 10,000 deliveries[5]. In Tanzania, a study to determine the incidence of eclampsia at Muhimbili National Hospital in Dar es Salaam estimated the hospital and population-based prevalence of eclampsia to be 200/10,000 and 67/10,000, respectively[8]. A follow up study in the same hospital reported a prevalence of eclampsia to be 6%[9].

Visual disturbances in pre-eclampsia and eclampsia: Pre-eclampsia and eclampsia involve multiple systems and organs including the eye and visual system. Reports in literature show that up to 25% of patients with severe pre-eclampsia and 50% of patients with eclampsia have visual symptoms of clinical significance[10]. In Tanzania visual disturbances were reported among 39% cases where blurring of vision affected 36.6% of patients[11].

Visual disturbances are temporary. However 1 - 3% of affected patients remain with irreversible blindness[2]

due to involvement of the visual cortex[12,13]. Reported ocular symptoms in pre-eclampsia and eclampsia include double vision, intermittent visual loss and, photopsia. In literature focal or generalized arteriolar narrowing (70%) has been reported to be commonest sign in pre-eclampsia and eclampsia[2].

Pre-existing ocular and systemic diseases such as chronic systemic hypertension and diabetic retinopathy have been reported as risk factors for development of ocular complications in pre-eclampsia.We found no documented study that indicated the type of visual disturbances and their sequeale in Tanzania. In this study we sought to determinine the prevalence and clinical presentation of visual disturbances in patients with eclampsia admitted at Muhimbili National Hospital.

MATERIALS AND METHODS

Study design: A hospital based descriptive cross-sectional study.

Study period: This study was carried out for 18 months from June 2013 to December 2014.

Study area: Muhimbili National Hospital (MNH) in Dar-es-Salaam. Data were collected from the eclampsia unit of the obstetric ward. The eclampsia unit provides care to patients admitted for management of pre-eclampsia and eclampsia. On average 40 patients with pre-eclampsia and eclampsia are admitted in the unit per month.

Study population: All pregnant women diagnosed with pre-eclampsia and eclampsia, who were admitted in eclampsia unit at MNH during the study period were recruited. Patients with established ocular and systemic diseases with similar fundoscopic pattern as in pre-eclampsia and eclampsia such as diabetic retinopathy; glaucoma, HIV and chronic systemic hypertension were excluded from the study.

Sampling and sample size: All patients who met the eligibility criteria were recruited (Box 1).

Box 1: Recruitment criteria

1. All patients admitted in the obstetric ward, eclampsia unit for management of pre-eclampsia and eclampsia
2. Patients who agreed to sign the informed consent to participate in the study

Box 2: Exclusion criteria

1. Very sick patients were excluded in the study because, we didn't want to jeopardize patients' lives for research purposes but also other subjective tests such as visual acuity taking were not possible. Such patients were left under obstetrician intensive care; we only assisted with indirect ophthalmoscopy when required.

Data collection procedures: Data were collected from patients admitted in the eclampsia unit. After obtaining their consent, they were requested to sign the informed consent form. A short history was taken from the patient or her next of kin. Patient's case notes were reviewed to elicit patient's current pregnancy obstetric details. Standard ocular examination was performed starting with visual acuity using a portable Snellen's chart. Best corrected visual acuity was assessed using a pinhole. The intraocular pressure was measured by a tonopen. The anterior segment was examined using a torch. Examination of the fundus was done after dilatation of pupils by tropicamide 1% using the Keeler head-mounted indirect ophthalmoscope. A structured questionnaire was used to record all the information.

Data analysis: All data were entered into a computer. SPSS version 20 was used to aid descriptive analysis. The results were summarized in frequency distribution tables and were interpreted basing on the study objectives. Chi-square test was used to determine the association between visual acuity levels at admision and discharge and severity of the disease in order to show the effect of the disease and its severety on the acuity level. The significance level was taken at $p<0.05$.

Ethical considerations: This study was ethically approved by the Ethics and Research Committee of Muhimbili University of Health and Allied Sciences (MUHAS). Permission to conduct the study was granted by the relevant hospital authorities. Written informed consent was obtained from each participant. Confidentiality and privacy was maintained throughout the study. Data was stored safely and used for the purposes of the study only.

RESULTS

A total of 113 patients were recruited for the study. All patients met the criteria and all were included in the analysis.

Table 1: Age distribution of the study population (n=113)

Age (Years)	No.	(%)
≤ 20	11	9.7
21 – 30	50	44.2
31 – 39	43	38.1
≥ 40	9	8
Total	113	100

Majority (44.2%) of the study population were aged between 21-30 years. The mean age was 29.26 ± 6.97 years and the age range was 18- 49 years.

Table 2: Obstetric characteristics of the study population

Character	Specific variable	No. (%)
Current gestation age (months)	4 – 6	2 (1.8)
	7 – 9	111 (98.2)
Parity	Nulliparous	27 (23.9)
	Para 1	24 (21.2)
	Para 2	22 (19.5)
	Para 3	16 (14.2)
	≥ Para 4	24 (21.2)
Any complication in previous pregnancy	None	90 (79.7)
	*PIH	9 (8)
	Severe pre-eclampsia	3 (2.7)
	Eclampsia	6 (5.3)
	Others	5 (4.3)
Obstetric diagnosis	Pre-eclampsia	45 (39.8)
	Eclampsia	68 (60.2)

* PIH = Pregnancy Induced Hypertension

Majority 111 (98.2%) of the participants were in their 3rd trimester of pregnancy during admission. Most 90 (79.70%) had no previous obstetric complications. Previous obstetric complications included: PIH 9 (8%), severe pre-eclampsia 3 (2.7%), eclampsia 6 (5.3%) and others 5 (4.3%). Most patients 45 (39.8%) were diagnosed with pre-eclampsia, 27 (23.9%) eclampsia, 35 (31%) severe pre-eclampsia and 6 (5.3%) post-partum eclampsia.

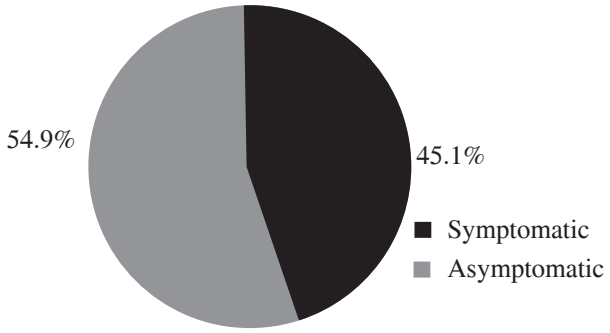

Figure 1: Distribution of ocular symptoms among the study population (n= 113)

Forty five percent of the study participants, presented with various ocular complaints.

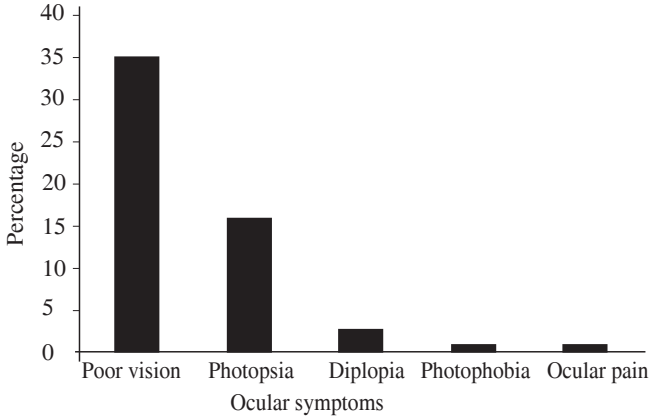

Figure 2: Distribution of ocular symptoms among patients who presented with visual complaints

Poor vision was the most common (35.4%) presenting visual complaint. Some patients had multiple complaints.

Table 3: Visual acuity status on the day of admission and discharge among the study population (n=113)

Visual acuity	VA on admission day No. (%)	VA on the day of discharge No. (%)
(BCVA:6/18-6/6) Normal vision	74 (64.6)	98 (87.6)
(BCVA: <6/18) Visual impairment	39 (35.4)	15 (13.3)
Total	113 (100)	113 (100)

(p<0.001)

*BCVA = Best Corrected Visual Acuity

On admission, 39 (35.4%) of patients had visual impairment, while at discharge only 15 (13.3%) had visual impairment. There was a remarkable improvement of visual acuities between admission and discharge day. This finding was statistically significant (p <0.001).

Table 4: Visual acuity among patients with pre-eclampsia and eclampsia

Obstetric diagnosis	Visual impairment (BCVA:<6/18) No. (%)	Normal vision (BCVA:6/18-6/6) No. (%)
Pre-eclampsia	5 (12.8)	40 (54.0)
Eclampsia	34 (87.2)	34 (46.0)
Total	39 (100)	74 (100)

Among patients with visual impairment, majority had eclampsia (87.2%).

Table 5: Average duration for recovery of transient vision loss among the study population

Duration of visual recovery (days)	No.	(%)
< 1	7	18.0
1-4	11	28.2
5-10	16	41.0
>10	5	12.8
Total	39	100

Majority of patients who presented with visual impairment spontaneously regained VA of >6/18 within one week. The mean recovery time was 8.5±1.2 days.

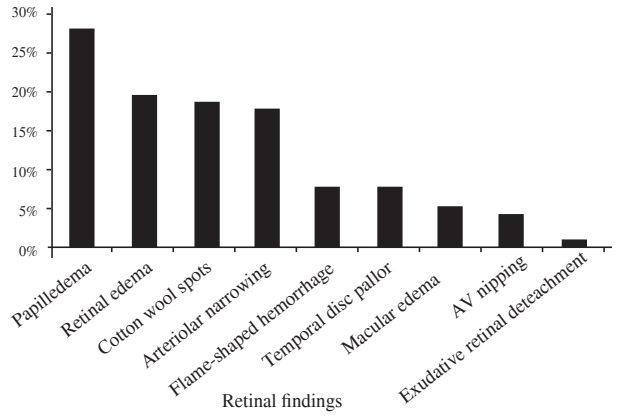

Figure 3: Distribution of ocular findings among the study population

Papilledema (bilateral disc swelling) was generally the most common (28.3%) fundus finding. Macular edema (5.3%) and exudative retinal detachment (0.9%) were the fundus abnomalities found to be the underlying causes of visual impairment. None of the study participants had significant abnormal anterior segment findings.

DISCUSSION

The aim of our study was to determine the prevalence and presentation of visual disturbances in patients with pre-eclampsia and eclampsia admitted at Muhimbili National Hospital. Study participants comprised of pregnant mothers with mean age 29.26 ± 6.97 years. This is the age when most marriages and child bearing occur in the urban general population of Tanzania[14]. This age group is essentialy a potential work force for the families and society at large and therefore requires a special attention to help prevent morbidities and reduce mortalities. Among the study participants, 23.9% were first time pregnant women (null-porous) and most of them (98.2%) were in 3rd trimester of pregnancy. This distribution complies with the documented facts that nulliparity is one of the risk factors for pre-eclampsia and eclampsia. It is estimated that women with pre-eclampsia are twice as likely to be nulliparous compared to women without pre-eclampsia[15] carrying their first to fourth pregnancy. Majority (80%) had no previous obstetric complications. This group of patients needs to be informed about pregnancy induced hypertension and related complications during antenatal clinic visits to ensure access to required services in time. Our findings show that visual disturbances occurred in slightly less than half (45.1%) of study participants. Poor vision was the commonest symptom that affected 35.4% patients. This finding is similar to studies elsewhere[2,16,17] that reported poor vision as the most common ocular manifestation among patients with pre-eclampsia and eclampsia.

Results show that 39 (35.4%) patients presented with visual impairment of less than 6/18 on admission. The predominance of the proportion of visual impairement among patients with eclampsia 20/27 (74%) over pre-eclampsia 20/39 (51.3%) implies that visual impairment was related to the severity of the disease. It is of utmost importance to strengthen the capacity of screening and managing pregnancy induced hypertension in antenatal clinics in the peripheral hospitals so as to halt the progression of the disease to a more severe form. This will decrease both mortalities and morbidities, in particular visual impairment related to pre-eclampsia and eclampsia.

In most patients however visual loss was temporary such that at discharge only 15 (13.3%) had visual impairment. The visual recovery average time of 8.2 days found in this study is similar to a study done at the Parkland hospital in the United States which revealed visual recovery of 4 hours to 8 days[16,18]. The improvement in vision in most patients signifies improved management and care of patients with pregnancy induced hypertension as studies show that vision improves with good care[19]. It is worth noting however that more than 13.3% of patients remained visually impaired at discharge. The vision in these patients may or may not improve depending on the cause. Patients whose vision does not improve may need further ophthalmological care including establishing and treating the cause of poor vision to avoid irreversible blindness. Therefore, there is a need to create awareness among staff managing patients with pre-eclampsia and eclampsia to refer affected patients for ophthalmological care by having meetings between the eye and obstetric departments to discuss the same.

In this study, the commonest posterior segment findings were related to increased intracranial pressure including papilledema (28%), retinal oedema (19.5%) and cotton wool spots (18.6%). Arteriolar narrowing was found in 17.7% while macular oedema occurred in 5.3%. This is in contrast to the studies done at Ross Eye Institute, in the United States that showed focal and generalized arteriolar narrowing secondary to spasms of arterioles to be the commonest finding occurring in 70% of study participants[2]. The frequency of arteriolar narrowing has

been noted to decline owing to improved management of pregnancy induced hypertension[20].

The underlying causes of poor vision were macular edema, exudative retinal detachment and optic neuropathy. This is in agreement with studies done in the USA and Romania on similar subject which mentioned retinal edema, vascular abnormality, retinal detachments and cortical blindness as causes for poor vision in patients with pre-eclampsia and eclampsia[16,21]. However, in recent studies, more emphasis is put on cortical blindness[22]. Clinically cortical blindness is characterized by a triad of reduced visual acuity, intact pupillary reflexes and normal fundus. The exact mechanism of cortical blindness is unclear but is associated with cerebral vasospasms, ischemic injury of the occipital cortex, vasogenic edema due to increased capillary permeability and focal edema of the occipital lobe. In this study visual impairment of cortical aetiology was suspected in 4.1% of the patients who presented with poor vision. Inability to perform retinal imaging as well as brain studies limited the study findings. Diagnostic investigations such as Ocular Coherent Tomography (OCT) would have revealed other subtle retinal changes that were not identified by clinical examination alone. Studies done in Columbia University in the United States and Tel-Aviv Sourasky Medical Center in Israel documented the identification of sub-clinical retinal and choroidal thickening, subretinal fluid and photoreceptors irregularities by OCT as causes of visual impairment in patients with pre-eclampsia and eclampsia[22,23]. In the absence of imaging techniques and visual evoked potential studies to diagnose cortical blindness, future studies need to estimate serum levels of S100B protein which is a peripheral biomarker of central nervous (CNS) injury as demonstrated by a study done in Uppsala University, Sweden[24].

CONCLUSIONS

The prevalence of visual disturbances among patients with pre-eclampsia and eclampsia at MNH was significantly high and majority presented with blurred vision. Visual impairment was associated with severity of the disease and was temporary in 87% of patients.

RECOMMENDATION

Creation of awareness among health personnel regarding sudden visual loss among pregnant women as an alarming sign of pre-eclampsia need to be instituted. Obstetricians should perform visual acuity and fundus examination in patients with pre-eclampsia and eclampsia and refer them for ophthalmic care accordingly.

ACKNOWLEDGEMENT

This study was made possible by financial support from the Muhimbili University of Health and Allied Sciences.

Financial and non-financial competing interests: The authors have no proprietary interest in any materials mentioned in this article.

REFERENCES

1. World Health Organization. Maternal mortality: Fact sheet 2015.
2. Samra KA. The eye and visual system in the preeclampsia. *Saudi J Ophthalmol.* 2013; **27**(1):51–53.
3. The American College of Obstetricians and Gynecologists: Practice Bulletin No. 33: Diagnosis and management of preeclampsia and eclampsia. *Obstet Gynecol.* 2002; **99**(1):159–167.
4. Matthews Z. Make every mother and child count. *World Health.* 2005 p. 409–411.
5. Osungbade KO, Ige OK. Public health perspectives of preeclampsia in developing countries: implication for health system strengthening. *J Pregnancy*. 2011; **2011**:481-495.
6. Lelia Duley. Pre-eclampsia and the hypertensive disorders of pregnancy. *Br Med Bull*. 2003; **67**(1):161–176.
7. Charlene T, Hannah D, Andrew K, Annemarie HP. The incidence of preeclampsia and eclampsia and associated maternal mortality in Australia from population. *Am J Obstet Gynecol*. 2013; **208**(6):476. e1–476.e5.
8. Urassa DP, Carlstedt A, Nyström L, Massawe SN. Eclampsia in Dar es Salaam, Tanzania. The incidence, outcome, and the role of antenatal care. *Acta Obs Gynecol Scand*. 2006; **85**(5):571–578.
9. Kidanto HL, Wangwe P, Kilewo CD, Nystrom L, Lindmark G. Improved quality of management of eclampsia patients through criteria based audit at Muhimbili National Hospital, Dar es Salaam, Tanzania. Bridging the quality gap. *BMC Pregnancy Childbirth*. 2012; **12**:134.
10. Ryan SJ. Pregnancy and retinal disease. *Retina.* 1994; **2**:1393–403.
11. France J. Characteristics of symptoms of imminent eclampsia: A case referent study from a tertiary hospital in Tanzania. *Open J Obstet Gynecol*. 2012; **2**(September):311–317.
12. Do DV, Rismondo V, Nguyen QD. Reversible cortical blindness in preeclampsia. *Am J Ophthalmol*. 2002; **134**:916–918.
13. Mitas RL. Acute cortical blindness in preeclampsia. *Ginekol Pol*. 2012; **83**(6):469–472.
14. National Bureau of Statistics (NBS). Youth in Tanzania. *Tanzania Demographic and Health Survey* 2010 p. 5.
15. Odegård RA, Vatten LJ, Nilsen ST, Salvesen KA, Austgulen R. Risk factors and clinical manifestations of pre-eclampsia. *Brit J Obstet Gynecol.* 2000; **107**(11):1410–1416.

16. Cunningham FG, Fernandez CO, Hernandez C. Blindness associated with preeclampsia and eclampsia. *Am J Obstet Gynecol.* 1995; **172**:1291–1298.
17. Shah AK, Rajamani WJ. Eclampsia: a neurological perspective. *J Neurol Sci.* 2008; **271**(1-2):158.
18. Rajaram GN. Sudden bilateral loss of vision postpartum. *J Indian Acad Clin Med.* 2002; **3**:213–214.
19. Swende TZ, Abwa T. Reversible blindness in fulminating preeclampsia. *Ann Afr Med.* 2009; **8**(3):189–191.
20. Schreyer P, Tzadok J SD. Fluorescein angiography in preeclamptic patients. *Curr Opin Obstet Gynecol*. 1992; **4**(1):129–150.
21. Jyotsana, Sharma AK BS. Reversible blindness in severe preeclampsia and eclampsia. *JK Sci.* 2004; **6**:43–45.
22. Garg A, Wapner RJ, Ananth CV, Dale E, Tsang SH, Lee W, Allikmets RBS. Choroidal and retinal thickening in severe preeclampsia. *Invest Ophthalmol Vis Sci.* 2014; **55**(9):5723–5729.
23. Neudorfer M, Spierer O, Goder M, Newman H, Barak S, Barak A, *et al*. The prevalence of retinal and optical coherence tomography findings in preeclamptic women. *Retina.* 2014; **34**:1376–1383.
24. Bergman L, Akhter T, Wikström AK, Wikström J, Naessen T ÅH. Plasma levels of S100B in preeclampsia and association with possible central nervous system effects. *Am J Hypertens*. 2014; **27**(8):1105–1111.