

FUNDUS CHANGES IN PRE-ECLAMPSIA AND ECLAMPSIA- AN OBSERVATIONAL STUDY

Karupputhevar Senthil¹, Sivasamy Subhashankari², Ganesan Vidhubala³, Manoharan Suhanya⁴, Pugaledndhi Priyadharsini⁵, Bohar Sugapriya⁶, Sanjayraut Ashwini⁷

¹Associate Professor, Department of Ophthalmology, Madurai Medical College, Madurai.

²Assistant Professor, Department of Ophthalmology, Madurai Medical College, Madurai.

³Senior Resident, Department of Ophthalmology, Madurai Medical College, Madurai.

⁴Junior Resident, Department of Ophthalmology, Madurai Medical College, Madurai.

⁵Junior Resident, Department of Ophthalmology, Madurai Medical College, Madurai.

⁶Junior Resident, Department of Ophthalmology, Madurai Medical College, Madurai.

⁷Junior Resident, Department of Ophthalmology, Madurai Medical College, Madurai.

ABSTRACT**BACKGROUND**

Pre-eclampsia is reported to occur in around 25% of primigravida and 12% - 15% of subsequent pregnancies. Ocular involvement is common. Reversible cortical blindness and extraocular muscle palsy have also been documented in eclamptic patients. The ocular vascular changes have been said to correlate with the severity of hypertension and this has been used as an indicator for termination of pregnancy.

The aim of this study is to determine the retinal changes in pre-eclampsia and eclampsia, and its relationship with severity of hypertension.

MATERIALS AND METHODS

An observational study was conducted over the period of 9 months at Department of Ophthalmology, Madurai Medical College among 199 patients, who fit into the diagnostic criteria of pre-eclampsia and eclampsia. After obtaining a detailed history, a thorough ocular examination was conducted with necessary blood investigations. All subjects were reviewed again at Ophthalmology Department two weeks after delivery.

RESULTS

The information collected regarding all the cases were recorded in a Master Chart. The study subjects were segregated into three major groups- Group 1: Mild Pre-eclampsia - BP > 140/90 mmHg with proteinuria > 300 mg/mL; Group 2: Severe pre-eclampsia - BP > 160/110 mmHg with proteinuria > 500 mg/mL associated with elevated renal parameters/ pulmonary oedema/ HELLP syndrome/ foetal compromise; and Group 3: Eclampsia- any unexplained seizures/ coma. The eclampsia group had more number of aged mothers, primigravida with generalised and pedal oedema and also proteinuria, whereas mothers with severe pre-eclampsia and mild pre-eclampsia were in the lower age group with or without pedal oedema and proteinuria, and the visual acuity was found to improve in all the three groups after delivery.

CONCLUSION

The frequency and severity of fundus changes more closely follow the severity of hypertension and also an associated early onset of pre-eclampsia by 24 - 28 weeks of pregnancy. Most of the patients with grade 1 and grade 2 fundus changes had an uncomplicated mode of delivery with a good foetal outcome and fundus findings resolved after delivery.

KEYWORDS

Eclampsia, Pre-eclampsia, Hypertension, Pregnancy.

HOW TO CITE THIS ARTICLE: Senthil K, Subhashankari S, Vidhubala G, et al. Fundus changes in pre-eclampsia and eclampsia- an observational study. J. Evolution Med. Dent. Sci. 2018;7(03):291-293, DOI: 10.14260/jemds/2018/64

BACKGROUND

Pre-eclampsia is reported to occur in around 25% of primigravida and 12% - 15% of subsequent pregnancies. Ocular involvement is common in 30% - 100% of these patients like hypertensive retinopathy, exudative retinal detachment, vitreous haemorrhage, retinal haemorrhage, ischaemic optic neuropathy and hypertensive choroidopathy.¹

'Financial or Other Competing Interest': None.

Submission 15-11-2017, Peer Review 29-12-2017,

Acceptance 05-01-2018, Published 13-01-2018.

Corresponding Author:

Dr. Karupputhevar Senthil,

Associate Professor of Diabetology,

Eye Department of OP No. 50, Government Rajaji Hospital,

No. 1, Panagal Road, Madurai-625020, Tamilnadu.

E-mail: eyedeptrh@gmail.com

DOI: 10.14260/jemds/2018/64



Reversible cortical blindness and extraocular muscle palsy have also been documented in eclamptic patients. The ocular vascular changes have been said to correlate with the severity of hypertension and this has been used as an indicator for termination of pregnancy.

Aim

To determine the retinal changes in pre-eclampsia and eclampsia, and its relationship with severity of hypertension.

MATERIALS AND METHODS

An observational study was conducted over the period of 9 months at Department of Ophthalmology, Madurai Medical College among 199 patients who fit into the diagnostic criteria of pre-eclampsia and eclampsia (> 20 weeks of pregnancy, blood pressure > 140/90 mmHg and Proteinuria). The formula used by our statistician to determine the sample size is $[Z_{1-\alpha/2}^2 p(1-p)] / d^2$, where $Z_{1-\alpha/2}$: is the standard normal

variate at 5% type I error ($p < 0.05$), which is 1.96. 'P' is the expected proportion in population based on pilot study is 10% and 'd' is the absolute error or precision is 5%. The sample size was found to be 199. Patients who had pre-existing diabetes mellitus, hypertension, renal disease and ocular condition which makes fundus examination difficult were excluded from this study. After obtaining a detailed history a thorough ocular examination was conducted including visual acuity, fundus photograph, blood urea, serum creatinine, serum uric acid, complete haemogram and urine examinations for protein and sugar was done. All subjects were reviewed again at Ophthalmology Department two weeks after delivery. All the statistical analysis was done using statistical software IBM SPSS Ver. 21.0 (Armonk, NY).

RESULTS

The information collected regarding all the cases were recorded in a Master Chart. The study subjects were segregated into three major groups^{2,3} namely, Group 1: Mild pre-eclampsia - BP > 140/90 mmHg with proteinuria > 300 mg/mL, Group 2: Severe pre-eclampsia - BP > 160/110

mmHg with proteinuria > 500 mg/mL associated with elevated renal parameters/ pulmonary oedema/ HELLP syndrome/ foetal compromise, and Group 3: Eclampsia- any unexplained seizures/ coma. The distribution of subjects into these three major groups and their mean, standard deviation and range is shown in Table 1. The eclampsia group had more number of aged mothers, primigravida with generalised and pedal oedema and also proteinuria, whereas mothers with severe pre-eclampsia and mild pre-eclampsia were in the lower age group with or without pedal oedema and proteinuria, Table 2. So, the 'p' value < 0.001 by Fisher's exact test and Chi-square test respectively shows that presence of generalised or pedal oedema and proteinuria were statistically significant among the factors observed. 'P' value <0.05 by Wilcoxon Signed rank test showed that the visual acuity was found to improve in all the three groups after delivery, Table 3. On comparing the severity of hypertension and fundus changes in Retinopathy before and after delivery, the 'p' value by Fisher's exact test was < 0.001 and hence statistically significant, Table 4.

Group	N	Mean (SD)	RANGE
Mild pre-eclampsia	95	22.49 (4.15)	16 - 35
Severe pre-eclampsia	80	22.91 (4.41)	16 - 35
Eclampsia	24	23.62 (4.33)	17 - 32
Total	199	22.79 (4.27)	16 - 35

Table 1. Descriptive Statistics for Age (Years)

Parameter	Mild Pre-Eclampsia	Severe Pre-Eclampsia	Eclampsia	Total	P value
	N (%)	N (%)	N (%)	N (%)	
Age group	<20 yrs.	35 (50)	30 (42.86)	5 (7.14)	0.618¥ (NS)
	21-25 yrs.	38 (49.35)	29 (37.66)	10 (12.9)	
	26-30 yrs.	17 (39.53)	18 (41.86)	8 (18.6)	
	>30 yrs.	5 (55.56)	3 (33.33)	1 (11.11)	
Gravida	Primi	60 (48)	52 (41.6)	13 (10.4)	0.626€ (NS)
	Multi	35 (47.3)	28 (37.84)	11 (14.86)	
	Total	95 (47.74)	80 (40.2)	24 (12.06)	
Pedal oedema	Present	6 (100)	0	0	0.052¥ (NS)
	Absent	89 (46.11)	80 (41.45)	24 (12.44)	
Generalised oedema	Absent	90 (61.64)	56 (38.36)	0	<0.001€ (S)
	Present	5 (9.43)	24 (45.28)	24 (45.28)	
Proteinuria	1+	4 (9.52)	33 (78.57)	5 (11.9)	<0.001¥ (S)
	2+	0	3 (13.64)	19 (86.36)	
	Absent	58 (100)	0	0	
	Trace	33 (42.86)	44 (57.14)	0	

Table 2. Comparison of Various Parameters between the Groups

¥ is Fisher's exact test, € is Chi-square test.

Group	Visual Acuity	Mean(SD)	Median(IQR)	P value [£]
Mild pre-eclampsia	Before delivery	0.1 {6/6} (0.22)	0 {6/6} (0-0.18)	0.025
	After delivery	0.08 {6/6} (0.19)	0 {6/6} (0-0.18)	
Severe pre-eclampsia	Before delivery	0.18 {6/9} (0.26)	0 {6/6} (0-0.3)	0.0005
	After delivery	0.14 {6/9} (0.22)	0 {6/6} (0-0.18)	
Eclampsia	Before delivery	0.29 {6/12} (0.42)	0.09 {6/6} (0-0.3)	0.0146
	After delivery	0.23 {6/12} (0.41)	0 {6/6} (0-0.18)	
Total	Before delivery	0.15 {6/9} (0.27)	0 {6/6} (0-0.18)	<0.001
	After delivery	0.13 {6/9} (0.24)	0 {6/6} (0-0.18)	

Table 3. Comparison of Visual Acuity (Log Mar) Before and After Delivery in Each Group

£ is Wilcoxon Signed rank test.

Group		Severity of Hypertension N (%)						P value ^{ef}
		0	1	2	3	4	Total	
Mild pre-eclampsia	Before delivery	47 (49.47)	36 (37.89)	12 (12.63)	0	0	95 (100)	<0.001
	After delivery	92 (96.84)	3 (3.16)	0	0	0		
Severe pre-eclampsia	Before delivery	2 (2.5)	37 (46.25)	29 (36.25)	10 (12.5)	2 (2.5)	80 (100)	
	After delivery	73 (91.25)	5 (6.25)	2 (2.5)	0	0		
Eclampsia	Before delivery	0	5 (20.83)	11 (45.83)	2 (8.33)	6 (25)	24 (100)	
	After delivery	2 (8.33)	16 (66.67)	6 (25)	0	0		
Total	Before delivery	49 (24.62)	78 (39.2)	52 (26.13)	12 (6.03)	8 (4.02)	199 (100)	
	After delivery	167 (91.25)	24 (12.06)	8 (4.02)	0	0		

Table 4. Comparison of Retinal Changes with Severity of Hypertension After Delivery

F- Fisher’s exact test.

DISCUSSION

The retinal and choroidal circulations are affected in pre-eclampsia and eclampsia with retinopathy similar to hypertensive retinopathy. Serous retinal detachments, retinal pigment epithelial lesions, occlusions of the vessels and cortical blindness are also seen here.^{4,5} Retinal arteriolar narrowing (focus or generalised) is the most common finding in pre-eclampsia. This is due to vasospasm of the central retinal artery, which usually resolves in the postpartum period due to normalisation of blood flow.⁶ Other retinal changes include hard exudates, flame-shaped haemorrhages, dot and blot haemorrhages, cotton wool spots and retinal oedema.

Retinal findings were graded as per American Ophthalmological Society’s classification of retinal changes in pre-eclampsia and eclampsia: Grade 0: Normal fundus; Grade 1 and 2: Characterised by slight or moderate degrees of reflex strip arterial-venous narrowing and spasm- the stage of angiospasm; Grade 3: The above with oedema, haemorrhage and exudates- pre-eclampsia; and Grade 4: Papilloedema. Choroidal dysfunction clinically manifests as yellow retinal pigment epithelial lesions and retinal detachment (Serous, Bullous, Bilateral). All these usually resolved in the postpartum period.

In one study done by Tadin L et al⁷ in 40 women with pre-eclampsia, there was a statistically significant correlation between the degree of hypertensive retinopathy and patient’s age, APGAR score, tropism, proteinuria, blood pressure and oedema. He concluded that the degree of retinopathy was directly proportional to the severity of pre-eclampsia. In another study by Sagili Chandrasekhara Reddy et al⁸ done in 78 PIH patients, he found Grade 1 and Grade 2 hypertensive retinopathies in 59% of the subjects and they were significantly associated with blood pressure, proteinuria and severity of the disease and concluded that fundus examination helps in assessing the severity of PIH.

Strict control of blood pressure should be initiated and all meticulous precautions to prevent eclampsia should be taken. Usually, medical management is aimed at correction of the abnormal derangements in the maternal metabolism and correction imbalances in the electrolyte levels. If pre-eclampsia resists to medical management, immediate

delivery with labour induction and caesarean section is advised. Treatment of eclampsia includes control of convulsions, hypoxia and acidosis correction, control of blood pressure and planning for delivery after the control of convulsions. This retinopathy also reverts to normal after delivery with complete restoration of vision frequently.

CONCLUSION

The frequency and severity of fundus changes more closely follow the severity of hypertension and also an associated early onset of pre-eclampsia by 24 - 28 weeks of pregnancy. This shows that increased blood pressure, when it is persistent for more than 8 - 10 weeks results in an increased severity of retinopathy. Most of the patients with Grade 1 and Grade 2 fundus changes had an uncomplicated mode of delivery with a good foetal outcome and fundus findings resolved after delivery.

REFERENCES

- [1] Richard RO. Pregnancy induced hypertension (preeclampsia-eclampsia) In: Schachat AP, Murphy RB. (eds). Retina. 2nd edn. St Louis: Mosby, 1994:1405-12.
- [2] Nalliah S, Abdullah AR. Eclampsia in Kelantan. Med J Malaysia 1990;45(1):49-56.
- [3] Noraihan MN, Sharda P, Jammal AB. Report of 50 cases of eclampsia. J Obstet Gynaecol Res 2005;31(4):302-9.
- [4] Nalliah S, Thavarashah AS. Transient blindness in pregnancy induced hypertension. Int J Gynaecol Obstet 1989;29(3):249-51.
- [5] Achanna S, Monga D, Sivagnanam. Transient blindness in pregnancy induced hypertension. Asia Oceania J Obstet Gynaecol 1994;20(1):49-52.
- [6] Rasdi AR, Nik-Ahmad-Zuki NL, Bakiah S, et al. Hypertensive retinopathy and visual outcome in hypertensive disorders in pregnancy. Med J Malaysia 2011;66(1):42-7.
- [7] Tadin I, Bojić L, Mimica M, et al. Hypertensive retinopathy and pre-eclampsia. Coll Antropol 2001;25 Suppl:77-81.
- [8] Reddy SC, Nalliah S, George SR, et al. Fundus changes in pregnancy induced hypertension. Int J Ophthalmol 2012;5(6):694-7.