

## Study of prevalence of fundus changes in pregnancy induced hypertension in a teaching hospital

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### Abstract

**Objective of the Study:** This study designed to identify the rate of prevalence of fundus changes in pregnancy induced hypertension population and also to analyze the correlation with blood pressure and proteinuria parameters.

**Materials and Methods:** Patients those are attending to ophthalmology department with the diagnosed pregnancy induced hypertension were admitted in current study. Demographics, blood pressure, gravida, gestational period, and proteinuria other details were recorded. Previous history related any eye symptoms were recorded. Patients after admission in to the ward, fundus examination carried out by dilating the pupil with direct ophthalmoscope.

**Results:** A total of 70 patients were examined. Mean age of the patient was 24.12 years (15-40). Changes in the retina were noted in 37 patients (53.29%). Grade I in 33 patients (47.14%) and Grade II in 4 patients (6.15%). There was no haemorrhages, no hard exudates, and no retinal detachments recorded in any of admitted subjects.

**Conclusion:** According to grade I & II hypertensive related retinopathy, the retinal changes were measured in total of 53.29% in total pregnancy induced hypertension population. Hence, fundus examination in these cases assisted to assess the severity of pregnancy induced hypertension.

**Keywords:** Proteinuria, Pregnancy induced hypertension, Retinal changes.

### Introduction

Hypertensive disorders during pregnancy considered to be the major risk factor and the important cause related to maternal morbidity and also maternal mortality in the developing countries. In India, hypertensive disorders during pregnancy is responsible for 8 to 9% of maternal deaths and whereas, 15 to 20% in maternal deaths throughout the world. In total, they complicate 5 to 10% of pregnancies in India due to various lifestyles and other risk factors<sup>1</sup>. The disease mechanism of PIH might affect almost every organ system of the pregnant's body including endocrine, cardiovascular, ophthalmological parameters, renal and central nervous systems etc. Changes those were observed in the retinal vasculature may be correlate to the severity of systemic hypertension and/but it was not always occurs. The resultant vasospastic complications/manifestations in PIH were mostly reversible and these retinal vessels will be returned to the normal levels after the delivery.<sup>2</sup>

Normally pregnancy induced hypertension (PIH) is divided into 3 types; mild PIH, preeclampsia and eclampsia respectively. Mild PIH defined as blood pressure of 140/90 mm of Hg. But, mild PIH will be returns to normal level. Secondly, pre-eclampsia defined as blood pressure of >140/90 mm of Hg. In pre-eclampsia, conditions like 2 occasions with spacing of 4 hours and significant proteinuria >300mg/24 hours and also results in edema.<sup>3</sup> Pre-eclampsia condition will develop during the second half of pregnancy period. Thirdly, eclampsia results in the occurrence of convulsions, coma, and unrelated to other cerebral conditions, and also including with the symptoms of pre-eclampsia.<sup>3</sup> During this disease, the pathological

changes will appears which is related to vascular endothelial dysfunction, which results in the consequences of generalized vasospasm and/or capillary leak. The ocular involvement is also common during pregnancy induced hypertension, which occurs in 30-100% of patients.<sup>4</sup> Most of the common symptoms like blurring of vision, photopsia, scotomas, diplopia will be noted.<sup>5</sup> Visual system involvement is due to severe toxemia. The most common abnormality seen is spasm and narrowing of the retinal vessels. Vision threatening conditions involved in central retinal artery occlusion, secondary optic atrophy, macular tear, central serous retinopathy, retinal detachment, central retinal vein occlusion, choroidal ischaemia and haemorrhage. Spontaneous vitreous haemorrhage may occur in cases of HELLP syndrome (patients with haemolysis, elevated liver enzymes, and low platelet count).<sup>4</sup>

There are 3 different stages of clinical course of Fundus changes during PIH were observed: First, spastic stage, in which spasm of retinal arterioles will occurs.<sup>6-10</sup> Second, stage of sclerosis, in which when PIH changes are superimposed on pre-existing organic sclerotic changes in vessels.<sup>6-10</sup> Lastly, stage of retinopathy, in which cotton wool spots, micro aneurysms, flame shaped and splinter haemorrhages, hard exudates, and disc edema etc., may be occurs.<sup>6-13</sup>

Tadin et al.,<sup>14</sup> study reported 45% of retinal changes observation in pregnancy induced hypertension. Another study by Reddy et al.,<sup>15</sup> also reported 59% of retinal changes in total of 78 PIH cases. Study by Karki et al.,<sup>16</sup> showed that 13.7% of fundus changes in total 153 PIH cases. Rasdi et al.,<sup>17</sup> reported 21.5% of the prevalence of retinopathy. Whereas, Ranjan et al.,<sup>18</sup> demonstrated that 40% retinal changes observed in 75 PIH pregnant

population. In a study by Javadekar et al.,<sup>19</sup> demonstrated retinal abnormalities in 42% in total PIH.

Hence, scarcity or less literature data/ studies available which were related to the retinal changes and it's prevalence in PIH population in Indian setups. So, current study designed to identify the prevalence of Fundus changes in PIH population in a rural setup those are attending to regular checkups and also this study recorded various retinal changes related to their severity of the disease condition.

## Materials and Methods

Current study is a cross sectional and observation, which was conducted during the period of 2 months like may 2018 to June 2018 at department of ophthalmology, Narayana Medical college, Nellore, A.P. Patients those have the diagnosis of pregnancy induced hypertension and less than 24 wks gestation period pregnancy, with high arterial BP and proteinuria were included in the department of obstetrics and gynecology, Narayana medical college and hospital, Nellore. Pregnant with preexisting diabetes, hypertension, renal disease, and/or hazy media which do not permit us to examine the fundus changes excluded.

Demographics, the complete history of eye, and their symptoms and their anterior segment were examined by light on the bedside. Both eye's pupils were dilated with 1% tropicamide eye drops and then fundus examination was carried out by directly by ophthalmoscope. Hypertensive related retinopathy observations in either eye were recorded. Demographics, blood pressure levels, gravida, para and proteinuria parameters were recorded. According to classification by Keith Wagener, the changes in the retina graded into grade I, II, III and IV. In grade I, mild generalized arterial attenuation, and in grade II, more severe grade I features along with the focal arteriolar attenuation. In grade III, which includes the features of grade II with haemorrhages, hard exudates, cotton wool spots. Whereas in grade IV, all the features of grade III included with optic disc swelling like papilloedema.<sup>20</sup> Whereas, proteinuria measured by using dipstick method and was graded as  $\pm 0.3$  gm/L, ++ = 1 gm/L and +++ = 3 gm/L.<sup>21</sup>

## Results

In this study, a total of 70 patients with mean age of 24.12 years (15 to 40) were included. The gestational period ranged between 27 and 40 weeks. 28 were primigravida (first time pregnancy), 36 cases belongs to multi-gravid (2 to 4 pregnancies) and 6 cases belongs to grand multi's (5 times or more pregnancies). There are changes related to the retina were observed in 37 PIHs i.e. 53.29% of patients.

**Table 1: Retinal changes in pregnancy induced hypertension**

Retinopathy grading	No. of cases	Percentage
No changes	33	47.14
Grade 1	33	47.14
Grade 2	4	6.15
Grade 3	0	0
Grade 4	0	0

## Discussion

Hypertension complicates 10% of all pregnancies.<sup>22</sup> Maternal mortality rate in pre-eclampsia and eclampsia is recorded upto 1.8% in developed countries<sup>23</sup>. Maternal mortality in eclampsia patients was observed as very high in India and this ranges varies from 2 to 30%,<sup>24</sup> it was much more in rural setups than the urban areas. But, if they treated early and adequately, the mortality rate will be less than 2%. The changes related to retinal vascular which were observed have also been said to be correlated with the severity of hypertension. As per the literature search related to PIH studies, the wellbeing related to fetus will be depends on it's placental circulation. It was observed that the vascular changes in placenta, indicated with the presence of changes may occurs in retinal arterioles/haemorrhages. So, the direct ophthalmoscopic observation to the mother's fundus may also results in the interpretation/report, which will be similar micro-circulation changes of placenta and it's indirectly to the fetus wellbeing. So, the fundus observation of during the pregnancy induced hypertension, will be the important clinical tool to predict/interpret the adverse fetal outcomes if any.<sup>25</sup>

Therefore, this study was undertaken to evaluate the fundus changes in 70 patients with PIH.

In our study grade 1 retinal changes were seen in 33(47.14%) and grade 2 in 4 (6.15%) patients.

In S.C. Reddy et al. study,<sup>27</sup> grade I retinal changes in 41(52.46%) and grade II in 5(6.4%) were noted. In A.P. Shah<sup>26</sup> study Grade 1 retinal changes in 12 (8%) and Grade 2 in 6 (4%) were noted. S.C. Reddy et al, A.P. Shah studies did not find any haemorrhages, cotton wool spots and/or retinal detachments.<sup>27,26</sup>

This observation will attributed to give proper antenatal care and also early identification of pregnancy induced hypertension cases, thereby preventing further them to progress.

In Ranjan et al, study<sup>28</sup> demonstrated the prevalence of fundus changes in 70% cases with grade I hypertensive retinopathy, 20% cases have grade II hypertensive retinopathy and 10% cases have Grade III hypertensive retinopathy. Whereas, in Tadin et al. study reported 10 cases (25%) have grade I hypertensive retinopathy, 6 (15%) cases have grade 2 hypertensive retinopathy and 2 cases (5%) have grade 3 hypertensive retinopathy.<sup>14</sup>

Rasdi et al.<sup>17</sup> study reported 50 patients with hypertensive retinopathy. Among these, 24 patients (48%) had Grade I hypertensive retinopathy, 21 patients (42%) had Grade 2, 4 patients (8%) had Grade 3 and 1 patient (2%) had Grade 4 hypertensive retinopathy changes.

In A.J. Bhandari study reported 56% did not have any ocular fundus changes in 100 PIH cases. In their study, grade III retinal vascular changes observed in 3% and grade IV observed in 2%.<sup>29</sup>

In our study, 38 (54.12%) patients had +1 proteinuria, 20 (28.57%) patients had +2 proteinuria and 6(8.57%) patients had +3 proteinuria. Retinal vascular changes were seen in 17(24.28%), 14(20%) and 6(8.57%) with proteinuria +1, +2 and +3 respectively.

**Table 2: The association between retinal changes and different parameters**

S. No.	Parameter	Retinal changes			Total
		Nil (n=33)	Gr I (n=33)	Gr II (n=4)	
1	Blood pressure				
	<150 mm Hg systolic <100 mm Hg diastolic	29	13	0	42
	>150 mm Hg systolic >100 mm Hg diastolic	4	20	4	28
2	Proteinuria				
	+	21	16	1	38
	++	6	12	2	20
	+++	0	5	1	6
3	Age				
	15 to 20	9	6	1	16
	21 to 30	22	24	2	48
	31 to 40	2	3	1	6

In A.P. Shah in their study observed 58 patients with proteinuria of 1+ to 4+ on the dipstick, and 22.41% PIH subject developed retinopathy compared from 92 cases who doesn't have the proteinuria.<sup>26</sup>

In A.J. Bhandari study observations, out of 100 cases, 49% of cases have 1+ proteinuria on urine dipstick method followed by 27% cases having 2+ proteinuria. Patients with 3+ and 4+ proteinuria constituted 17% and 7% respectively. Retinal vascular changes observed in 27%, 44%, 71% and 100% of cases with proteinuria 1+, 2+, 3+ and 4+ respectively. This will shows that retinal vascular changes were observed in more cases with high degree of proteinuria.

### Conclusion

Ophthalmologically, regular fundus observations during the pregnancy, PIH with special reference to younger, primigravida women and early onset of PIH subjects may results in proper assessment of their clinical status outcome. Therefore, repeated fundus observations during pregnancy can assess the severity of the disease to plan the treatment, which instituted thereby improving the fetomaternal outcome.

**Conflict of Interest:** None.

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