Research Article

Comparative study of intraocular pressure variation in pregnant and non pregnant women

Hilda K Nixon[1*], Norman Mendonca[2], Sripathi Kamath[3], Sunayana Bhat[4]

[1]Postgraduate, [2]Professor and HOD, [3,4]Assistant Professor, Department of Ophthalmology, Father Muller Medical College, Mangalore-575002, Karnataka, INDIA.
Email: hilda24ophthal@gmail.com

Abstract

Introduction: Hormonal changes occurring during pregnancy have significant effect on the body including eyes. Hormonal changes can affect intraocular pressure (IOP) in pregnancy and are transient. The present study is to investigate the variation of IOP in pregnancy and non pregnant women. **Methods:** A comparative case control, Hospital based study was done which incorporated 200 patients (100 were pregnant and 100 non pregnant).IOP was measured using a Rebound tonometer for right and left eye for both the groups. Statistical analysis by T- test. **Results:** 200 patients included in the study (n=100 pregnant and n=100 non pregnant patients).Age group 20 to 35 yrs were included in both the groups with mean age 25.92 years pregnant and 26.31 years non pregnant. Mean IOP of non pregnant women were 16.280 mmHg (Std. Deviation 1.79269) and 16.590 mmHg (Std. Deviation1.1984) for right and left eye respectively. Among 200 eyes of non pregnant women, 133 eyes (67%) had IOP between 16 to 18 mmHg followed by 52 eyes (26%) belonged to 13 to 15 mmHg. Others were 12 eyes (6%) were 19 to 21mmHg and only 3 eyes (1%) were between 10 to 12 mmHg. Among 200 eyes of pregnant women, 115 eyes (58%) had IOP between 13 to 15 mmHg, followed by 64 eyes (32%) belonged to 10 to 12 mmHg. Others were 20 eyes (10%) were between 16 to 18 mmHg and no patients were between 19 to 21 mmHg. The difference between the mean values of IOP between the pregnant and non pregnant women was statistically highly significant (P <0.001). **Conclusions:** Our study showed IOP decreased in advanced pregnancy compared to non pregnant women. IOP decreases in pregnancy and pre-existing glaucoma may possibly improve. Hence during pregnancy only few cases of glaucoma may be diagnosed. In glaucoma screening, attention should be paid regarding IOP variation as pregnancy advances and effect on multiple pregnancy.

Keywords: intraocular pressure, aqueous dynamics, pregnancy, hormonal variation.

[*]**Address for Correspondence:**
Dr. Hilda K Nixon, Postgraduate, Department of Ophthalmology, Father Muller Medical College, Mangalore-575002, Karnataka, INDIA.
Email: hilda24ophthal@gmail.com

Received Date: 02/08/2015 Revised Date: 10/08/2015 Accepted Date: 13/08/2015

Access this article online

Quick Response Code:

Website: www.statperson.com

DOI: 16 August 2015

INTRODUCTION

Hormonal changes occurring during pregnancy have significant effect on the body and are often in association with ocular changes. Pregnancy induced ocular changes are mostly transient and are either physiological or pathological. Physiological changes that occur during pregnancy include changes in the refractive state, visual fields, cornea sensitivity, intraocular pressure (IOP) reduction, and dry eye.[1,2] Pathologic changes include central serous chorioretinopathy.[2] During pregnancy, elevated hormonal levels influences the IOP as aqueous humor producing ciliary processes and aqueous drainage channels are sensitive to these changes. High levels of progesterone and estrogen have effect on the dilation of the circulatory system vessels, decreased arterial pressure and reduction in aqueous humor production.[3] The liquid passage between collagen in soft tissues increased by relaxin hormone and helps in aqueous outflow and thus reduction in IOP.[4] During the 14 weeks of the first trimester and at delivery relaxin reaches its peak level. Multiple pregnancy have increased serum relaxin concentrations.[5] As all these factors can affect IOP in pregnancy, the present study was undertaken is to investigate the variation of IOP in pregnancy and non pregnant women. Physiological changes and hormonal levels significantly increase as pregnancy advances, thus further decrease in IOP. Hence all pregnant patients of third trimester were included in this study.

How to site this article: Hilda K Nixon, Norman Mendonca, Sripathi Kamath, Sunayana Bhat. Comparative study of intraocular pressure variation in pregnant and non pregnant women. *International Journal of Recent Trends in Science and Technology* August 2015; 16(1): 169-172 http://www.statperson.com (accessed 18 August 2015).

MATERIALS AND METHODS

This study was a comparative case control, hospital based study. Ethical clearance was taken from the institutional ethical committee prior to the start of the study. Prior to the study, each subject was informed in detail about the objective of the study, the research protocol and the method for consent. A total of 200 female patients were included in the study. Patients attending 'routine antenatal outpatient' clinics at the Obstetrics and Gynecology department and patients attending clinics at ophthalmology department of Father Muller Medical College from July 2015 – September 2015 were included in the study were included in the study. 200 female patients (400 eyes) who were included in the study were allotted into two groups; one group included 100 pregnant women (200 eyes) and other group with non pregnant women (200 eyes). All pregnant women in this study belonged to third trimester. Inclusion criteria were age 20 to 35 years in both the groups. All patients included in the study were normotensive subjects. Age more than 35 yrs and less than 20 yrs, patients with gestational diabetics and hypertension, patients who used oral contraceptives, multiple gestation patients, patients diagnosed with glaucoma, intraocular pressure more than 21mmHg in either eyes were excluded from study. Pregnant women who developed complications, such as preeclampsia, eclampsia were excluded from study. The IOP was measured using a Rebound tonometer. IOP measurements were recorded for right and left eye separately. The IOP was measured between 8 a.m. and 10 a.m. to avoid diurnal variation. Gestational period of pregnant women were recorded. Intraocular pressure of pregnant and non pregnant women were compared. Data was analysed using mean, frequency, percentage and T- test.

RESULTS

A total of 200 (400 eyes) female patients were included in the study. One group included 100 pregnant women (200 eyes) and other group with non pregnant women (200 eyes). Age group 20 to 35 yrs were included in both the groups with mean age 25.92(Std. Deviation 2.65786) years for pregnant and 26.31(Std. Deviation 2.80582) years for non pregnant. All pregnant women in this study belonged to third trimester and according to weeks of gestation were further grouped. Most of pregnant patients (42%) belonged to 34 to 36 weeks of gestation, followed by (22%) pregnant women belonged 31 to 33 weeks gestation, others were (19%) 28 to 31 weeks(,17%) 37 to 39 %. Mean IOP of pregnant women were 13.470 mmHg (Std. Deviation 1.49379) and 13.5100 mmHg (Std. Deviation 1.35955) for right and left eye respectively. Mean IOP of non pregnant women were 16.280 mmHg (Std. Deviation 1.79269) and 16.590 mmHg (Std. Deviation1.19844) for right and left eye respectively. IOP of both the groups pregnant and non pregnant were further studied and grouped according to IOP mmHg. Among 200 eyes of non pregnant women, 133 eyes (67%) had IOP between 16 to 18 mmHg and this group was the highest followed by 52 eyes (26%) belonged to 13 to 15 mmHg. Others were 12 eyes (6%) were between 19 to 21mmHg and only 3 eyes (1%) were between 10 to 12 mmHg. Among 200 eyes of pregnant women, 115 eyes (58%) had IOP between 13 to 15 mmHg and this group was the highest followed by 64 eyes (32%) belonged to 10 to 12 mmHg. Others were 20 eyes (10%) were between 16 to 18 mmHg and no patients were between 19 to 21 mmHg. The difference between the mean values of Intraocular Pressure between the pregnant and non pregnant women was statistically highly significant (P <0.001).

Table 1: Mean and Standard deviation of age, IOP of right and left for non pregnant and pregnant women

	Group	N	Mean	SD	SEM
Age	non pregnant	100	26.3100	2.80582	.28058
	pregnant	100	25.9200	2.65786	.26579
Right	non pregnant	100	16.2800	1.79269	.17927
	pregnant	100	13.4700	1.49379	.14938
Left	non pregnant	100	16.5900	1.19844	.11984
	pregnant	100	13.5100	1.35955	.13596

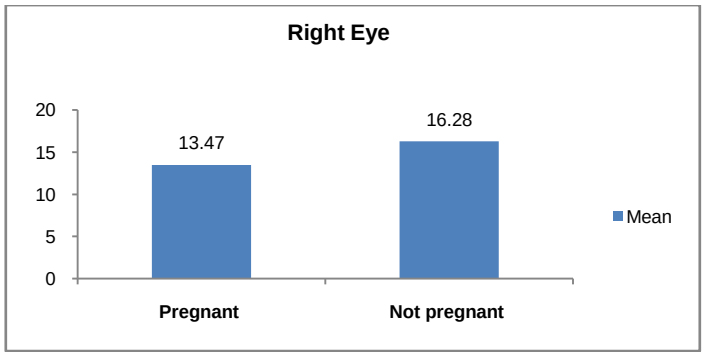

Figure 1: Mean of right eye IOP in pregnant and non pregnant

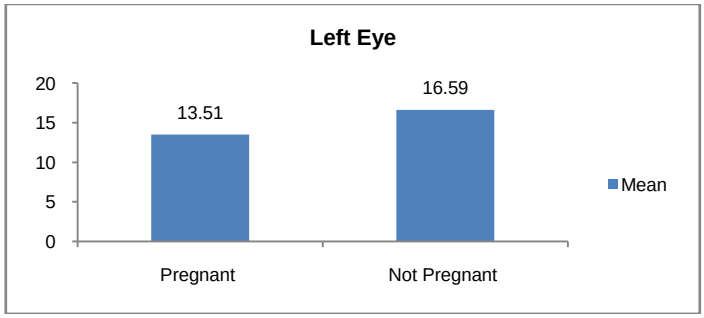

Figure 2: Mean of left eye IOP in pregnant and non pregnant

Table 2: Number of patients according to gestation of pregnancy in weeks

Ges(wks)	No: of patients	Percentage
28 - 30	19	19
31 -33	22	22
34-36	42	42
37-39	17	17

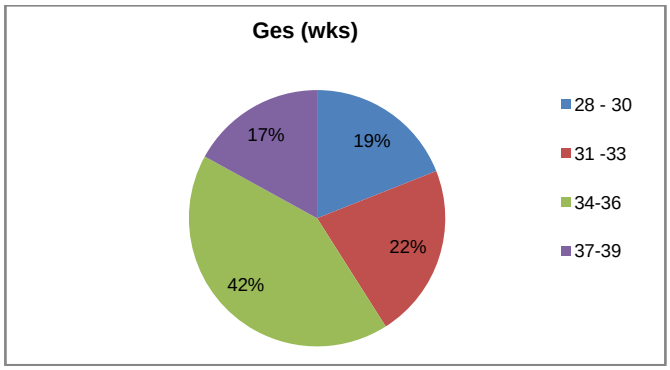

Figure 3: Percentage of pregnant women according to gestational period

Table 3: Number of non pregnant women according to IOP

IOP mmHg	no: patients (non pregnant)
10 to 12	3
13 to 15	52
16 to 18	133
19 to 21	12
Total	**200**

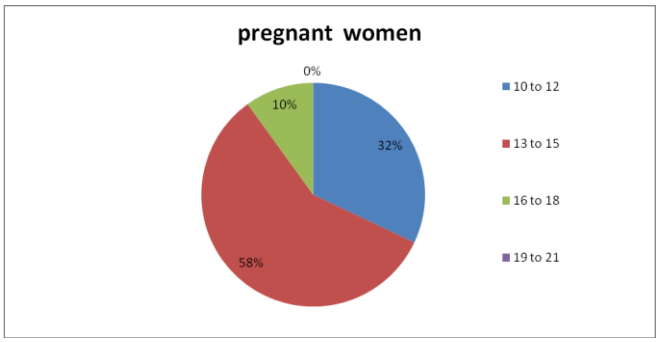

Figure 4: Percentage of non pregnant patients according to IOP

Table 4: Number of pregnant women according to IOP

IOP mmHG	No of patients (pregnant)
10 to 12	64
13 to 15	116
16 to 18	20
19 to 21	
Total	**200**

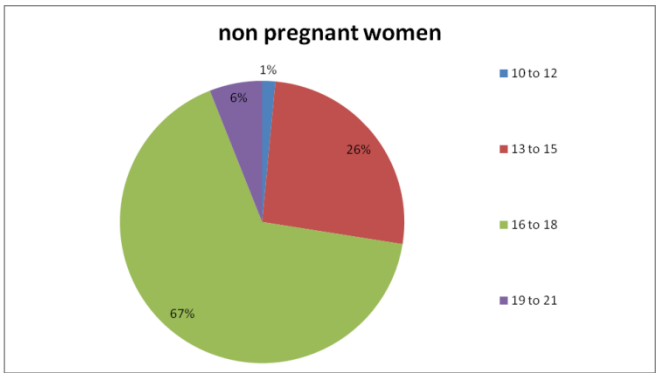

Figure 5: Percentage of pregnant patients according to IOP

DISCUSSION

Pregnancy induced physiological changes in the body organs involves a wide spectrum. The progressive physiological changes that occur have impact even on ocular system. Reduction in IOP during pregnancy is a part of normal physiologic changes. Physiological changes and hormonal levels significantly increase as pregnancy advances, thus futher decrease in IOP. Qureshi *et al* showed during pregnancy, ocular hypertension women had decreased in IOP that becomes notable during the second trimester and as pregnancy advances it further decreased.[6] The decrease in IOP during pregnancy is likely multifactorial. The mechanisms of IOP reduction can be due to hormonal a level that fluctuate during pregnancy such as estrogen, relaxin, progesterone, and human chorionic gonadotrophin and a second messenger system that help in aqueous outflow and also helps in decreased episcleral venous pressure. Saylik *et al* in their study hypothesize that the additional decrease in IOP in the twin pregnancy. Eighty eyes of 40 twin pregnancies (TwPs), 80 eyes of 40 singleton pregnancies (SiPs) and 80 eyes of 40 non-pregnant females (NoPs) were included in the study. The mean IOP (MIOP) values in TwPs were 14.29 ± 1.28, 11.48 ± 1.20, and 9.81 ± 1.36 mmHg and the MIO *P* values in SiPs were 14.42 ± 0.95, 13.12 ± 0.75, and 10.97 ± 0.89 mmHg in subsequent trimesters.[2] Their study showed that intraocular pressure in pregnancy are also influenced by number of fetuses in uterus and hypothesized that increase hypotensive effect in twin pregnancy compared with singleton pregnancy are most likely related to the presence of higher levels of hormones, particularly estrogen, progesterone and relaxin. Elevated hormonal levels of progesterone and estrogen during pregnancy causes reduction in aqueous humor production by Pilas *et al*.[3] During and after pregnancy, aqueous flow remains constant, but increase in the outflow facility causes decrease in intraocular pressure. The changes in aqueous dynamics in pregnancy can be due to excess progesterone blocks the ocular hypertensive effect of endogenous corticosteroids by

Niloofar *et al*.[7] Ebeigbe *et al* studied intraocular pressure in 117 pregnant women and showed intraocular pressure decreased as pregnancy advanced. Pregnancy associated Ocular changes are transient as they mostly resolve postpartum, with values return to values of near pre pregnant level.[8] The finding from this study showed, among 200 eyes of non pregnant women that most of them (67%) had IOP between 16 to 18 mmHg and only (1%) were between 10 to 12 mmHg. Among 200 eyes of pregnant women, (58%) had IOP between 13 to 15 mmHg and this group was the highest and no patients were between 19 to 21 mmHg. Our study showed intraocular pressure decreased in advanced pregnancy compared to non pregnant women. The difference between the mean values of Intraocular Pressure between the pregnant and non pregnant women was statistically highly significant (P <0.001). The changes in aqueous dynamics can be due to significant hormonal variation occurring in pregnancy and these having ocular hypotensive effect on the eyes.

CONCLUSION

Intraocular pressure changes occurring during pregnancy may provide a direct insight in to the pathophysiological variation that occurs. In our study the difference between the mean values of Intraocular pressure between the pregnant and non pregnant women was statistically highly significant (P <0.001).Thus IOP decreases in pregnancy and pre-existing glaucoma may possibly improve. Hence during pregnancy only few cases of glaucoma may be diagnosed. In glaucoma screening, attention should be paid regarding IOP variation as pregnancy advances and effect on multiple pregnancy.

REFERENCES

1. Sunness JS. The pregnant woman's eye. Survey of ophthalmology. 1988; 32(4):219-38.
2. Saylık M, Saylık SA. Not only pregnancy but also the number of fetuses in the uterus affects intraocular pressure. Indian journal of ophthalmology. 2014; 62(6):680.
3. Pilas-Pomykalska M, Luczak M, Czajkowski J, Woźniak P, Oszukowski P. [Changes in intraocular pressure during pregnancy]. Klinika oczna. 2003; 106(1-2 Suppl):238-9.
4. Phillips CI, Gore SM. Ocular hypotensive effect of late pregnancy with and without high blood pressure. British journal of ophthalmology. 1985; 69(2):117-9.
5. Maclennan A, Green R, Nicolson R, Bath M. Serum relaxin and pelvic pain of pregnancy. The Lancet. 1986; 328(8501):243-5.
6. Qureshi IA, Xi XR, Wu XD. Intraocular pressure trends in pregnancy and in the third trimester hypertensive patients. Acta obstetricia et gynecologica Scandinavica. 1996; 75(9):816-9.
7. Ziai N, Ory SJ, Khan AR, Brubaker RF. β-human chorionic gonadotropin, progesterone, and aqueous dynamics during pregnancy. Archives of ophthalmology. 1994; 112(6):801-6.
8. Ebeigbe J, Ebeigbe P, Ighoroje A. Ocular changes in pregnant Nigerian women. Nigerian journal of clinical practice. 2012; 15(3):298-301.

Source of Support: None Declared
Conflict of Interest: None Declared