

Frequency of Optic Refractive Changes During Third Trimester of Pregnancy

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ABSTRACT

PURPOSE: To determine the frequency of optical refractive changes (myopia, hypermetropia) during third trimester of pregnancy.

METHODOLOGY: After ethical approval this cross-sectional study recruited 86 participants who had pregnancy in third trimester between January, 2023 and August, 2023. The age of participants ranged from 25 to 40 years and Females who were not diabetic, hypertensive and spectacle users were recruited from Gynaecology outpatient of Shalamar Hospital, Lahore. After informed consent, the best corrected visual acuity for distance was determined by Snellen chart and Retinoscopy was performed. Later on, subjective refraction was done on all participants. Data was entered and analyzed in SPSS version 26. Fischer's exact test was used to check for association. P value of less than 0.05 was considered significant.

RESULTS: Visual acuity and refractive errors are the physiological changes during pregnancy, they are mostly transient and resolved after postpartum. The results of this study showed the frequency of myopia was 91.9% and hypermetropia was 8.1%. So, the myopia was the refractive error that is mostly reported during third trimester of pregnancy with symptoms of blurred vision, headache, itching.

CONCLUSION: Pregnancy causes refractive error and progressive reduction in visual acuity for distance and there is slight change in visual acuity for near. Myopia was the commonest refractive error during third trimester of pregnancy. The main symptoms reported during third trimester of pregnancy were blurred vision, itching and headache.

Key words: Pregnancy, Refractive error, Myopia, Visual Acuity

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INTRODUCTION:

Pregnancy is a particular condition of a women's body which is marked by the variety of changes in many different organ and organ systems.¹ Pregnancy can cause numerous physiological and pathological changes throughout the body, the eye is no exception.² These various changes can occur in the body

which is the result of release of placental hormones, maternal endocrine glands and fetal adrenal glands.³ Pregnancy is a physiological state which is responsible for remodeling in all body systems, including the visual system.⁴

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These changes are possibly due to modifications in Hormonal, Immunological, Metabolic, Hematological and Cardiovascular systems of the body.⁴ These changes are usually distinct in Third Trimester as hormonal activity is at its peak.⁵ The Eye is even though a closed space which go through many modifications, which are comparatively harmless, but some become pathological.⁶ Ocular changes during pregnancy may occur due to physiological alterations to deal with the Gestational product. The extremity of ocular changes are affected by the health status especially in Hypertensive and Diabetic pregnant women.⁷ Marked changes in the eye occur during pregnancy.⁸ These refractive changes are temporary that will normalize after parturition but some are permanent that require an intervention.⁹ Pregnant women have higher refractive difference from preliminary spectacle prescription.¹⁰

Ocular structures that are affected during pregnancy include eyelid, conjunctiva, cornea, lens, retina, optic nerve, and orbit.¹¹ Decrease in IOP in post-menopausal women is due to Human Chorionic Gonadotropin hormone.¹² Posterior segment changes include worsening of Diabetic Retinopathy, Central serous chorioretinopathy and Retinal detachment.¹³

Intracranial disorders with ocular effects in pregnancy include Pseudotumor cerebri, prolactinomas and Sheehan's syndrome.¹¹ The balance of the axial length of the eye, the optical power of the cornea and the lens determine the refractive state of the eye.¹⁴ Refractive errors are the type of vision problems that are unable to focus the image on the retina.¹⁵ Visual acuity and Refractive error changes are occur due to physiological modifications during pregnancy.¹⁶ A spherical equivalent (SE) of less than $-0.50D$ in either eye or both, that can be corrected by concave lens.^{6,17}

A spherical equivalent (SE) of greater than $+0.50D$ in either eye or both, that can be corrected by convex lens.¹⁸ Blurred vision is a main symptom of refractive error. Impaired vision, headache, morning sickness, redness, tearing, itching, contact lens intolerance are common symptoms during pregnancy.¹⁹

METHODOLOGY:

After ethical approval this cross-sectional study recruited 86 participants who had pregnancy in third trimester between January, 2023 and August, 2023. The age of participants ranged from 25 to 40 years and Females who were not diabetic, hypertensive and spectacle users were recruited from Gynaecology outpatient of Shalamar Hospital, Lahore. Then Questionnaire based proforma was signed by the subject to ensure that her participation was voluntary. It had taken 15 minutes participation of the subject. After informed consent, the best corrected visual acuity for distance was determined by Snellen chart and Retinoscopy was performed. Later on, subjective refraction was done on all participants. No laboratory, radiological or any other types of non-ocular and ocular investigations were performed. There was no associated foreseeable risk to the subjects. Data was entered and analyzed in SPSS version 26. Fischer's exact test was used to check for association. P value of less than 0.05 was considered significant.

RESULTS:

The study was conducted for 8 months. During this time period, 86 subjects were examined to determine the frequency of optical refractive error during third trimester of pregnancy. Among all the subjects, 91.9% patients were myopic and 8.1% were hypermetropic which showed that frequency of myopic patients were increased during third trimester of pregnancy. There was no significant association between occupation and refractive errors, ($p=0.486$). There was significant association between blurred vision and refractive errors, ($p=0.002$). There was no significant association between lacrimation and refractive errors, ($p=1.000$). There was no significant association between itching and refractive errors, ($p=0.183$).

Table -1: Frequencies of Refractive Error

Refractive Errors	Frequency	Percent
Myopic	79	91.9
Hypermetropic	7	8.1
Total	86	100.0

Table -2: Relationship of Refractive Error with Burning

Refractive Error		Burning		Total
		Yes	No	
Myopic	Count	44	35	79
	% within Refractive Error	55.7%	44.3%	100.0%
Hypermetropic	Count	0	7	7
	% within Refractive Error	0.0%	100.0%	100.0%
Total	Count	44	42	86
	% within Refractive Error	51.2%	48.8%	100.0%

Fisher's Exact Test was applied. There was significant association between burning and refractive errors, (p=0.005).

Table- 3: Relationship of Refractive Error with Redness

Refractive Error		Redness		Total
		Yes	No	
Myopic	Count	50	29	79
	% within Refractive Error	63.3%	36.7%	100.0%
Hypermetropic	Count	0	7	7
	% within Refractive Error	0.0%	100.0%	100.0%
Total	Count	50	36	86
	% within Refractive Error	58.1%	41.9%	100.0%

Fisher's Exact Test was applied. There was significant association of redness and refractive errors, (p=0.002).

Table -4: Relationship of Refractive Error with use of Visual Display Units

Refractive Error		TV, Mobile or Computer use		Total
		Yes	No	
Myopic	Count	73	6	79
	% within Refractive Error	92.4%	7.6%	100.0%
Hypermetropic	Count	6	1	7
	% within Refractive Error	85.7%	14.3%	100.0%
Total	Count	79	7	86
	% within Refractive Error	91.9%	8.1%	100.0%

Fisher's Exact Test was applied. There was no significant association between the use of visual display units and refractive errors, (p=0.461).

DISCUSSION:

This study showed the frequency of refractive changes during 29-40 gestational weeks. It was noted that myopia was the refractive error which was highly reported with blurred vision, burning, redness and headache during third trimester of pregnancy. The frequency of myopia reported was 91.9% and frequency of hypermetropia was 8.1%. The asthenopic symptoms those were studied in this study were redness, burning, photophobia, blurred vision, tearing, itching.

Nkiru ZN et al²⁰ in their study in Southeast Nigeria had participants aged 18–48 years with a mean age of 30.81 (±5.49) years and majority of the participants never had an eye check during pregnancy while this study also had never a regular eye checkup during pregnancy. The most frequent ocular symptoms during their pregnancy were itching and blurring of vision. Majority of the participants had Visual acuity (VA) between 6/6 and 6/18. There was a progressive worsening of VA for distance in more women from second to third trimesters which improved during the postpartum period. There was only a slight change in VA for near throughout the study period. Changes in VA for distance occurred among more pregnant women in the third trimester than second trimester. The most common refractive error among the participants was simple myopia. There was an increased myopic shift in more pregnant women from second to third trimester.

Diress M et al⁶ conducted a cross-sectional study and visual acuity (VA) of participants were done by a standardized Snellen acuity chart at a distance of 6 meters. The dependent variable of their study was Visual impairment and the independent Socio-demographic variables includes Age, occupation, regular use of media.

Pizzarello LD et al²¹ conducted study on participants who had visual changes during pregnancy. There was myopic shift from pre-pregnancy levels. (0.87+/-0.3 diopters in the right eye (P<0.0001) and 0.98+/-0.3 diopters in the left eye (P<0.0001). Post-partum, all subjects returned to near pre-pregnancy levels of myopia. This report showed worsening of myopia.

Mehdizadehkashi et al²² in their study in Iran also reported significant changes in VA for both distance and near. However, there was no significant change in near VA. A cross-sectional study, while this study was also a cross-sectional study, this study excluded those participants who had refractive error before pregnancy and who were hypertensive and diabetic. While this exclusion criteria were not specific in their study. The change in VA could be attributed to the increased level of estrogen (a fluid retaining hormone) and aldosterone which leads to retention of fluid in ocular tissues such as the cornea. Limitation of this study include small sample size and collection from a single centre.

CONCLUSION:

Pregnancy causes change in the visual acuity for distance. The major symptoms reported during third trimester of pregnancy are burning, redness, blurriness, itching.

Conflict of Interest: None to declare

Author Contributions: Areej Iftikhar: Concept, Design, Data Collection

Arfa Batool: Data Collection, Literature Review, Drafting

Amina Ashraf: Data Analysis and Critical Review

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