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A systematic analytical study on ocular manifestations of pregnancy

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ABSTRACT

Introduction: During pregnancy, ocular changes are very commonly observed. Ocular changes during pregnancy are categorized as physiological or pathological. Ocular manifestations during pregnancy could also lead to diplopia, scotomata, retrobulbar pain and visual obstruction. According to many studies we analyzed, it has been stated that an estimate of 14 percent of pregnant women reports experience visual changes during pregnancy.

Materials and Methods: A systemic self-study and meta analysis was planned to analyze and study the various ocular manifestations of pregnancy. With the application of Electronic databases we searched PubMed, Google Scholar, Web of Science, Medline Plus, Health line & Cleveland Clinic web which were published in English Language. This systemic self-study have reviewed the facts which were published earlier to determine the current scenario by vast study of statistics and derivation of facts. Vast analysis and along with proper examination of data were made to evaluate with final conclusion.

Observation and Discussion: Based on our systematic self study and vast analysis on ophthalmic changes occurring during pregnancy we derive to a fact that any ocular changes could be categorized as physiological ocular changes or pathological ocular changes occurring during pregnancy. Physiological changes are those changes which occur normally during pregnancy whereas pathological changes are those changes which are present for the very first time in pregnancy or it could be modification in existed disease affected by pregnancy.

Conclusion: We conclude that pathological manifestations are very common in pregnancy which accounts for majority of pregnant women could be managed by general practitioners and optometrists. Pathological preexisting ocular condition could be referred to ophthalmologist for further management. Pregnant women with systemic disease would require hospital care with supportive antenatal service.

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1. Introduction

During pregnancy, ocular changes are very commonly observed and encountered. The ocular structures which are commonly affected during pregnancy are cornea, retina, eyelid, conjunctiva, optic nerve / tract and orbit.¹ According to study by Chaula S in Med J Armed Forces of India

they stated that ocular changes during pregnancy are categorized as physiological or pathological. They further stated the fact that pregnancy related pathological changes might be present as new development in our eye, a modifications in pre-existing ocular pathological changes and furthermore ocular complications of systemic disease.² According to American Academy of Ophthalmology which classifies that any ocular manifestations of pregnancy could be categorized into three divisions mainly includes

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changes in pre existing eye disease, pregnancy specific eye disease and physiological changes. Ocular manifestations during pregnancy could also lead to diplopia, scotomata, retrobulbar pain and visual obstruction. According to many studies, it also has been stated that an estimate of 14 percent of pregnant women have reported visual changes during pregnancy.³ It has been stated that changes in metabolism, hormone profile and circulation of blood are the most common etiological factors which could affect eyes during pregnancy. Visual changes are very common in pregnancy and also many are exclusively associated during pregnancy.⁴

2. Materials and Methods

A systematic meta analysis was planned to analyze and study the various ocular manifestations of pregnancy. With the application of Electronic databases we searched PubMed, Google Scholar, Web of Science, Medline Plus, Health line & Cleveland Clinic web which were published in English Language. In this study we have reviewed the facts which were published earlier to determine the current scenario by vast study of statistics and conclusions. Vast analysis and along with proper examination of data we were able to arrive at our final conclusion.

3. Observations and Discussion

Based on our systematic meta analysis on ophthalmic changes occurring during pregnancy, any ocular changes could be categorized as physiological ocular changes or pathological ocular changes occurring during pregnancy. Physiological changes are those changes which occur normally during pregnancy whereas pathological changes are those changes which are present for the very first time in pregnancy or it could be modification in pre-existing disease affected by pregnancy.⁵

There are several common physiological ocular changes we observed in our study. Physiological changes during pregnancy basically involves development and changes to interior of the eye to ocular surface of the eye.

Most ocular changes during pregnancy have hormonal, hematological, cardiovascular and immunological origin.⁶

Corneal change occurs during and the latter phases of pregnancy which could cause temporary alteration in the refraction.⁷

During pregnancy especially in 3rd trimester due to increase in sympathetic activity the diameter of photopic and mesopic pupil increases.⁸

Studies have shown that transient decrease of accommodation could occur during pregnancy and lactation period.⁹ Our crystalline lens consists of 65% of volume, increase in volume of liquid during pregnancy could result in development of cataracts also.¹⁰

During pregnancy in first two trimesters, a Krukenberg spindle might be observed which is basically a pigmented deposition on our posterior cornea. However, this decreases in size during third trimester which are mostly due to hormonal changes of our body.¹¹ Krukenberg spindles are observed in 3% of pregnant women in the world.¹²

We observed in many studies that due to hormonal changes during pregnancy leads to physiological modification of tear film which produce dry eye syndrome.¹³ Dryness could further increased by dehydration usually resulting from use of anti-emetic drugs.¹⁴

In many studies which we analyzed and investigated we derive to this fact that most commonly encountered problem during pregnancy is increase in the pigmentation in the region of cheeks and eyes which is also known by the name chloasma.¹⁵ This happens due to increase in the level of progesterone, estrogen and melanocyte stimulating hormone it is also known by the name pregnancy mask.¹⁶ Also we observed in some studies that benign spider angiomas developed on face and upper body during pregnancy.

According to one study by Kara S thickness of choroid is higher in first trimester of pregnancy with an exception of preeclampsia (PE).¹⁷ Choroid is also known to be highly vascularized tissue which is very susceptible to ongoing hormonal and hemodynamic changes during pregnancy.¹⁸

It have been widely reported that there are significant changes in visual field during pregnancy. The pituitary gland grows physiologically in pregnancy which often leads to modifications such as bitemporal concentric visual field defects.¹⁹ But their exact etiology of modification in visual field during pregnancy is still unknown.²⁰

Hemeralopia is a condition also known as “Day Blindness” a Greek word which originated in 18th century. It is a visual defect characterized by the inability to see clearly in bright light. Daytime vision worsens in patients suffering from hemeralopia. According to one study conducted by S Milazzo where he investigated and reported that hemeralopia is one of the most common visual complaints of women during pregnancy. During pregnancy, it has been widely reported that hemeralopia occurs due to deficiency of vitamin A.

Intraocular pressure (IOP) in simpler terms could be defined as the fluid pressure of the eye. Intraocular pressure is an important tool in assessing and evaluation of patients at risk of glaucoma. During pregnancy mainly due to influence of progesterone hormone Intraocular pressure has been seen to drop 2-3mmHg.²¹ During third trimester of pregnancy this drop has been noted to reach up to 10% of the normal value.²² It also has been reported widely that intraocular pressure decrease may be even greater in patients suffering from ocular hypertension during pregnancy. By two months postpartum, it has been observed that intraocular pressure

changes typically returns to pregnancy levels.²³

It has been widely reported that a range of ocular pathology exists during pregnancy. There are some pre existing diseases which could worsen during pregnancy. Early diagnosis and management is very crucial for pathological ocular conditions during pregnancy.

Pathological ocular could be divided into three categories:-

1. Pre existing ocular manifestations of pregnancy.
2. Pathological ocular condition for the first time.
3. Ocular complications of systemic disease.

Diabetic retinopathy is a diabetic complication which affects eyes. This condition arises due to damage to blood vessels of light sensitive tissue at back of eye which is retina. During pregnancy, diabetic retinopathy is a very common ocular manifestations and the progression is witnessed in both type 1 and type 2 diabetes. Diabetic retinopathy commonly occurs during second and third trimester. According to one study conducted by Rasmussen KL, he reported that prevalence of diabetic retinopathy in type 2 diabetes patients is about 14%.²⁴ In type 1 diabetes mellitus (DM), higher in first two trimesters and have reduced in third trimester. However, the retinopathy is less severe in women with two or more pregnancies. The visual symptoms associated with retinopathy are mostly floaters, blurred vision or sometimes even total vision loss which could vary in different individuals. According to Samra KA, her article reports that the exact mechanism of pathogenesis for progression of Diabetic Retinopathy (DR) still remains controversial during pregnancy.

Uveitis is a condition which causes inflammation of the middle layer of the eye, the uvea and surrounding tissues. Uveitis is a very rare, commonly diagnosed at an age of 39 years. The impact and significance of pregnancy is not well-established.²⁵

According to vast analysis on some studies on uveitis, we found it to be most common in first trimester during pregnancy. But the condition improves by second and third trimesters. Some case reports also suggested that though uveitis might improve or remit during pregnancy but then there are chances it could recur during postpartum period.

Glaucoma is a condition which arises due to increase in intraocular pressure which further damages the optic nerve and causes visual field loss. Glaucoma is very rare in pregnant women. But according to one study by Harinder et al. published in International Journal of Ophthalmology glaucoma has been reported to occur in 2% to 3% of pregnant adults at age 40. Management of glaucoma is very crucial especially during pregnancy, it becomes a major challenge of balancing the risk of visual loss for both mother and fetus. Laser trabeculoplasty could be an ideal treatment of choice in all trimesters. The first line of treatment for pregnant women with glaucoma are beta blockers according

to some studies.²⁶

Idiopathic intracranial hypertension arises from elevated intracranial pressure which could worsen in pregnancy due to gain of weight. According to a recent study by Falardeau in Journal of neuroophthalmology where he reported that Acetazolamide is relatively safe for management of idiopathic intracranial hypertension.²⁷

Uveal Melanoma is the most common intraocular primary malignancy in adults but it is very uncommon in pregnancy. Uveal Melanoma is very rarely reported and most of the studies are often sporadic cases during pregnancy according to an article published in JAMA by Siegel R.²⁸

According to the European Society of Endocrinology, in healthy women during pregnancy, pituitary gland gradually increases in size. Pregnancy could increase the size of tumor which secrete prolactin (PRL) especially macroadenomas which increases the risk for visual impairment. This is followed by often headaches, visual changes, bi-temporal field effects and diplopia occurs during pregnancy. Bromocriptine, steroids and surgery are the necessary management for pituitary adenoma

Due to increase in tumor growth and vascularity and probably hormonal changes pre-existing meningioma could manifest the second-half of pregnancy.²⁹ Another report by Dumitrescu states that incidents of meningioma during pregnancy is estimated at 5.6 cases in 100,000 pregnant women.³⁰

Central serous chorioretinopathy in simpler terms could be defined as spontaneous detachment of sensorineural retina in the macula, which further causes blurred vision, central scotomas and microscopy. This condition can occur in any trimesters of pregnancy. Recent studies have also suggested that increased risk for CSCR during pregnancy due to increase in cortisol levels and other variation in hormones during pregnancy.³¹ CSCR has the possibility of recurrence in subsequent pregnancies.³²

Anti phospholipid antibody syndrome is an autoimmune condition, hypercoagulable state which have high frequency in pregnancy. Patients are treated with long-term anticoagulants and prognosis is also excellent according to Mezhov V who published his study in Medical Journal of Australia.³³

Disseminated intravascular coagulation is a serious complication in which protein which controls the clotting of blood becomes hyperactive. During pregnancy DIC is a major emergency which is caused by disruption of coagulation pathway. There have been various incidences of serous retinal detachment where DIC is secondary to pregnancy related hypertension.³⁴

Thrombotic Thrombocytopenic purpura is a hematological condition which occurs during pregnancy characterized by renal failure, microangiopathic hemolytic anemia and thrombocytopenia.³⁵

Graves' disease is an immune disease which results in overproduction of thyroid hormones. During pregnancy this disease can occur and worsen during first trimester of pregnancy. According to one study by Copper DS where he reports that Graves' disease affects 1 to 2% of all pregnancy.³⁶

4. Conclusion

We hereby conclude our vast systematic study and analysis by accomplishing our aim to put clinicians at greater ease when they encounter ocular complaints and further enable them to differentiate between physiological ocular changes and preexisting ocular pathological changes with visual manifestations.

Hence, we conclude that pathological manifestations are very common in pregnancy which accounts for majority of pregnant women could be managed by general practitioners and optometrists. Pregnant women with systemic disease would require hospital care with supportive antenatal service.

5. Source of Funding

None.

6. Conflict of Interest

None.

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