A Study on effects on the eye in puberty life at Agartala

By

[1]Tanushree Majumder, [2]Debanjoy Debnath, [3]Poushali Das, [4]Abhranil Chakraborty, [5]Dr. Goutam Datta
[1234]B. Optometry Students, Department of Optometry, Tripura Institute of Paramedical Sciences
[5]Associate Professor, Department of Optometry, Tripura Institute of Paramedical Sciences

ABSTRACT

The menstrual cycle represents the series of cyclical changes that occur in a female's body after puberty, starting with menarche—the onset of reproductive capacity—and ending with menopause, which marks the conclusion of her fertile years. Interestingly, although the reproductive and visual systems are often discussed separately, emerging research indicates a close connection between eye health and brain function. During puberty, hormonal fluctuations can significantly impact various bodily systems, including the eyes. Changes in estrogen and progesterone levels throughout the menstrual cycle can lead to effects such as fluid retention, dry eye symptoms, vision changes, and variations in refractive error. While these effects are generally temporary, they can vary from person to person and fluctuate at different stages of the menstrual cycle. The survey's findings on the effects of the menstrual cycle on ocular health during puberty indicate that out of a total of 109 girls, 67 (61.5%) experienced ocular abnormalities related to their menstrual cycles, while 42 (38.5%) did not report any issues. This data provides insight into the prevalence of menstrual cycle-associated ocular changes in the surveyed population. The reported abnormalities may include symptoms such as dry eyes, blurred vision, and hormonal changes that affect tear production or cause cyclical fluctuations in refractive error. Hormonal imbalances during menstruation, particularly changes in estrogen and progesterone, can impact the lacrimal gland, corneal sensitivity, and intraocular pressure, contributing to these symptoms. To manage these effects: Drinking plenty of water can help maintain tear production, Use Lubricating eye drops, taking breaks from screen time, using proper lighting, and wearing sunglasses outdoors can help minimize light sensitivity and eye strain. Managing the effects of the menstrual cycle on ocular health during puberty requires awareness, education, and proactive measures. Here's a comprehensive guide for society to help individuals navigate these changes effectively.

Keywords: *Menstruation cycle, Puberty, Hormonal fluctuation, Dry eye, Headache, Agartala, Tripura*

INTRODUCTION

Puberty in girls is a natural developmental process during which their bodies undergo physical and hormonal changes that lead to sexual maturity. It typically begins between the ages of 10 and 16 and can last several years. Key changes during this time include the growth of breasts, the development of body hair (such as underarm and pubic hair), a growth spurt, and the onset of menstruation (periods). Hormones like estrogen and progesterone play a significant role in these changes. Additionally, girls may experience emotional shifts as part of this transition. Puberty prepares the body for the ability to reproduce, although emotional and physical maturity continues to develop into late adolescence. There are several signs are found in puberty life:

1. Hair Growth: During puberty, hair growth may begin in the axillary area (underarms) or the pubic region, which were previously hairless.

2. Mood Swings: Girls may experience mood swings during this stage, becoming irritable or angry over minor issues. They may also become quieter and withdraw from family interactions.

3. Breast Budding: During puberty, girls may notice pain or tenderness in their breasts, which can affect one side or both simultaneously. The discomfort may not be severe and might only be felt upon touch. Additionally, there may be noticeable changes in the shape and size of their breasts.

4. Height Spurt: Sudden increases in height may occur, making a girl one of the taller children in her class. This growth spurt is attributed to the surge of puberty hormones.

5. Pimples or Acne: Girls may experience increased oiliness in their skin, particularly on their faces, leading to a rise in acne and pimples. This change results from the transition from childhood to adolescence.

6. Menstruation: The final stage of puberty in girls is the onset of menstruation. Initially, periods may be irregular due to the immature hormonal axis. The arrival of menstruation typically indicates advanced bone age, suggesting that her height gain may be limited after she starts her periods.

Several factors can contribute to menstrual disorders, including hormonal imbalances, genetic predispositions, clotting disorders, pelvic health issues, and dietary choices. It is important to recognize how modern lifestyle choices, such as unhealthy eating habits and reduced physical activity, can influence menstrual health. Four stages are found in menstrual cycle:

Menstruation: The most well-known stage of the menstrual cycle is called Menstruation. This first stage of the cycle begins when someone gets their period – when the thickened lining of a uterus, which would support a pregnancy, is no longer needed, so it sheds through the vagina.

Follicular phase: The follicular phase starts on the first day of menstruation and ends with ovulation, creating an overlap of phases. The follicle-stimulating hormone stimulates the ovary to produce around five to 20 follicles.

Ovulation: Typically occurring between days 11 and 21 of the menstrual cycle, the ovulation stage is when someone is most likely to get pregnant.

Luteal phase: Once ovulation occurs, the follicle that contains the egg transforms into something called a corpus luteum and produces progesterone and estrogen.

The menstrual cycle represents the series of cyclical changes that occur in a female's body after puberty. Interestingly, the reproductive and visual systems are often discussed separately, emerging research indicates a close connection between eye health and brain function. This relationship highlights the intricate interactions between the brain's functions and the menstrual cycle, supported by delicate feedback loops and neural pathways connecting the brain, hypothalamus, and pituitary gland. Future studies will explore how these systems mutually influence one another and investigate how the female reproductive cycle might affect visual performance and related parameters.

Changes in estrogen and progesterone levels throughout the menstrual cycle can lead to effects such as fluid retention, dry eye symptoms, vision changes, and variations in refractive error. While these effects are generally temporary, they can vary from person to person and fluctuate at different stages of the menstrual cycle. According to a 2022 review, researchers have found receptors that recognize and respond to sex hormones all the way through the eye, including the Meibomian glands which keep the eyelids lubricated, the conjunctiva, which keeps the eye moist by making mucus and tears. Below is a summary of the potential effects of the menstrual cycle on the eyes during puberty:

Estrogen and Progesterone: These hormones significantly regulate fluid balance, corneal thickness, and intraocular pressure (IOP). Fluctuations during the menstrual cycle can lead to temporary changes in ocular physiology.
Androgens: These hormones influence Meibomian gland function and tear film stability, which are crucial for maintaining ocular surface health.
Dry eye syndrome: Hormonal changes can reduce tear production or alter the composition of the tear film, leading to dryness, irritation, and discomfort.
Eye strain or discomfort: Increased sensitivity or strain may occur, particularly during hormonal fluctuations.
Swelling around the eyes: Fluid retention during certain phases of the menstrual cycle can be alleviated by staying hydrated and reducing salt intake.
Increased light sensitivity: Photophobia, or discomfort in bright light, can often be managed with tinted glasses or by adjusting lighting conditions.

Migraine-associated vision changes: Those who experience visual disturbances related to hormonal migraines may benefit from medication or lifestyle adjustments.
Blurred vision: Fluid retention caused by hormonal shifts may temporarily alter corneal thickness or curvature, affecting visual acuity.
Conjunctival changes: Some individuals may experience mild conjunctival hyperaemia (redness) due to hormonal influences on blood vessels.

Guidelines for Preventing Eye Health during Puberty
1. Focus on Eye Hydration: Incorporate the use of artificial tears or lubricating eye drops to effectively combat dryness. Prioritize hydration by drinking plenty of water throughout the day.
2. Practice Good Eye Care: Refrain from rubbing the eyes to help prevent irritation and the risk of infections. Make it a habit to remove makeup thoroughly, which can help keep tear ducts clear and reduce irritation.
3. Limit Screen Exposure: Embrace the 20-20-20 rule: every 20 minutes, take a moment to look at something 20 feet away for 20 seconds. This simple practice can significantly reduce eye strain.
4. Take Charge of Hormonal Migraines: Utilize prescribed medications for migraines promptly if notice any vision changes or experience pain. Establish a consistent sleep routine and practice stress-reduction techniques to minimize potential migraine triggers.
5. Enhance Diet and Supplements: Aim for a balanced diet that includes foods rich in omega-3 fatty acids, which are beneficial for tear production.
6. Stay Proactive with Eye Care: Schedule regular check-ups with an eye specialist to ensure your eyes remain healthy and to address any concerns promptly.

Aim of the Study:
1. To assess the prevalence of ocular abnormalities facing during menstrual cycle in puberty life.
2. To evaluate the impact of the menstrual cycle on eye health during puberty life.
Objectives:
To investigate the relationship between menstrual phases and changes in ocular parameters and to assess whether hormonal fluctuations during puberty influence visual function.

METHODS & METHODOLOGY
Study of the Area:
Tripura is a tiny beautiful state in north east India. Three sides of Tripura are surrounded by Bangladesh. The capital city of Tripura is Agartala. There are so many religions are receding in different corner of the state. The mixed population have different cultural activities and no communication mis adjustment there. Most of the people are dependent on farming. In education people of Tripura are second stage in Indian literacy survey. So people are very much awarded in their education in both genders. Therefore, girl students are also very much aware about their educational life. This study was conducted at different Schools in Agartala, West Tripura.
Time Period:
The study was conducted from September 1, 2024, to February 25, 2025 in different schools in Agartala.
Methods and Materials:
Study Design: A cross-sectional or longitudinal study design to assess the effects of menstrual cycle on the eye during puberty life.
Sample selection criteria: We have selected patients who have started puberty and are experiencing ocular problems. We focused on girls' students aged 10 to 16 years from this population, we randomly screening around 425 individuals and selected 109 girls for our research project.
Inclusion criteria:
Age Group: Girls aged 10–16 years (puberty age group). Participants who have started menstruating (post-menarche). Girls without pre-existing ocular diseases or conditions (e.g., congenital eye abnormalities, glaucoma, or severe refractive errors). Girls with regular or irregular menstrual cycles (to assess variability in ocular symptoms).
Exclusion Criteria:
Girls below 10 years or above 16 years. Pre-menarche girls or those who have not yet started menstruating. Girls with diagnosed systemic diseases (e.g., diabetes, hypertension) or chronic ocular

conditions that could confound the results. Participants who do not complete the required screenings or questionnaires.

Data Collection:

Survey: Utilize a combination of quantitative and qualitative methods. Conduct vision screenings; distribute questionnaires to assess activities performance, quality of life, and mental health. Also, conduct interviews or focus group discussions to gather qualitative insights. Use standardized forms to collect data at baseline, mid-study, and at the end of the study.

Clinical procedure: Participant those who have found any type of ocular abnormalities as well as facing any symptoms like blurring of vision, redness, headache, we were measured their visual acuity by Snellen's chart. We also examined anterior segment by the loops and torch light and posterior segment including fundus examined by direct ophthalmoscope. Further we also examined those participants who have had dryness also examined their tear secretion level by Schirmer's tear test strip. For those patients whose vision less than 6/6, we utilized our portable equipment to provide correct visual acuity by trial box with objective refraction by streak retinoscopy followed by subjective refraction in various methods which were preferable for the respective participants.

RESULT

In this study, we were randomly screened around 425 individuals and selected 109 girls, those who were facing puberty. A questionnaire sheet was provided to all the school students, which included visual performance and clinical examination. In the study, out of 109 girl students, 67(61.46%) girls were suffering menstruation cycle related ocular abnormalities and 42(38.53%) girls were not suffering any ocular abnormalities in puberty life. In this study, we considered only 67 girl students; those who were suffering different eye related abnormalities in their puberty life.

Out of 67 girls' students, 10 girls (9.17%) were suffering from headaches, 13 girls (11.92%) were suffering from eyestrain, 16 girls (14.67%) were suffering from dry eyes, 14 girls (12.84%) were suffering from blurring of vision, 6 girls (5.50%) were suffering from watering and 8 girls (7.33%) were experiencing in multiple symptoms of eye. [Table No. 1]

Ocular abnormalities	Sufferers	Percentage
Headache	10	9.17%
Eyestrain	13	11.92%
Dry eye or foreign body sensation	16	14.67%
Blurring of vision	14	12.84%
Watering	6	5.50%
Multiple symptoms	8	7.33%
Total	67	61.46%

Table no-1 (Ocular observation in puberty life)

Out of 67 subjects, 14 female subjects were suffering blurring vision in different age groups. In study we were assess their visual acuity by Snellen's Chart monocularly. In the 1st group, 2.75% had 6/6(P) to 6/9(P) vision, 1.83% had 6/12 to 6/18(P) vision, and 2.75% had 6/24 to 6/60(P) vision. In the second group, 1.83% had 6/6(P) to 6/9(P) vision, 0.91% had 6/12 to 6/18(P) vision, and 2.75% had 6/24 to 6/60(P) vision. [Table – 2]

Visual Acuity	10 to 13 Years	14 to 16 Years
6/6(P) to 6/9(P)	3 (2.75%)	2 (1.83%)
6/12 to 6/18(P)	2 (1.83%)	1 (0.91%)
6/24 to 6/60(P)	3 (2.75%)	3 (2.75%)
Total	8 (7.33%)	6 (5.50%)

Table no-2 (visual acuity assessment of puberty girls in different age group)

Out of 67 subjects, 16 female subjects were facing dry eye sensation in different age groups. In study we were assess their tear secretion test by Schirmer's test (II) monocularly. In the 1st group, 3.66%

were suffering sever dry eye, 2.75% were suffering dry eye, and 1.83% were normal tear secretion. In the second group, 1.83% were suffering sever dry eye, 1.83% were suffering dry eye, and 2.75% were normal tear secretion. [Table – 3]

Schirmer's test (II)	10 to 13 Years	14 to 16Years
0 mm to 5mm	4(3.66%)	2 (1.83%)
6mm to 10 mm	3(2.75%)	2(1.83%)
Above 10 mm	2(1.83%)	3 (2.75%)
Total	9 (8.25%)	7(6.42%

Table no-3 Tear secretion assessment of puberty girl in different age group

DISCUSSION

In the study, it was found that, the effects of the menstrual cycle on ocular health during puberty indicate that out of a total of 109 girls, 67 (61.5%) were experienced ocular abnormalities related to their menstrual cycles, while 42 (38.5%) did not report any ocular issues. This data provides insight into the prevalence of menstrual cycle-associated ocular changes in the surveyed population.

A significant proportion (61.5%) of girls reported experiencing ocular abnormalities, suggesting a strong association between menstrual cycles and eye health during puberty. The reported abnormalities may include symptoms such as dry eyes, blurred vision, and hormonal changes that affect tear production or cause cyclical fluctuations in refractive error. Hormonal imbalances during menstruation, particularly changes in estrogen and progesterone, can impact the lacrimal gland, corneal sensitivity, and intraocular pressure, contributing to these symptoms.

Among the participants, 10 (9.17%) girls reported experiencing headaches, 13(11.92%) girls experienced eyestrain. Furthermore, 16 (14.67%) girls reported suffering from dry eyes. There were also 14 (12.84%) girls who complained of blurred vision. These findings suggest variability in how hormonal fluctuations impact individuals, potentially due to differences in genetics, lifestyle, or overall health. It is essential to be aware of menstrual-related ocular symptoms in young girls so that these issues can be identified and managed effectively. Screening programs and targeted interventions, such as eye lubrication and dietary recommendations, could help alleviate symptoms.

CONCLUSION

The menstrual cycle can have a variety of effects on the eyes during puberty, as hormonal changes can influence different aspects of eye health. The study aimed to assess the prevalence of ocular abnormalities and evaluate the impact of the menstrual cycle on eye health during puberty. The research highlighted a significant correlation between the menstrual cycle and ocular changes during puberty, with a notable prevalence of symptoms such as dry eyes, blurred vision, and eye fatigue, particularly during specific phases of the menstrual cycle. These findings suggest that hormonal fluctuations during puberty may play a critical role in influencing ocular health.

The study underscores the importance of raising awareness about the potential impact of menstrual cycles on eye health, especially among adolescent girls. It also emphasizes the need for further research to explore the underlying mechanisms of these ocular changes and to develop targeted interventions or preventive measures. This research contributes to a growing body of knowledge on the intersection of hormonal changes and ocular health, paving the way for more comprehensive care in the future.

To manage these effects; stay hydrated with drinking plenty of water, which can help increase tear production. Use Lubricating Eye Drops; over-the-counter lubricating drops can alleviate dry eye symptoms. Maintain Proper Eye Care; taking breaks from screen time, using proper lighting, and wearing sunglasses outdoors can help minimize light sensitivity and eye strain.

Managing the effects of the menstrual cycle on ocular health during puberty requires awareness, education, and proactive measures. Here's a comprehensive guide for society to help individuals navigate these changes effectively: promote awareness and education: schools, parents, and healthcare providers should educate young individuals about the potential ocular changes linked to hormonal fluctuations during the menstrual cycle. This helps reduce anxiety and encourages proactive management. Encourage regular eye check-ups: especially those experiencing vision changes or discomfort, to undergo regular eye exams. This helps identify and address any underlying issues early. Monitor symptoms: teach individuals to track ocular symptoms (e.g., dry eyes, blurred vision) in

relation to their menstrual cycle to identify patterns and seek timely care. Support Mental and Emotional Well-being. Consult healthcare providers: if ocular symptoms are severe or persistent, advise individuals to consult a healthcare provider.

Reference:

1. The relationship between sex hormone levels and ocular surface parameters in girls with idiopathic central precocious puberty - PMC
2.https://www.medicalnewstoday.com/articles/hormones-and-vision-problems
3.https://www.researchgate.net/publication/327398694_A_study_on_menstruation_of_Indian_adolescent_girls_in_an_ur ban_area_of_South_India.
4.Changes in ocular and visual variables during the menstrual cycle - PubMed
5. The Menstrual Cycle and Vision: The Eye is a Gender Specific and Hormonally Sensitive Target Organ - JMVH
6. Hormones: Link Between Dry Eye and Menstrual Cycle
7. https://https://pmc.ncbi.nlm.nih.gov/articles/PMC4834779/www.mdpi.com/2227-9032/11/8/1108
8. https://pmc.ncbi.nlm.nih.gov/articles/PMC4834779/
9. https://pubmed.ncbi.nlm.nih.gov/8152819/