

Evaluation of the Prevalence and Risk Factors of Dry Eye in Young Population

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Purpose: To evaluate prevalence and causative risk factors of dry eye in pediatric population.

Methods: It was a prospective observational study, conducted in 500 patients (1000 eyes), who visited at outpatient department of pediatric ophthalmology of our tertiary eye care center. All patients were screened for ocular surface disease index. Of those, having score >13 were further evaluated for the dry eye tests. The 60 eyes of 30 patients were selected and studied for the causes, types of dry eye.

Abstract

Results: Out of 500 out patients, 30 patients (60 eyes) have >13 score, with clinically proven bilateral dry eye. The most commonly affected age group was 7-18 years. The most common association were Vernal Kerato-Conjunctivitis (VKC), Meibomian Gland Dysfunction (MGD) & Computer Vision Syndrome (CVS)- as over use of mobile.

Conclusion: The evaporative dry eye due to MGD & CVS is common in pediatric age group, while the aqueous deficiency dry eye is not so. The use of mobiles, tablets, computers leads to increase the rate of dry eye in children, which also affect the outdoor activity, study of child & child over all development.

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Keywords: Dry eye, allergic conjunctivitis, ocular surface disorders.

Introduction

Dry eye is a multifactorial disease of the ocular surface characterized by loss of homeostasis of the tear film, and accompanied by ocular symptoms in which tear film instability and hyperosmolarity, ocular surface inflammation and neurosensory abnormalities play etiological roles.¹

In the paediatric population, dry eye to be noticed much less frequently in general practice but it should be taken seriously when parents bring their children with sign and symptoms. Little data is available on the prevalence of dry eye in the population under age 18, but it is known to occur in the children due to variety of causes. Many cases of dry eye in children show the presence of systemic causes (for example Steven Jonson syndrome, Sjögren's syndrome, juvenile rheumatoid arthritis) or increased visual tasking activity (for example; computer and mobile video game use).² The causes and treatment of dry eyes in paediatric patient is something different than adult patient. Making the diagnosis of dry eye in children is not as easy as it is in adults. Kids don't complaint about their symptoms like adults.

Parents are usually notice that their child is excessive blinking or rubbing the eyes during doing study or during watching the television. In children we more likely to see dry eye exacerbated by blepharitis, ocular rosacea, Meibomian gland dysfunction or even an infection apart from allergy, Vitamin A deficiency can be another cause of dry eye in children.³

There is another recently noticed cause is more screen time. Children tend to stare at the screen when they are using the computer or playing video games. As in recent days though outdoor activity of children has been decreased and

increased screen time and indoors game with processed air can irritate children.⁴ Use of video display terminals and learning (reading and writing) for a long hour has been associated with maximum blink interval, so there is development of dry eye symptoms. Many parents notice the ocular fatigue and frequent rubbing of eyes in the child after prolonged work with video display terminals and after prolonged reading and writing.⁵

There are multiple causes behind the symptoms, so finding the specific cause and the best treatment is not as straightforward as it may seem.

Aims and Objectives

The aim of this study was to analyze prevalence and risk factor of dry eye among young population.

Material & Methods

It was a prospective, interventional study conducted at M & J western regional Institute of ophthalmology, Ahmedabad, Gujarat, during year 2016 to 2018. The total 500 patients (1000 eyes) were screened. Out of which 30 patients (60 eyes) with bilateral presentation were included.

Inclusion criteria: (1) Patients less than 18 years of age visiting the outpatient department of the M and J western regional institute, civil hospital

Exclusion criteria: (1) Patients more than 18 years of age. (2) Patient having active ocular surface disease. (3) Patients not willing to give consent. (4) Patients having the past history of surgery. (5) Presence of any other ocular diseases. (6) Patients with systemic illness.

The patients with c/o dryness, itching, grittiness were screened according to ocular surface disease index. If the score was > 13, then they were further evaluated. Apart from detailed routine eye examination in torch light and slit lamp examination, they were further evaluated for the dry eyes by performing tear film break up time, tear meniscus height and schirmer's test. We had also evaluated the patients for systemic illness and for the mobile, video game playing and computer screen use. We selected the 30 patients with bilateral presentation after screening. We examined the 60 eyes of 30 patients. We divided the patients according to age group for evaluation. Individuals who had a history of contact lens wear, topical medication, and ocular surgery within the previous 3 months, abnormalities in the cornea, conjunctiva, or eyelid, and secondary ocular diseases were excluded from this study.

Results

The 60 eyes of 30 children were included in this study, out of which 10 (33.33%) were female and 20 (66.67%) were male. We have divided the children in three age group, in which 7 (23.33%) children were in 1-6 years' age group, 16 (53.34%) were in 7-12 years' age group and 7 (23.33%) were in 13-18 years' age group. The prevalence of the dry eye was 6% (60 out of 1000 eyes) in our study. The prevalence of dry eyes was highest in age group of the 7-12 years (53.34%), while 23.33% in age group of 1-6 years and 13-18 years.

The Table-1 shows the distribution of risk factors of dry eyes among the age groups.

In risk factor association, the MGD (Meibomian gland dysfunction) was present in 11 eyes of 7-12 years of age, and all 11 (100%) eyes were having dry eyes. The 52 eyes were found to have vernal keratoconjunctivitis. Among this 52 eyes, 29 (55.76%) eyes showed the evidence of dry eyes. The 52 eyes were found to have prolonged exposure to computer screen and history of smartphone use. Among these 52 eyes, 28 (53.84%) eyes showed the evidence of dry eyes. (Table-2) The average tear film breaks up time (TBUT) was 8 seconds in 1-6 years & 13-18 years of age group, while 6 seconds in 7-12 years.

Table 1: Distribution of risk factors among the age groups

Age Group (Years)	Total No. of affected eyes	Risk Factors Distribution			
		60 (100%)	VKC	Mobile Users	Computer Users
1-6	14 (23.33%)	14 (100%)	6 (43%)	6 (43%)	0 (0%)
7-12	32 (53.34%)	24 (75%)	32 (100%)	32 (100%)	11 (34%)
13-18	14 (23.33%)	14 (100%)	14 (100%)	14 (100%)	0 (0%)

Table 2: Association of Risk factors with Dry eye

Risk Factor	Total Eyes affected	Dry eye preset	Dry eye (percentage)
MGD	11	11	100
VKC	52	29	55.79
Computer & Smart Phone User	52	28	53.84

The GRAPH-1 shows the mean value of schirmer's test among the age groups.

The mean tear meniscus height was 0.26mm in 1-6 years, 0.25mm in 7-12 years & 0.21mm in 13-18 years of age group. (GRAPH-2)

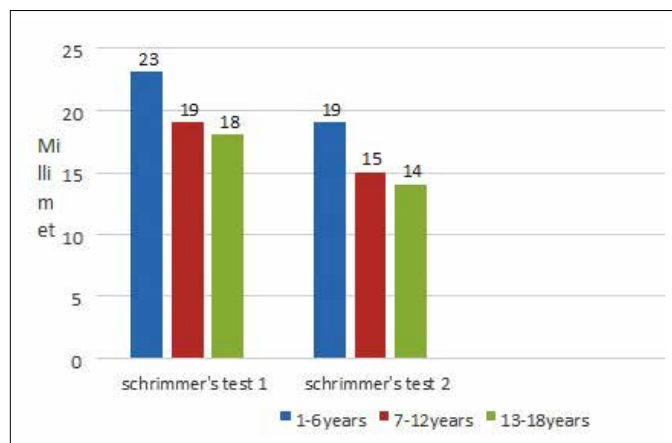


Chart 1: Mean value of schirmer's test among the age groups

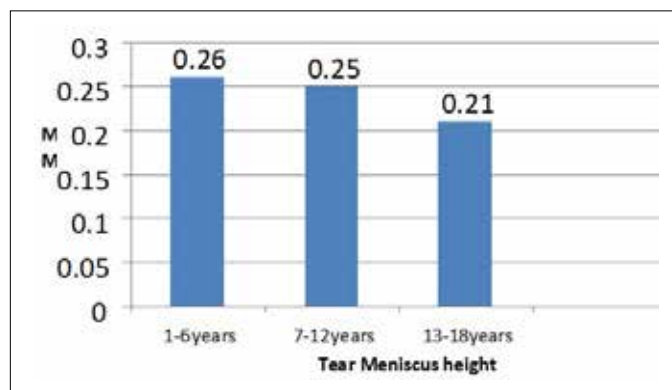


Chart 2: Mean tear meniscus height with age group distribution

Discussion

It is now well established that prevalence of dry eye is more among 1-6 years of age group. The children having dry eyes showed tear film instability rather than aqueous deficiency as seen in adult patient.

The most common risk factor was VKC (vernal keratoconjunctivitis) and mobile game playing and prolonged use of computer screen.

In our study, VKC was found in 52 eyes, among those 29 (55.79%) eyes showed the evidence of dry eyes. A single-center, prospective, case-control study conducted between May 2015 and December 2015 included 40 children, 3-6 years of age, with seasonal allergic conjunctivitis (SAC) or perennial allergic conjunctivitis (PAC) and 40 age- and gender-matched children undergoing medical healthy examination without history of allergy or dry eye as a control. The results show, the prevalence of dry eye was 97.5% (78/80 eyes) in cases and 27.50% (22/80 eyes) in controls. Mean DESS score was 4.75 ± 2.22 in the case group and 0.80 ± 1.22 in the control group (p < 0.001). Symptoms of dry eye in the case group were mild (<6). Mean tear film break-up time was

6.54 ± 1.48 seconds in the case group and 10.04 ± 1.79 seconds in the control group ($p < 0.001$). Mean FCS scores were 0.79 ± 1.34 and 0.21 ± 0.57, respectively ($p = 0.001$). The DESS score and TFBUT were both associated with the duration of allergic conjunctivitis.⁸

The retrospective cases series study finds the relationship of children allergic conjunctivitis with symptoms of dry eye. There were 30 cases (60 eyes) of children seasonal allergic conjunctivitis, and 20 cases (40 eyes) of children ametropic as control group were analyzed. All of them had no symptoms of dry eye. All subjects were inquired disease history and examined including external eyes, anterior segment, breakup time (BUT), corneal fluorescein staining (FL) and Schirmer I test (SIt). FL score was evaluated from 0 to 12, and 0 score indicated no staining of cornea. Main Outcome Measures were BUT, SIt and FL score. Results showed that BUT in allergic conjunctivitis group and in control group was (7.35±2.46) sec, (11.95±2.183) sec, respectively ($t=9.569$, $P=0.000$). SIt in allergic conjunctivitis group and in control group was (18.28±5.123) mm, (16.50±5.149) mm, respectively ($t=1.702$, $P=0.092$). The patient number of non 0 FL score in allergic conjunctivitis group and in control group was 13 cases (20 eyes), 6 cases (6 eyes), respectively ($\chi^2=4.193$, $P=0.041$). There was no significant correlation between the time length of disease and FL score, BUT in allergic conjunctivitis group. Conclusion was the correlation to dry eye in children seasonal allergic conjunctivitis even without symptom of dry eye. The decreased tear break-up time and positive fluorescent staining were the main representations. Tear film stability in allergic conjunctivitis children without symptoms of dry eye. In comparison to this study our study shows that the 90% were having children having allergic conjunctivitis among which 45% eyes were diagnosed having dry eyes.⁶

Our study shows that all the children of 7-12 years and 13-18 years age group showed the sign and symptoms of dry eyes showed the history of mobile game playing and prolonged computer screen watching. Researchers tracked 916 children, varying in age from 7 to 12 years, from urban and rural settings, through a series of assessments, generating a modified ocular surface disease index score for each child. Dry eye disease was identified in 6.6 percent of children. Of those, 97 percent reported using smartphones on average for more than 3 hours daily. Of the children without any dry eye symptoms, 55 percent used smartphones for an average of only 37 minutes daily. Moreover, those children with dry eye disease were less likely to venture outside 1.5 hours daily versus the children without symptoms, who averaged 2.3 hours daily. It also identified older, urban children (those in 4th through 6th grade) as most at risk for dry eye disease. In 2014, the overall rate of smartphone use in Korea was 83 and 89.8% in children and adolescents. The rate of smartphone use differs according to region (urban vs. rural) and age (younger grade vs. older grade). Smartphone use in children was strongly associated with pediatric DED; however, outdoor activity appeared to be protective against pediatric DED. Older-grade students in urban environments had DED risk factors (long duration of smartphone use), and a short duration of outdoor activity time. Therefore, close

observation and caution are needed when older children in urban areas use smartphones. The rate of smartphone use was 65.1% in older-grade children and 50.9% in younger-grade children ($P < 0.001$). The mean daily duration of smartphone use was longer in the DED group than controls (logistic regression analysis, $P < 0.001$, $OR = 13.07$), and the mean daily duration of outdoor activities was shorter in the DED group than controls (logistic regression analysis, $P < 0.01$, $OR = 0.33$).⁷ Twenty-eight children were included in the dry eye disease group and 260 children were included in the control group. Gender and best-corrected visual acuity were not significantly different between the two groups. Smartphone use was more common in the dry eye disease group (71%) than the control group (50%) ($P = .036$). The daily duration of smartphone use and total daily duration of video display terminal use were associated with increased risk of dry eye disease ($P = .027$ and $.001$, respectively), but the daily duration of computer and television use did not increase the risk of dry eye disease ($P = .677$ and $.052$, respectively).⁹

Conclusion

Our study shows that in the pediatric age group, the aqueous deficiency is least likely to occur. There is decreased tear film break up time with normal schirmer's test and tear meniscus height. The prevalence of dry eye was 6%, of which 7-12 years' age group shows highest prevalence than others age group. In 1-6 years' age group, VKC (vernal keratoconjunctivitis) was found to be a most common risk factor causing dry eye, while in 7-12 years' and 13-18 years' age group-the mobile game playing and prolonged use of computer screen.

References

1. Craig JP, Nichols KK, Akpek EK, Caffery B, Dua HS, Joo CK, et al. TFOS DEWS II Definition and Classification Report. *The Ocular Surface Journal*, 2017; 15(3):276-283.
2. Eva-Marie Chong, Mona Harissi- Dagher and Reza Dana. Wetting of the ocular surface and dry eye disorders. Albert & Jakobiec's Principles and practice of ophthalmology. Third edition, chapter 57; 773-777.
3. Chaudhuri Z, Kusumesh R, Shweta S, Iyer GK, Vinathi M. Tear Film dysfunction. Dry eye Disease-Postgraduate Ophthalmology. Japee-Highlights, volume 1; chapter 6.8.2; 596-606.
4. Granet. Dry eye diagnosis in the children takes some detective work. The Eye world. Ophthalmology news by Vanessa Caceres eye world contributing writer. 2013.
5. John Pietrantonio. Children and dry eye- Kids may often cry, but that doesn't mean their eyes are never dry. *Review of optometry*, 2009.
6. Ousler GW 3rd, Hagberg KW, Schindelar M, Welch D, Abelson MB. The ocular protection index. *Cornea*, 2008; 27(5):509-13.
7. Moon JH, Kim KW, Moon NJ. Smartphone use is a risk factor for pediatric dry eye disease according to region and age: a case control study. *BMC Ophthalmol* 16, 2016; 188.
8. Chen L, Pi L, Fang J, Chen X, Ke N, Liu Q. High Incidence Of Dry Eye In Young Children With Allergic Conjunctivitis In Southwest China. *Acta Ophthalmologica*. 94(8):727-730.
9. Moon JH, Lee MY, Moon NJ. Association Between Video Display Terminal Use and Dry Eye Disease in School Children displayed. *Journal of Paediatric Ophthalmology and Strabismus*, 2014; 51(2):87-92.

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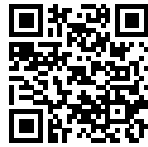
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