



Passive Smoking as a Risk Factor for Dry Eye in Children

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Abstract

Introduction: To find an association of passive smoking with dry eye in children

Methodology: Cross-sectional study, all children presenting with eye discomfort were eligible. After applying exclusion criteria, children were assessed and graded for severity of dry eye based upon history and sequential testing- Tear film Break Up time (TBUT), Corneal examination by fluorescent staining, Schirmer-I test. Passive smoking was evaluated based upon questionnaire and recall method.

Results: Out of 250 children reported with eye discomfort, 100 were eligible for study. 70/100 children were diagnosed with dry eye. Passive smoking was evaluated using two parameters- number of cigarette smoked per day and exposure to smoke per day; both the factors showed strong association with dry eye as compared to non dry eye (0.66 ± 2.1 vs 18.7 ± 11.2 , $p < 0.0001$) and (0.9 ± 2.88 vs 9.5 ± 5.2 , $p < 0.0001$) respectively.

Conclusion: Passive smoking represents a significant risk factor of dry eye in children.

Keywords: Passive smoking, dry eye, eye discomfort.

Introduction

Dry eye has been defined as “Dry eye is a multifactorial disease of the tears and ocular surface that results in symptoms of discomfort, visual disturbance, and tear film instability with potential damage to the ocular surface. It is accompanied by increased osmolarity of the tear film and inflammation of the ocular surface”.⁽¹⁾ In active smoker, it is known that chronic smoking has a negative effect on the ocular surface and affects some tear characteristics.⁽²⁾ Furthermore, meta-analysis has shown that smoking strongly associated with dry eye in general population (OR=1.50; 95% CI: 1.08-2.09; P=0.016).⁽³⁾ Children are exposed to passive tobacco smoke if either of their parents smokes. The literature

regarding the effect of passive smoke on children is limited and no study has been done in our region.

Methodology

The cross-sectional study was conducted in outpatient department, from September 2017 to February 2018 in the Department of Ophthalmology, Government Medical College Jammu. Children with age group 5-18 years presenting with eye discomfort were eligible for study. Exclusion criteria were: active smokers, conjunctivitis, contact lens users, history of ocular surgery in the last 6 months, systemic diseases such as diabetes mellitus and collagen disorders, those with atopy or allergic diseases, drugs such

as antihistaminics and atropine with its similar agents, and children with refractive errors.

In all included children, detailed history regarding degree and pattern of exposure to passive smoke and baseline demographic data was recorded in pre-structured performa. These children were subjected to detailed ophthalmic examination with emphasis on test for ocular dryness. The test was done in sequence to avoid any error due to reflex tearing; sequence followed was:

1. Tear film Break Up time (TBUT): A fluorescein paper was put in the lower fornix and child was asked to blink. The interval between the last complete blink and the appearance of the first corneal black spot in the stained tear film was measured.^(4, 5)
2. Corneal examination by fluorescent staining.
3. Schirmer-1 test to assess basic secretion: Topical anesthetic was used bilaterally. Standardized strips of filter paper were placed in the lateral canthus away from the cornea and left in place for 5 min with the eyes closed. Readings were recorded in millimetres of wet strip.

The severity of dry eye was assessed using the Dry Eye Severity grading scheme by Behrens et al.⁽⁶⁾ TBUT value of less than 10 seconds and Schirmer-1 test value of less than 5 mm were considered as abnormal and used to define Dry eye

Quantitative variables were expressed as mean ±SD, and whereas qualitative variables were given as numbers and percentage. Student's t-test was used to assess the statistical significance of differences between two groups. Descriptive statistics was done using chi-square analysis. Correlation analysis was performed by calculating Pearson correlation coefficient (r). Data analysis was done using IBM-SPSS v.20 and Microsoft Excel.

Results

A total of 250 children presented with eye discomfort to the Outpatient department. After applying the exclusion criteria 150 children were excluded. 100 children were enrolled and tests

were applied. Baseline demographic data is given in Table 1.

Seventy children were diagnosed to have dry eye. The comparison of characteristics between dry eye and non dry group is given in

Table 2. The number of cigarettes smoked per day and duration of exposure to smoke was significantly higher in dry eye group as compared to non dry eye.

Dry eye score was correlated with risk factors

Table 3. Significant positive correlation was observed number of cigarette smoked and duration of exposure

Table 1: Baseline demographic data

Characteristics	
Age in years (mean ± sd)	8.12 ±2.24
Male	65/100
Body Mass Index	22.6 ± 3.1
Number of cigarette smoked per day (mean ± sd)	18.2 ± 7.2
Duration (in hours) of smoke exposure per day(mean ± sd)	6.1 ± 3.5

Sd: standard deviation

Table 2: Comparison of Characteristics between Non dry and dry eye

Parameter	Non Dry eye (n=70) Mean ± sd	Dry eye (n=30) Mean ± sd	P-value
Age	8.5 ± 3.5	7.9 ± 2.5	0.19
Body Mass Index	22.8 ± 3.7	22.0 ± 3.9	0.83
Number of cigarettes smoked per day	0.66 ± 2.1	18.7 ± 11.2	<0.0001
Duration (hours) of smoking exposure per day	0.9 ± 2.88	9.5 ± 5.2	<0.0001

Sd: standard deviation

Table 3: Correlation between dry eye score and various parameters

Parameter	Dry eye score (r)	P-value
Age	-0.34	0.75
Body mass index	0.18	0.45
Number of cigarettes smoked per day	0.68	<0.0001
Duration (in hours) of smoking exposure per day	0.62	<0.0001

Discussion

The majority of children presented with eye discomfort had dry eye on evaluation (70%). Similarly results were obtained by study by El Shazly et al.⁽⁷⁾ Many risk factors are associated with pediatric dry eye which includes congenital, autoimmune, endocrine, and inflammatory disorders, or under certain environmental and nutritional conditions.⁽⁸⁾

Body mass index was used as a surrogate marker for nutritional status in children. It not significantly associated with dry eye. Other significant associations were number of cigarettes smoked per day and duration of smoke exposure. Similar results were obtain by study by El Shazly et al.⁽⁷⁾

Active smoke has been shown to be associated with dry in various studies.⁽⁹⁻¹⁵⁾ A recent meta analysis also showed similar results.⁽³⁾ The role of passive smoked in children has not been studied well. Our studied showed that passive smoke is strongly associated with dry eye.

Our study had a limitation, that assessment of passive smoking was based on questionnaire and recall method. These may suffer from recall bias. We could not get the biochemical evidence of nicotine exposure due to lack of finding. Further studies showing association of biochemical evidence of smoking with dry eye is warranted.

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