

# Practice of Ocular Hygiene and Risk for Ocular Disorders among Undergraduate Students of Mangaluru, Karnataka, India: A Cross-sectional Study

MK ARUN<sup>1</sup>, HEZIL REEMA BARBOZA<sup>2</sup>, K PAVITHRA<sup>3</sup>, PS SREEKANTH<sup>4</sup>

## ABSTRACT

**Introduction:** The eyes are the most precious human organ for the function of vision, expression and beauty. Good vision contributes to improved athletic ability, better driving skills, improved learning, comprehension and better quality of life. Eye helps to participate in occupation, hobbies, and even to perform most everyday tasks.

**Aim:** To assess the practice of ocular hygiene and the risk for ocular disorders among undergraduate students in a selected college in Southern India.

**Materials and Methods:** A cross-sectional study was conducted in Department of Medical Surgical Nursing, Yenepoya Nursing College, Mangaluru, Karnataka, India from October 2021 to September 2022. It was conducted among 178 subjects recruited by convenience sampling technique. Undergraduate students between the age group of 18-24 years were selected as study participants. Students who underwent special training in ocular hygiene were excluded from the study. One time data was collected using demographic proforma, ocular hygiene practice scale and risk assessment checklist for ocular disorders.

Participants were required to take 30 minutes to complete the data collection questionnaires. The collected data was coded and transformed into a master data sheet for statistical analysis. Data was analysed by descriptive and inferential statistics.

**Results:** The results of the present study showed that 47 (26.4%) of the students had very good practice and 124 (69.7%) of them had good practice of ocular hygiene. The results of risk assessment for ocular disorders showed that 146 (82%) had low-risk and a very less percentage 3 (1.7%) of them had a high-risk for the development of ocular disorders. There was a significant association between practice scores and demographic characteristics such as age ( $p$ -value=0.04) and using eye accessories ( $p$ -value=0.03).

**Conclusion:** In this study, there was a negative correlation between practices of ocular hygiene and risk for ocular disorders among undergraduates. Vision impairment and eye conditions are associated with poor quality of life. An initiative can be taken to improve the practice of ocular hygiene to reduce the risks for ocular disorders among undergraduates.

**Keywords:** Eye disorders, Quality of life, Vision impairment

## INTRODUCTION

Visual disability can particularly decrease well-being and prosperity. It can influence an individual's capacity to perform regular activities, expanding the danger of falls and injury. These impacts decrease the individual's autonomy and are frequently joined by seclusion, sorrow and more unfortunate social connections [1-3]. Eye contaminations can be brought about by bacterial, viral or other microbiological agents. Diseases can influence the eyelids, the cornea and even the optic nerve. Individuals who wear contact lens focal points may have a higher danger of contamination with *acanthamoeba keratitis* [4-6]. Various factors have been proposed to cause eye infections and the most well-known elements are smoking, alcoholism and diet. Trachoma is the world's leading cause of infectious blindness [7]. The World Health Organisation (WHO) has endorsed the SAFE Strategy to eliminate blindness due to trachoma by 2020 through "Surgery," "Antibiotics," "Facial cleanliness," and "Environmental improvement" [8,9]. Dry eye and meibomian gland dysfunction are largely modern diseases, has recently increased in incidence and an important public health problem. Although, proper eyelid care will ensure the health of the ocular surface and prevents multiple ocular disorders [10-14].

The practice of ocular hygiene is very important in our daily life. Ocular hygiene refers to the initiation and maintenance of hygienic measures to prevent any kind of infection and spread of infection and for the good health of the eyes. Ocular hygiene habits such as hand-washing will protect the eye from bacteria, viruses, and

illness. Poor ocular hygiene practices can lead to contamination with microorganisms. These microorganisms can cause ocular infections [15-17].

The unhealthy practices of ocular hygiene lead to irritation, dryness, discomfort, grittiness, redness, inflamed eyelids, itchiness and visual problems. Globally, dry eye and meibomian gland dysfunction are modern diseases due to very poor ocular hygiene practices. Unhealthy behaviours, such as low diet quality, low physical activity, smoking and heavy drinking are modifiable factors that may contribute to the primary prevention of visual impairment. Indeed, in the past 20 years, epidemiological studies have highlighted that low dietary intake of antioxidants and omega-3 fatty acids, low physical activity and smoking, were associated with an increased risk of eye diseases [18,19]. However, very few studies have examined the global impact of unhealthy behaviours on vision. Conjunctivitis and refractive errors were very much seen in children. Due to lack of awareness and poor personal hygiene children suffer from ocular disorders which affect their personal and professional life [20-23].

The primary objective of the study was to assess the practice of ocular hygiene and to determine the risk for ocular disorders among undergraduate students. Other objective was to find the correlation between the practice of ocular hygiene and risk for ocular disorders. The association between the practices of ocular hygiene, risk for ocular disorders and selected demographic variables were also was assessed.

## MATERIALS AND METHODS

It was a cross-sectional study which was conducted in Department of Medical Surgical Nursing, Yenepoya Nursing College at Mangaluru, Karnataka, India from October 2021 to September 2022. The research protocol was approved by the Scientific Review Board (SRB) and Institutional Ethics Committee (IEC) (Approval number: YEC2/800 dated 04/10/2021). Informed consent was obtained from all participants before the study. Formal written permission was obtained from the administrative authorities of the college. Subjects were informed about the nature and purpose of the study before the data collection and informed consent was obtained.

**Inclusion criteria:** Undergraduate students between the age group of 18-26 years were included in the study.

**Exclusion criteria:** Students who underwent special training and certification in ocular hygiene were excluded from the study.

**Sample size calculation:** The participants were selected using a convenient sampling technique. A sample size of 178 was considered.

In the present study, practice of ocular hygiene refers to the response given by the undergraduate students regarding the daily hygienic activities performed to minimise eye infections which was measured by a self-reported practice checklist. Risk for ocular disorders refers to the identification of risk factors that have the potential to cause eye disorders such as hygienic practices, sleep hygiene, tobacco use, alcohol consumption, nutrition, infections, and injury and medication side-effects [24].

### Study Procedure

The practice of ocular hygiene and risk assessment for ocular disorders checklist was prepared based on the objectives of the study. It was developed after a review of the literature on relevant topics and discussion, validation and suggestion by an ophthalmologist [24-26]. The tool was given to seven experts for validation. Eighty percentage of agreement among experts was considered for retaining the items. Three items were modified based on the suggestions of experts. The tool was finalised with 17 items in the ocular hygiene practice checklist and 29 items in the risk assessment for ocular disorders checklist. The pretest of the tool was done on 18 samples to assess the feasibility of the tool. The tool was administered for 10 samples to assess the reliability. The reliability coefficient was assessed using the test-retest method. The calculated reliability of the ocular hygiene practice tool was 0.78 and the risk assessment checklist was 0.8, respectively.

The tools used to collect the information were demographic proforma, ocular hygiene practice scale and risk assessment checklist for ocular disorders. Demographic proforma for obtaining information regarding age, gender, education qualification, type of family, family income, place of residence, dietary pattern, presence of any eye disorders/infections, previous knowledge on practices of ocular hygiene, using eye accessories. The ocular hygiene practice checklist consisted of 17 items regarding ocular hygiene practice was graded as very good (11-17), good (6-10) and fair (<5) after consultation with a statistician for the purpose of this study. The risk assessment checklist for ocular disorders consisted of 29 questions regarding risk factors and symptoms of ocular diseases. The respondents were asked to provide a "yes" or "no" response for both the tools. "Yes" response was given 1 score and "no" as 0. The scores were graded as low-risk (<10), moderate risk (11-19) and high-risk (20-29) after consultation with a statistician for the purpose of this study for the development of ocular disorders.

## STATISTICAL ANALYSIS

The collected data was coded and transformed into a master data sheet for statistical analysis. Demographic data, ocular hygiene practice, and risk assessment for ocular disorders were analysed using descriptive statistics such as frequency, percentage, mean and standard deviation. Karl Pearsons correlation coefficient was

used to correlate the ocular hygiene practice and risk for ocular disorders. The Chi-square test was used to find the association between the ocular hygiene practice and risk assessment for ocular disorders with selected demographic variables.

## RESULTS

[Table/Fig-1] depicts the sample characteristics of the subjects. Most of the subjects 95 (53.4%) belonged to the age between 18-20 years and majority 164 (92.1%) were females.

Demographic characteristics	N (%)
<b>Age (years)</b>	
18-20	95 (53.4)
21-23	80 (44.9)
24-26	3 (1.7)
<b>Gender</b>	
Male	14 (7.9)
Female	164 (92.1)
<b>Education qualification</b>	
1 <sup>st</sup> year	58 (32.6)
2 <sup>nd</sup> year	78 (43.8)
3 <sup>rd</sup> year	42 (23.6)
<b>Type of family</b>	
Joint family	12 (6.7)
Nuclear family	166 (93.3)
<b>Family income (Rs)</b>	
≤25000	34 (19.1)
25001-50000	52 (29.2)
50001-1,00,000	61 (34.3)
>1,00,001	31 (17.4)
<b>Place of residence</b>	
Day scholar	17 (9.6)
Hostel	161 (90.4)
<b>Dietary pattern</b>	
Vegetarian	9 (5.1)
Non vegetarian	169 (94.9)
<b>Presence of any eye disorders/infections</b>	
Yes	38 (21.3)
No	140 (78.7)
<b>Previous knowledge of practices of ocular hygiene</b>	
Yes	64 (36)
No	114 (64)
<b>Using eye accessories</b>	
Yes	54 (30.3)
No	124 (69.7)

**[Table/Fig-1]:** Distribution of demographic characteristics of students (N=178). The data represented is the frequency with percentage

**Ocular hygiene practice of undergraduate students:** The majority 124 (69.7%) of the undergraduates had good, 47 (26.4%) had very good and 7 (3.9%) had fair ocular hygiene practice. [Table/Fig-2] reflects the item-wise description of ocular hygiene practices which was assessed using a self-reported checklist.

**Risk assessment for ocular disorders undergraduate students:** [Table/Fig-3] shows the frequency and percentage distribution of risk factors. The results of risk assessment scores revealed that the majority 146 (82%) of the students had low-risk, 29 (16.3%) had moderate whereas 3 (1.7%) had a high-risk of developing ocular diseases. [Table/Fig-4] depicted that there was a negative correlation between practices of ocular hygiene and risk assessment for ocular disorders. Hence results showed good ocular hygiene practices reduce the risk of development of eye infections.

S. No.	Statements	Yes n (%)	No n (%)
1.	I wash my hands before and after touching the eyes	103 (57.9)	75 (42.1)
2.	I take a healthy diet for better vision	110 (61.8)	68 (38.2)
3.	I use running water to wash my eyes	160 (89.9)	18 (10.1)
4.	I wear sunglasses while in the sun	18 (10.1)	160 (89.9)
5.	I wash my eyes in the morning when I wake up	173 (97.2)	5 (2.8)
6.	I wash my eyes before sleeping	138 (77.5)	40 (22.5)
7.	I rub my eyes when my eyes are itching	147 (82.6)	31 (17.4)
8.	I use eye drops without a doctor's consultation	14 (7.9)	164 (92.1)
9.	I use a personal towel to wipe my eyes	123 (69.1)	55 (30.9)
10.	I use eye cosmetics	88 (49.4)	90 (50.6)
11.	I spend more time watching TV, computer, mobile	58 (32.6)	120 (67.4)
12.	I consult a doctor for regular eye check-ups	40 (77.5)	138 (22.5)
13.	I eat too much junk food and usually avoid a staple diet	52 (29.2)	126 (70.8)
14.	I consume a balanced diet of fruits, green leafy vegetables	95 (53.4)	83 (46.6)
15.	I sleep for atleast 7 hours a day	113 (63.5)	65 (36.5)
16.	I wear contact lenses while sleeping	5 (2.8)	173 (97.2)
17.	I drink 1.5- 2 L of water every day	111 (62.4)	67 (37.6)

**[Table/Fig-2]:** Description of ocular hygiene practice of undergraduate students N=178. The data represented is the frequency with percentage

S. No.	Presence of risk factors	Yes n (%)	No n (%)
1.	Family history of eye disorders	67 (37.6)	111 (62.4)
2.	History of eye infections	49 (27.5)	129 (72.5)
3.	Alcohol consumption	0	178 (100)
4.	History of smoking	1 (0.6)	177 (99.4)
5.	Presence of diabetes mellitus	2 (1.1)	176 (98.9)
6.	Presence of hypertension	4 (2.2)	174 (97.8)
7.	Overweight	19 (10.7)	159 (89.3)
8.	Foreign body sensation	22 (12.4)	156 (87.6)
9.	Previous eye injury	5 (2.8)	173 (97.2)
10.	Previous eye surgery	7 (3.9)	171 (96.1)
11.	>10 min exposure to sunlight	61 (34.3)	117 (65.7)
12.	Use of eye cosmetics	80 (44.9)	98 (55.1)
13.	Use of contact lenses	8 (4.5)	170 (95.5)
14.	Dryness in the eyes	18 (10.1)	160 (89.9)
15.	Screen time of more than 6 hours in a day	96 (53.9)	82 (46.1)
16.	Spending prolonged periods focusing on close objects such as reading	92 (51.7)	86 (48.3)
17.	Sensitivity to chemicals found in make-up	40 (22.5)	138 (77.5)
18.	Pre-existing skin conditions-skin infections, dandruff	89 (50)	89 (50)
19.	Intense burning in the eyes	20 (11.2)	158 (88.8)
20.	Presence of symptoms: Blurr vision	33 (18.5)	145 (81.5)
21.	Headache	101 (56.7)	77 (43.3)
22.	Nausea and vomiting	31 (17.4)	147 (82.6)
23.	Redness of the eyes	18 (10.1)	160 (89.9)
24.	Seeing halos around lights	19 (10.7)	159 (89.3)
25.	Eye pain	28 (15.7)	150 (84.3)
26.	Light sensitivity	55 (30.9)	123 (69.1)
27.	Eye strain	64 (26)	114 (64)
28.	Excessive tearing	21 (11.8)	157 (88.2)
29.	Discharge from eyes	12 (6.7)	166 (93.3)

**[Table/Fig-3]:** Risk assessment for ocular disorders among undergraduate students N=178. The data represented is the frequency with percentage

**Association of practice score of ocular hygiene and risk assessment scores with the selected demographic variables:** There was a significant association between practice score and

Variables	r value	p-value
Practices of ocular hygiene	-0.13	0.08
Risk for ocular disorders		

**[Table/Fig-4]:** Correlation between practices of ocular hygiene and risk assessment for ocular disorders. The statistical test used: Karl Pearson's Correlation Coefficient. Level of significance: p<0.05 \*significant p<0.05

demographic characteristics such as age (p-value=0.04), and using eye accessories (p-value=0.03) [Table/Fig-5]. There was a significant association between risk assessment score and demographic variables such as place of residence (p-value=0.03), and presence of any eye disorders/infections (p-value=0.01) [Table/Fig-6].

Demographic variables	Median		χ <sup>2</sup>	p-value
	≤9	>9		
<b>Age (years)</b>				
18-20	48	47	4.50	0.04*
21-23	53	27		
24-26	02	01		
<b>Gender</b>				
Male	07	07	0.38	0.36
Female	96	68		
<b>Education qualification</b>				
1 <sup>st</sup> year	31	27	0.93	0.81
2 <sup>nd</sup> year	46	32		
3 <sup>rd</sup> year	23	19		
<b>Type of family</b>				
Joint family	06	06	0.32	0.56
Nuclear family	97	69		
<b>Family income (Rs)</b>				
≤25000	18	16	2.16	0.53
25001-50000	27	25		
50001-1,00,000	39	22		
>1,00,001	19	12		
<b>Place of residence</b>				
Day scholar	07	10	2.14	0.14
Hostel	96	65		
<b>Dietary pattern</b>				
Vegetarian	04	05	0.70	0.40
Non vegetarian	99	70		
<b>Presence of any eye disorders/infections</b>				
Yes	19	19	1.22	0.26
No	84	56		
<b>Previous knowledge on practices of ocular hygiene</b>				
Yes	35	29	0.41	0.52
No	68	46		
<b>Using eye accessories</b>				
Yes	25	29	4.25	0.03*
No	78	46		

**[Table/Fig-5]:** Association of practices of ocular hygiene with the selected demographic variables N=178. The statistical test used: χ<sup>2</sup> test. Level of significance: p<0.05 \*significant p<0.05

Demographic variables	Median		χ <sup>2</sup>	p-value
	<5	>5		
<b>Age (years)</b>				
18-20	57	38	2.67	0.10
21-23	45	35		
24-26	1	2		

Gender				
Male	11	3	2.67	0.10
Female	92	72		
Education qualification				
1 <sup>st</sup> year	30	28	4.09	0.25
2 <sup>nd</sup> year	44	34		
3 <sup>rd</sup> year	29	13		
Type of family				
Joint family	7	5	0.00	0.97
Nuclear family	96	70		
Family income (Rs)				
≤25,000	22	12	2.900	0.40
25,001-50,000	30	22		
50,001-1,00,000	37	24		
>1,00,001	14	17		
Place of residence				
Day scholar	14	03	4.62	0.03*
Hostel	89	72		
Dietary pattern				
Vegetarian	05	04	0.02	0.88
Non vegetarian	98	71		
Presence of any eye disorders/infections				
Yes	13	25	11.08	0.01*
No	90	50		
Previous knowledge on practices of ocular hygiene				
Yes	37	27	0.01	0.99
No	66	48		
Using eye accessories				
Yes	26	28	3.00	0.08
No	77	47		

**[Table/Fig-6]:** Association of risk assessment of ocular disorder score with selected demographic variables N=178. The statistical test used:  $\chi^2$  test. Level of significance: p <0.05 \*significant p<0.05

## DISCUSSION

The present study revealed that students had good practice on ocular hygiene among undergraduate students. These results are supported by an online survey study conducted to assess public awareness of daily eyelid hygiene habits in Saudi Arabia. This revealed that 42.7% of the participants spent time each day focusing on screens (computer, smart phone, and television) [15]. A study was conducted by Azuamah YC et al., to assess the external eye infections and personal hygiene practices among patients attending optometry at Owerri and showed most common external eye infection observed was bacterial conjunctivitis. *Staphylococcus aureus* was the common causative organism and most individuals do not follow basic hand washing procedures [26]. Another study was conducted to assess the eye problems and risk factors encountered by patients in intensive care units and to evaluate the eye care awareness of healthcare workers in these units in Turkish. Dry eye was detected in 30 (32.3%) patients and various corneal disorders were detected in 18 patients (19.35%). The eyelid hygiene was adequate in 78 patients (83.9%) and inadequate in 15 patients (16.1%). Eye care awareness by providing eye care training to healthcare professionals is important to prevent the emergence of eye diseases [27]. This study reports majority 146 (82%) of the students had low-risk, 29 (16.3%) had moderate whereas 3 (1.7%) had a high-risk of developing ocular diseases. Another randomised control study, showed the impact of eyelid hygiene on the ocular surface and vision-related quality of life among operating room staff. It revealed that eyelid hygiene improves the ocular surface and tear film quality with reduced ocular symptoms and better vision-related quality of life in this population [28].

A focus group discussion for parents and grandparents as part of a population-based survey of ocular morbidity in a rural south Indian population in Madurai yielded five broad areas of interest relating to awareness and attitudes towards eye problems in children, a specific eye disease in children, vision problem in children, existing health practices, and vision impairment. The discussion raises several issues of relevance that eye care programs need to address for better community involvement [29]. An online survey study was conducted to assess public awareness of daily eyelid hygiene habits in Saudi Arabia. At least one ocular symptom was reported by 98.1% of the respondents. It revealed that the level of awareness of eyelid hygiene in Saudi Arabia was found to be suboptimal, particularly among patients with dry eyes. Poor knowledge about the benefits of daily eyelid hygiene was the primary barrier to its practice [15]. Similarly in the present study, 114 (64%) of students had no knowledge on practices of eye hygiene. A recent study reported the use of contact lenses; allergies and devices for studying purposes were associated with higher risk for eye disorders in medical students [30]. Comparative analysis of ocular hygiene practice and risk factors for ocular disorders among different categories of population has been done in [Table/Fig-7] [31-34].

Authors	Place, publication year	Sample size	Tools used	Outcomes of the study
Noertjojo K et al., [33]	Canada, 2006	882 adults	Self-administered questionnaires	Loss of vision was reported as a major medical concern. There was a little understanding of the risk factors for different eye diseases among adults.
Ko KK et al., [31]	Myanmar, 2019	414 elderly population	Structured questionnaires	Knowledge level indicated good (88.4%), and practice level (27.1%) were noticeably low among older peoples.
Zhao M et al., [32]	Punjab, Pakistan, 2019	2073 general population	Knowledge, attitude and practice questionnaire	21.5% had an eye examination atleast once a year. Practice regarding the eye examination was positive.
Xulu-Kasaba Z et al., [34]	South Africa, 2021	101 Human Resources for eye Health (HReH) and their managers	Likert-scaled questionnaires	Eye health managers have poorer knowledge and practices of eye health than the HReH.
Present study	India, 2023	178 undergraduate students	Ocular hygiene practice checklist and risk assessment for ocular disorders checklist	Undergraduates had good practice of ocular hygiene. Majority had low-risk and a very less percentage (1.7%) had a high-risk. Negative correlation was found between practices and risk for ocular disorders.

**[Table/Fig-7]:** Comparative analysis of ocular hygiene practice and risk factors for ocular disorders among different categories of population [31-34].

## Limitation(s)

The limitations of the study are that the practice of ocular hygiene and risk for ocular disorders was assessed with the self-reported checklists from the participants. This could lead to recall/response bias to recollect the information which hinder the accuracy of

information. Observational studies can be conducted to assess the practice of ocular hygiene among undergraduates.

## CONCLUSION(S)

The study findings showed most of the students had good practice of ocular hygiene in their daily life. Risk factors and presence of symptoms were assessed to understand the risk for ocular disorders which showed majority had low-risk and a very less percentage (1.7%) had a high-risk. There was a negative correlation between practices of ocular hygiene and risk for ocular disorders among undergraduates. This highlights that good hygienic practices reduces the risk of eye infections and diseases. Ocular hygiene is the key for healthy eyes among younger generation. Early detection through eye screening; health education and access to a quality eye care facility will reduce the burden of eye disease and infections among undergraduates. Regular health awareness and screening improves the practice of ocular hygiene and reduce the risk of ocular disorders.

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### PARTICULARS OF CONTRIBUTORS:

1. Postgraduate Student, Department of Medical Surgical Nursing, Yenepoya Nursing College, Mangaluru, Karnataka, India.
2. Assistant Professor, Department of Medical Surgical Nursing, Yenepoya Nursing College, Mangaluru, Karnataka, India.
3. Assistant Professor, Department of Medical Surgical Nursing, Yenepoya Nursing College, Mangaluru, Karnataka, India.
4. Assistant Professor, Department of Medical Surgical Nursing, Yenepoya Nursing College, Mangaluru, Karnataka, India.

### NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Hezil Reema Barboza,  
Assistant Professor, Department of Medical Surgical Nursing, Yenepoya Nursing College, Yenepoya (Deemed to be University), Mangaluru-575018, Karnataka, India.  
E-mail: hezilreemabarboza@gmail.com

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