

Awareness of Dry Eye Disease among Soft Contact Lens Users: A Cross-Sectional KAP Study among Medical Students

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ABSTRACT

Background: Dry Eye Disease (DED) is a common ocular surface disorder frequently associated with soft contact lens wear. Medical students represent a high-risk group due to prolonged screen exposure and extended lens use.

Objective: To assess knowledge, attitude, and practices (KAP) regarding DED among soft contact lens–using medical students and to evaluate the association between awareness and symptom severity using the Ocular Surface Disease Index (OSDI).

Methods: This cross-sectional KAP study included 200 soft contact lens–using medical students aged 17–25 years. Data were collected using a structured questionnaire and the validated OSDI tool. Descriptive statistics were applied, and associations between awareness and OSDI severity were analyzed using the Chi-square test, with $p < 0.05$ considered significant.

Results: While 73% were aware of DED, only 54% demonstrated adequate overall knowledge. Sixty-seven percent were symptomatic ($\text{OSDI} \geq 13$), with 38% having moderate-to-severe DED. Moderate-to-severe symptoms were strongly associated with daily wear duration >8 hours (65.4%), overnight use (65.2%), and lens use >3 years (60%). Severe symptoms were more common among those unaware of DED (25.9% vs 12.3%). Despite 75% acknowledging that discomfort should not be ignored, only 24% sought ophthalmic consultation.

Conclusion: Although awareness levels were moderate, a high symptom burden and persistent risky behaviors indicate a significant knowledge–practice gap. Targeted educational programs are essential to promote safer contact lens practices and timely medical consultation.

Keywords: Dry Eye Disease, Soft Contact Lenses, Knowledge Attitude Practice, OSDI, Medical Students

INTRODUCTION

Dry Eye Disease (DED) is a common and multifactorial disorder of the ocular surface characterized by tear film instability, hyperosmolarity, inflammation, and neurosensory abnormalities. It is recognized as a significant public health concern due to its high prevalence and impact on quality of life, work productivity, and visual performance. According to the Tear Film & Ocular Surface Society (TFOS) DEWS II report, DED results from a loss of tear film homeostasis and is often accompanied by ocular symptoms such as dryness, irritation, burning sensation, redness, and fluctuating vision [1]. Globally, the prevalence of DED ranges from 5% to 50%, depending on diagnostic criteria and population characteristics [2]. In India, epidemiological studies have reported prevalence rates varying between 18% and 32%, with higher rates observed among urban populations and young adults due to increased screen time and environmental exposure [3].

Soft contact lenses (SCLs) are widely used for refractive correction and cosmetic purposes, particularly among young adults and medical students. Although contact lenses offer convenience and improved aesthetics, they are strongly associated with symptoms of dryness and discomfort. Contact lens wear can destabilize the tear film, increase tear evaporation, and induce inflammatory changes in the ocular surface, thereby contributing to contact lens–associated dry eye (CLADE) [4]. Studies have shown that up to 50% of contact lens wearers report symptoms of dryness, and discomfort remains one of the primary reasons for discontinuation of lens use [5]. This is particularly concerning among medical students, who often combine prolonged contact lens wear with extended digital device use and demanding academic schedules.

The Indian context presents unique risk factors for DED. Climatic conditions such as high temperatures, low humidity, dust exposure, and air pollution significantly contribute to tear film instability [6]. Furthermore, increasing dependence on digital devices for academic learning, especially after the COVID-19 pandemic, has amplified screen time among medical students. Prolonged digital screen exposure reduces blink rate and increases tear evaporation, thereby exacerbating symptoms of dry eye [7]. When combined with soft contact lens wear, these factors may significantly increase the risk of ocular surface disturbances.

Despite the growing burden of DED, awareness among young adults remains suboptimal. Knowledge regarding risk factors, preventive strategies, appropriate lens hygiene, and early symptom recognition is essential to prevent long-term complications. Inadequate awareness can lead to improper lens care practices, prolonged wearing time, and delayed treatment seeking, potentially resulting in corneal complications or chronic ocular surface damage [8]. Medical students, being future healthcare providers, are expected to possess adequate knowledge about common ocular conditions. However, studies have demonstrated gaps in awareness and preventive practices even among healthcare trainees [9].

Knowledge, Attitude, and Practice (KAP) studies are valuable tools in assessing awareness levels and identifying behavioral gaps within specific populations. A KAP approach evaluates what individuals know about a disease (knowledge), how they feel about it (attitude), and how they behave in response (practice). Such studies help in designing targeted educational interventions. In the context of DED among contact lens users, assessing KAP is particularly important because behavioral factors—such as sleeping with lenses, exceeding recommended wear duration, inadequate cleaning, and ignoring symptoms—play a critical role in disease development and progression [10].

In India, there is limited literature specifically evaluating awareness of DED among soft contact lens–wearing medical students. Most available studies focus on prevalence or clinical evaluation rather than awareness and behavioral aspects. Given that medical students represent a highly educated yet high-risk group due to academic stress, prolonged screen exposure, and cosmetic lens use, understanding their knowledge and practices is crucial. Additionally, as future physicians, their awareness levels can influence patient education and public health messaging related to ocular surface diseases.

Therefore, this cross-sectional KAP study aims to assess the awareness of Dry Eye Disease among soft contact lens users among medical students in India. By evaluating knowledge regarding risk factors and symptoms, attitudes toward prevention and management, and daily lens-related practices, this study seeks to identify gaps that may require targeted educational interventions. The findings may contribute to developing structured awareness programs within medical institutions to promote safe contact lens practices and early recognition of dry eye symptoms.

MATERIALS AND METHODS

This cross-sectional Knowledge–Attitude–Practice (KAP) study was conducted among undergraduate medical students at a tertiary care teaching institution. The study aimed to assess awareness, attitude, and practices regarding dry eye disease (DED) among soft contact lens users and to evaluate the association between awareness and severity of symptoms using the Ocular Surface Disease Index (OSDI).

The study was carried out over a period of three months. Medical students aged 17–25 years who were current users of soft contact lenses were included. Students who did not use contact lenses, those using rigid gas-permeable lenses, individuals with previously diagnosed ocular surface disorders unrelated to contact lens use, and those unwilling to participate were excluded.

The sample size was calculated using the formula for estimating proportion in cross-sectional studies:

$$n = Z^2pq / d^2.$$

Assuming an anticipated awareness prevalence of 50% (due to limited prior data), a 95% confidence level ($Z = 1.96$), and allowable error of 7%, the minimum required sample size was 196. Considering feasibility and potential non-response, 200 participants were included in the final analysis.

A convenience sampling method was used. Eligible students were screened using a preliminary question regarding current contact lens use. Only soft contact lens users who provided written informed consent were enrolled.

Data were collected using a structured, self-administered questionnaire divided into six sections: demographic details; contact lens usage characteristics; knowledge regarding DED; attitude toward DED; OSDI questionnaire; and practice patterns including health-seeking behavior. The OSDI questionnaire was administered verbatim without modification and assessed symptoms experienced during the preceding one week.

The OSDI score was calculated using the formula:

$$\text{OSDI} = (\text{sum of scores of all answered questions} \times 25) / \text{total number of questions answered}.$$
 Scores were categorized as normal (0–12), mild dry eye (13–22), moderate dry eye (23–32), and severe dry eye (≥ 33).

Primary outcome measures included knowledge level, attitude pattern, and severity of dry eye symptoms based on OSDI scoring. Secondary outcomes included association between awareness and symptom severity, evaluation of health-seeking behavior, and identification of gaps between preventive knowledge and actual practices.

Data were entered into Microsoft Excel and analyzed using SPSS software version 25. Descriptive statistics were expressed as frequencies and percentages for categorical variables and mean $\pm$ standard deviation for continuous variables. The Chi-square test was used to assess associations between categorical variables such as awareness status and OSDI severity categories. A p-value of less than 0.05 was considered statistically significant.

Institutional Ethics Committee approval was obtained prior to commencement of the study. Written informed consent was obtained from all participants. Confidentiality and anonymity were maintained throughout the study, and participation was entirely voluntary.

RESULTS

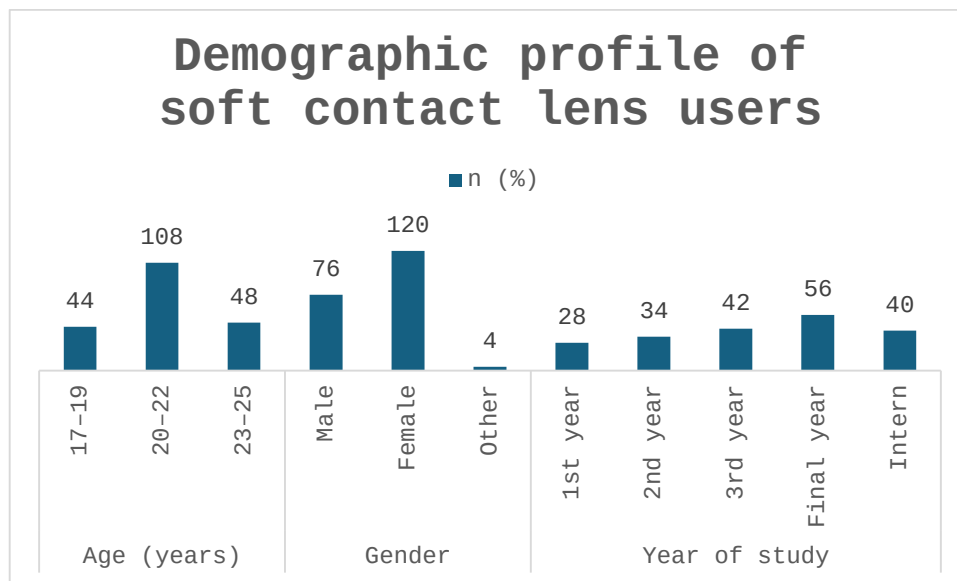
1. Demographic profile of soft contact lens users

Among 200 soft contact lens–using medical students, the majority were aged 20–22 years (54%) and female (60%), with most participants in the final year (28%) or internship (20%), indicating a predomina-

ntly young adult and senior academic cohort (Table 1).

Table 1. Demographic profile of soft contact lens users (N=200)

Variable	Category	n (%)
Age (years)	17–19	44 (22.0)
	20–22	108 (54.0)
	23–25	48 (24.0)
Gender	Male	76 (38.0)
	Female	120 (60.0)
	Other	4 (2.0)
Year of study	1st year	28 (14.0)
	2nd year	34 (17.0)
	3rd year	42 (21.0)
	Final year	56 (28.0)
	Intern	40 (20.0)



Graph 1. Demographic profile of soft contact lens users

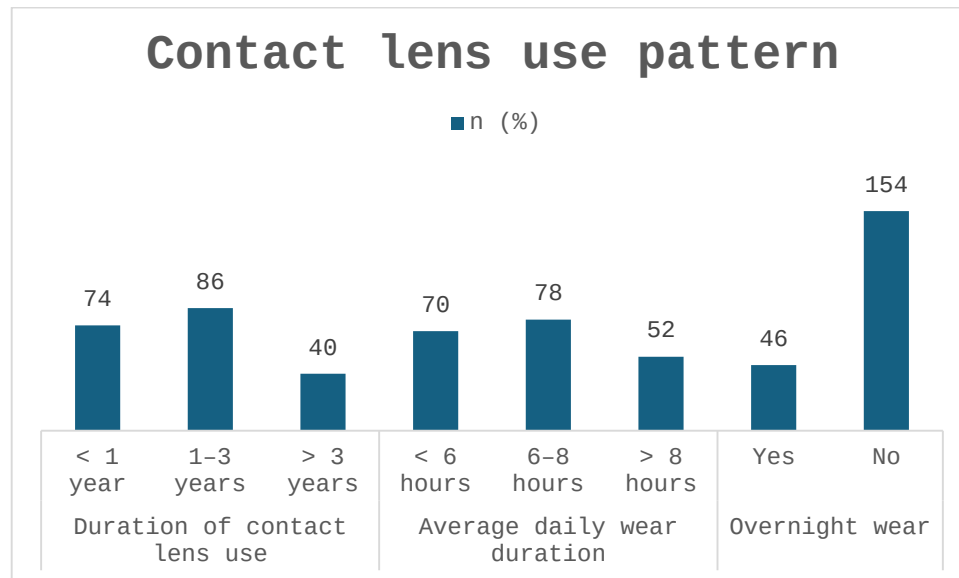
2. Contact lens use pattern

Most participants had been using contact lenses for 1–3 years (43%), wore lenses for 6–8 hours daily (39%), and 23% reported overnight wear, suggesting considerable exposure to modifiable risk behaviors (Table 2).

Table 2. Contact lens use pattern (N=200)

Variable	Category	n (%)
Duration of contact lens use	< 1 year	74 (37.0)
	1–3 years	86 (43.0)
	> 3 years	40 (20.0)
Average daily wear duration	< 6 hours	70 (35.0)

	6–8 hours	78 (39.0)
	> 8 hours	52 (26.0)
Overnight wear	Yes	46 (23.0)
	No	154 (77.0)



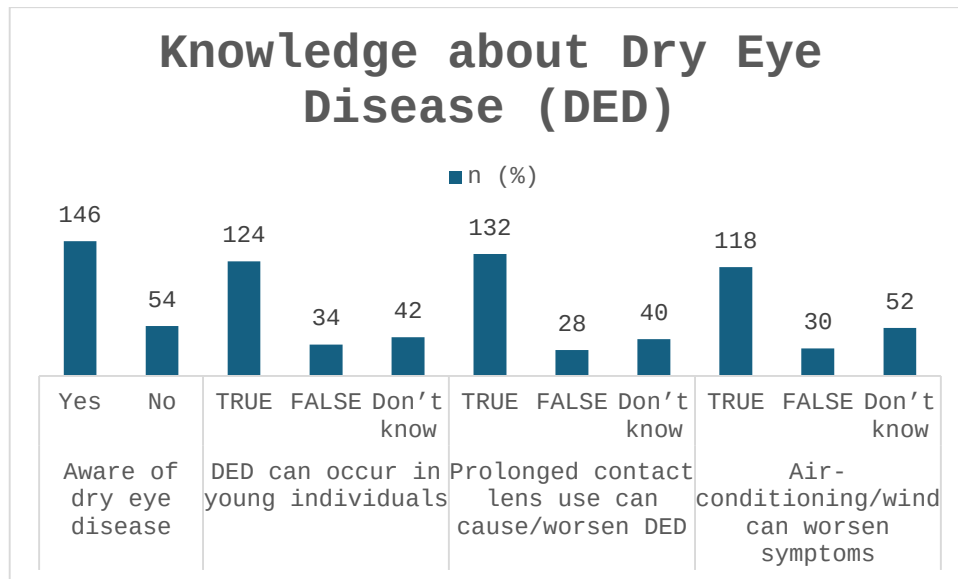
Graph 2. Contact lens use pattern (N=200)

3. Knowledge about Dry Eye Disease (DED)

While 73% were aware of DED, only 66% recognized prolonged lens use as a risk factor and 59% identified environmental triggers, indicating moderate but incomplete knowledge (Table 3).

Table 3. Knowledge about Dry Eye Disease (DED) (N=200)

Knowledge item	Response	n (%)
Aware of dry eye disease	Yes	146 (73.0)
	No	54 (27.0)
DED can occur in young individuals	True	124 (62.0)
	False	34 (17.0)
	Don't know	42 (21.0)
Prolonged contact lens use can cause/worsen DED	True	132 (66.0)
	False	28 (14.0)
	Don't know	40 (20.0)
Air-conditioning/wind can worsen symptoms	True	118 (59.0)
	False	30 (15.0)
	Don't know	52 (26.0)



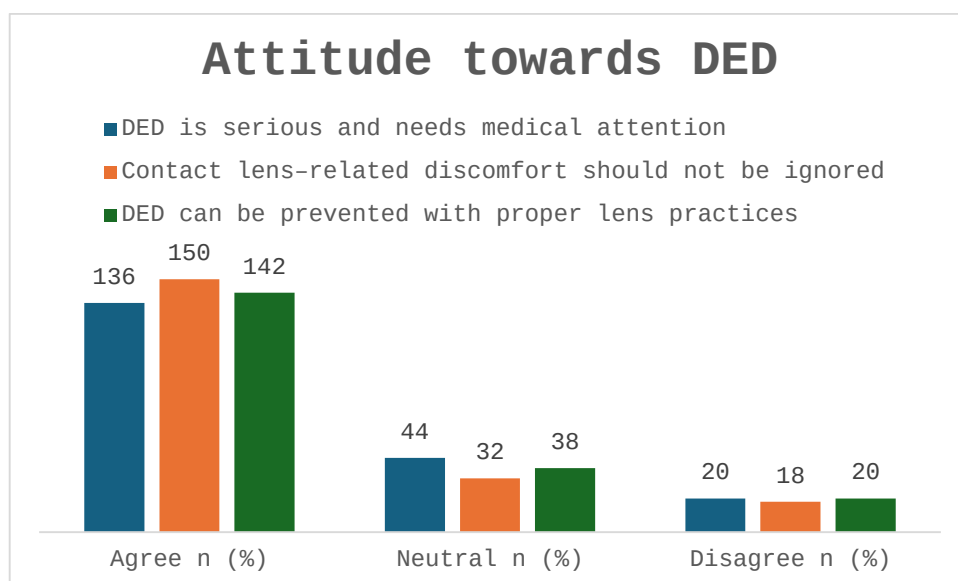
Graph 3. Knowledge about Dry Eye Disease (DED) (N=200)

4. Attitude towards DED

A majority showed a positive attitude, with 68% considering DED serious and 75% believing discomfort should not be ignored, reflecting generally favorable perceptions toward prevention and care (Table 4).

Table 4. Attitude towards DED (N=200)

Attitude statement	Agree n (%)	Neutral n (%)	Disagree n (%)
DED is serious and needs medical attention	136 (68.0)	44 (22.0)	20 (10.0)
Contact lens-related discomfort should not be ignored	150 (75.0)	32 (16.0)	18 (9.0)
DED can be prevented with proper lens practices	142 (71.0)	38 (19.0)	20 (10.0)



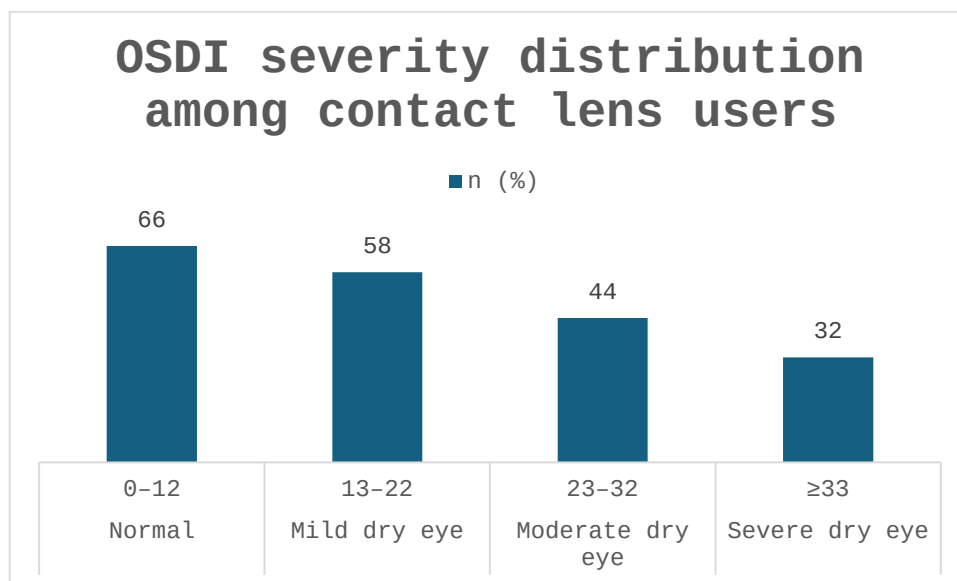
Graph 4. Attitude towards DED

5. OSDI severity distribution among contact lens users

Two-thirds (67%) of participants were symptomatic (OSDI ≥ 13), with 38% having moderate-to-severe DED, highlighting a substantial symptom burden among lens users (Table 5).

Table 5. OSDI severity distribution among contact lens users (N=200)

OSDI category	Score range	n (%)
Normal	0–12	66 (33.0)
Mild dry eye	13–22	58 (29.0)
Moderate dry eye	23–32	44 (22.0)
Severe dry eye	≥ 33	32 (16.0)



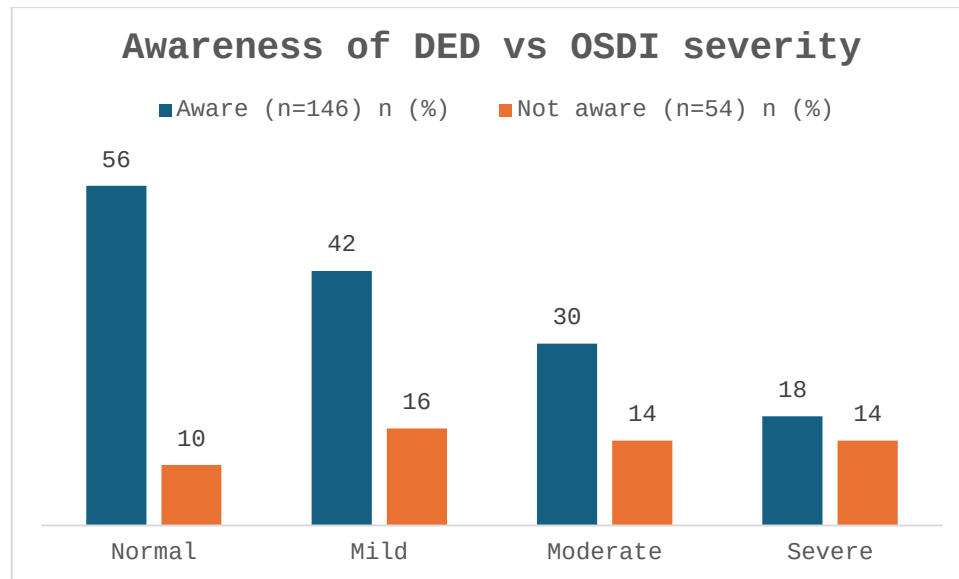
Graph 5. OSDI severity distribution among contact lens users (N=200)

6. Awareness of DED vs OSDI severity (Secondary Objective 1)

Participants unaware of DED had a higher proportion of severe symptoms (25.9%) compared to aware students (12.3%), suggesting awareness may be associated with lower severity (Table 6).

Table 6. Awareness of DED vs OSDI severity (Secondary Objective 1) (N=200)

OSDI severity	Aware (n=146) n (%)	Not aware (n=54) n (%)
Normal	56 (38.4)	10 (18.5)
Mild	42 (28.8)	16 (29.6)
Moderate	30 (20.5)	14 (25.9)
Severe	18 (12.3)	14 (25.9)



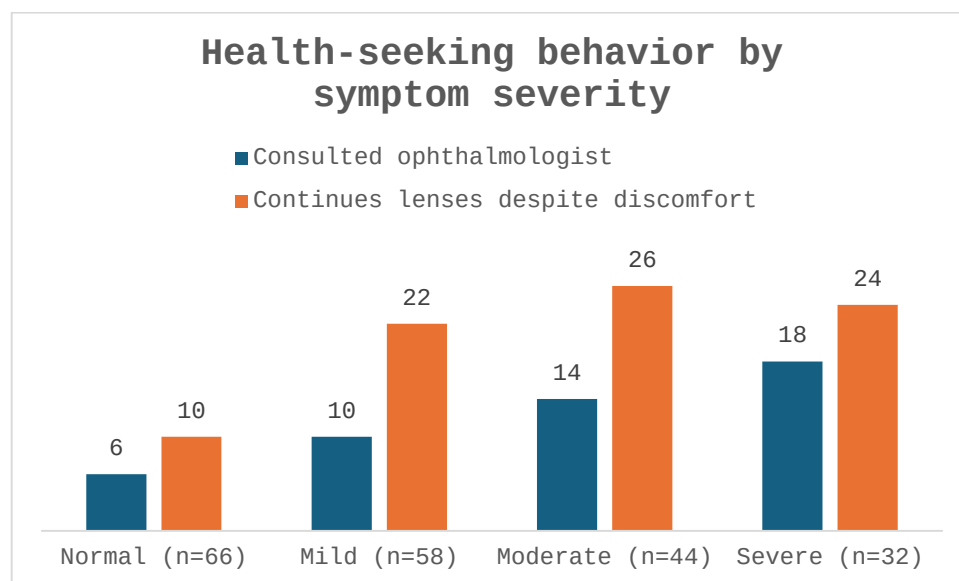
Graph 6. Awareness of DED vs OSDI severity (Secondary Objective 1) (N=200)

7. Health-seeking behavior by symptom severity

Health-seeking behavior increased with severity (56.3% in severe group), yet 75% of severe cases continued lens wear despite discomfort, indicating risky persistence behaviors (Table 7).

Table 7. Health-seeking behavior by symptom severity (N=200)

Behavior	Normal (n=66)	Mild (n=58)	Moderate (n=44)	Severe (n=32)
Consulted ophthalmologist	6 (9.1)	10 (17.2)	14 (31.8)	18 (56.3)
Continues lenses despite discomfort	10 (15.2)	22 (37.9)	26 (59.1)	24 (75.0)



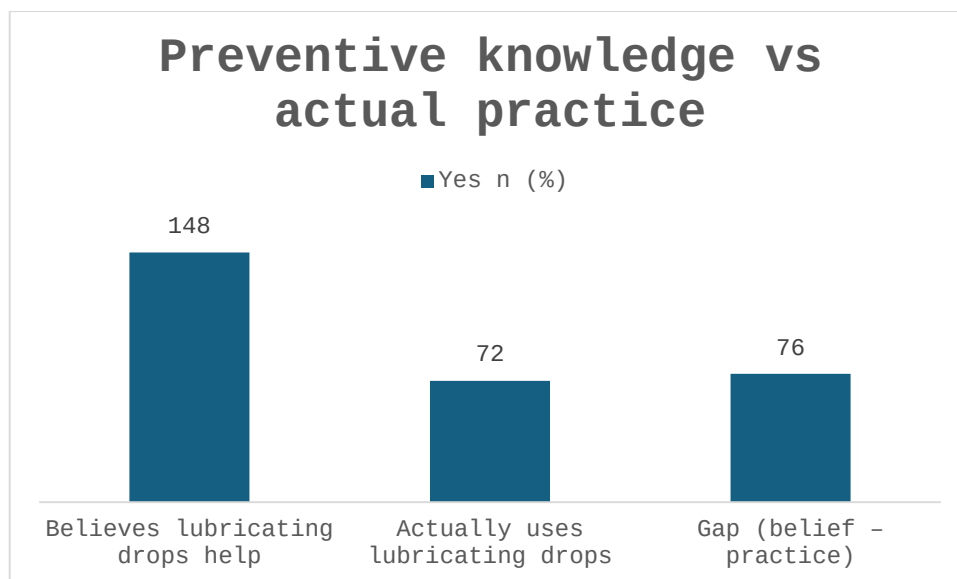
Graph 7. Health-seeking behavior by symptom severity (N=200)

8. Preventive knowledge vs actual practice

Although 74% believed lubricating drops are beneficial, only 36% actually used them, revealing a significant 38% knowledge–practice gap (Table 8).

Table 8. Preventive knowledge vs actual practice (Gap analysis) (N=200)

Item	Yes n (%)	No/Don't know n (%)
Believes lubricating drops help	148 (74.0)	52 (26.0)
Actually uses lubricating drops	72 (36.0)	128 (64.0)
Gap (belief – practice)	76 (38.0)	—



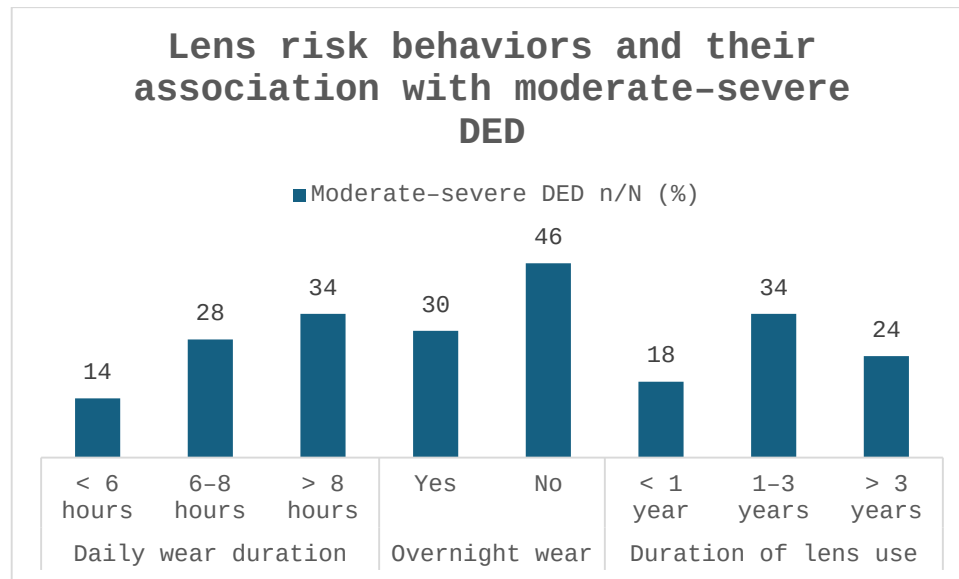
Graph 8. Preventive knowledge vs actual practice (Gap analysis) (N=200)

9. Lens risk behaviors and their association with moderate–severe DED (OSDI ≥ 23)

Longer daily wear (>8 hours), overnight wear, and duration >3 years were strongly associated with higher moderate–severe DED prevalence (65.4%, 65.2%, and 60% respectively), indicating clear behavioral risk factors (Table 9).

Table 9. Lens risk behaviors and their association with moderate–severe DED (OSDI ≥ 23) (N=200)

Risk factor	Category	Moderate–severe DED n/N (%)
Daily wear duration	< 6 hours	14/70 (20.0)
	6–8 hours	28/78 (35.9)
	> 8 hours	34/52 (65.4)
Overnight wear	Yes	30/46 (65.2)
	No	46/154 (29.9)
Duration of lens use	< 1 year	18/74 (24.3)
	1–3 years	34/86 (39.5)
	> 3 years	24/40 (60.0)



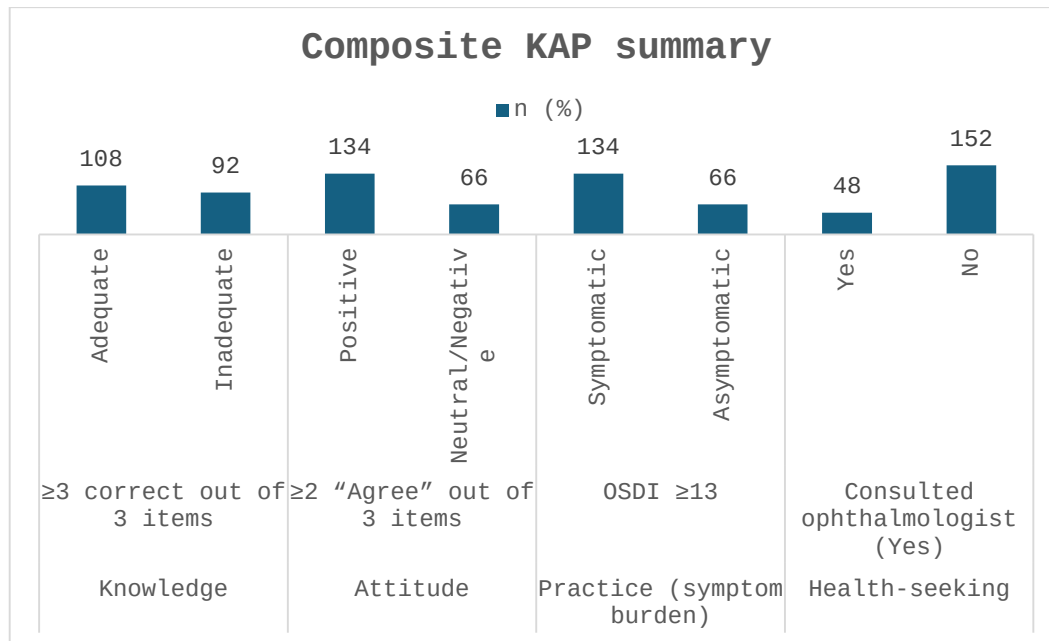
Graph 9. Lens risk behaviors and their association with moderate-severe DED (OSDI ≥ 23) (N=200)

10. Composite KAP summary

Overall, 54% demonstrated adequate knowledge and 67% had a positive attitude; however, 67% were symptomatic and only 24% sought professional care, indicating a gap between awareness and effective practice (Table 10).

Table 10. Composite KAP summary (N=200)

Domain	Operational definition (example)	Category	n (%)
Knowledge	≥ 3 correct out of 3 items	Adequate	108 (54.0)
		Inadequate	92 (46.0)
Attitude	≥ 2 "Agree" out of 3 items	Positive	134 (67.0)
		Neutral/Negative	66 (33.0)
Practice (symptom burden)	OSDI ≥ 13	Symptomatic	134 (67.0)
		Asymptomatic	66 (33.0)
Health-seeking	Consulted ophthalmologist (Yes)	Yes	48 (24.0)
		No	152 (76.0)



Graph 10. Composite KAP summary

DISCUSSION

This study evaluated awareness, attitude, and practices regarding Dry Eye Disease (DED) among soft contact lens–using medical students and explored its relationship with symptom severity. The majority of participants were young adults aged 20–22 years (54%) and female (60%), which is consistent with previous studies reporting higher contact lens usage among females and university students (Supiyaphun & Jongkhajornpong, 2021; Zengin et al., 2021) [11, 12]. Female sex has also been identified as an independent risk factor for dry eye symptoms, which may partly explain the high symptom burden observed in this cohort (Alashqar et al., 2025; Loaiza-Guevara et al., 2024) [13, 14].

A considerable proportion of students reported modifiable risk behaviors, including prolonged daily wear (>8 hours in 26%) and overnight lens use (23%). Prolonged wear duration and overnight use are well-established behavioral risk factors for contact lens–related complications and ocular surface discomfort (Supiyaphun & Jongkhajornpong, 2021) [11]. Dry eye sensation is recognized as the most common reason for contact lens discomfort and discontinuation (Markoulli & Kolanu, 2017) [15]. In the present study, moderate-to-severe DED was markedly higher among students who wore lenses for more than 8 hours daily (65.4%), those practicing overnight wear (65.2%), and those with more than 3 years of lens use (60%), demonstrating a clear dose–response relationship between risky behaviors and symptom severity. Although 73% of participants reported being aware of DED, only 54% demonstrated adequate overall knowledge. Similar knowledge gaps among medical and university students regarding contact lens complications and care have been reported in previous studies (Boqursain et al., 2021; Thiraviam et al., 2022) [16, 17]. Importantly, limited awareness has been associated with a higher prevalence of symptomatic dry eye (Ezinne et al., 2023) [18]. In this study, participants who were unaware of DED had approximately double the proportion of severe symptoms compared to those who were aware (25.9% vs 12.3%), suggesting that awareness may play a protective role in reducing symptom severity.

The overall symptom burden was substantial, with 67% of participants classified as symptomatic (OSDI ≥ 13) and 38% experiencing moderate-to-severe DED. These findings align with previous reports demonstrating high prevalence of dry eye symptoms among university students globally (Alashqar et al.,

2025; Loaiza-Guevara et al., 2024) [13, 14]. The elevated prevalence in student populations may be attributed to prolonged screen exposure, environmental factors, academic stress, and contact lens use. Despite generally favorable attitudes—68% considering DED serious and 75% agreeing that discomfort should not be ignored—health-seeking behavior remained suboptimal. Only 24% of the overall participants had consulted an ophthalmologist, and 75% of students with severe symptoms continued wearing lenses despite discomfort. Similar patterns of poor compliance and risky contact lens behaviors have been documented in university populations (Supiyaphun & Jongkhajornpong, 2021; Zengin et al., 2021) [11, 12]. Furthermore, although 74% believed lubricating drops are beneficial, only 36% actually used them, revealing a significant knowledge–practice gap of 38%.

Overall, while more than half of the students demonstrated adequate knowledge and a majority expressed positive attitudes, a high prevalence of symptomatic dry eye and continued engagement in risky behaviors highlight a significant gap between awareness and effective practice. These findings underscore the need for targeted educational interventions focusing not only on improving knowledge but also on translating awareness into safer lens practices and timely health-seeking behavior among medical students.

CONCLUSION

This study demonstrates that although awareness and positive attitudes toward Dry Eye Disease are relatively high among soft contact lens–using medical students, a substantial proportion remain symptomatic and continue risky lens practices. Moderate-to-severe DED was strongly associated with prolonged wear duration and overnight use. A significant knowledge–practice gap and poor health-seeking behavior were observed despite symptom burden. These findings highlight the need for structured educational interventions within medical institutions to promote safe contact lens habits and early recognition of dry eye symptoms.

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