Ophthalmology Section

Attitude and Challenges of Indian Medical Undergraduate Students in Learning Ophthalmology at Puducherry, Southern India: A Mixed-method Study

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ABSTRACT

Introduction: Ophthalmology is a critical component of undergraduate medical education in India. Medical students' perspectives on learning ophthalmology can provide valuable insights into the strengths and limitations of current teaching methodologies.

Aim: To assess the attitude, interest and challenges in learning ophthalmology among medical undergraduate students. Further, to explore the experiences, perceived factors influencing learning and suggestions for improvement in teaching and learning ophthalmology among medical undergraduate students at Puducherry, Southern India.

Materials and Methods: The present mixed-method study was conducted among 250 undergraduate medical students at a private medical college in Puducherry, South India, for three months from October to December 2024. Universal sampling was followed for the cross-sectional survey. A self-administered questionnaire through google forms was employed to assess students' attitudes, interests, and challenges in learning ophthalmology. Focus Group Discussions (FGDs) were conducted among 24 purposively selected medical students till the point of saturation. Quantitative data were analysed using Statistical Package for Social Sciences (SPSS) v20.0, while qualitative data underwent manual content analysis.

Results: A total of 250 undergraduate medical students participated in the present study. The mean age of participants was 22.03±1.35 years. While 126 (50.4%) agreed that the allotted time for ophthalmology teaching was adequate, 74 (29.6%) remained neutral about the effectiveness of one-way didactic teaching. Hands-on clinical exposure was rated as adequate by 91 (36.4%), though 72 (28.8%) remained neutral. FGDs identified key barriers, including exam-oriented teaching, workload of the faculty and lack of knowledge application. Students recommended incorporating multimedia-based teaching, simulation models, and enhanced bedside training.

Conclusion: While students expressed a generally positive attitude toward ophthalmology education, challenges remain in clinical exposure and interactive teaching methodologies. Integrating technology-enhanced learning and structured clinical training could improve competency and engagement, ensuring better preparedness for managing ophthalmic conditions in primary care settings.

Keywords: Clinical competence, Focus groups, Medical education, Ophthalmology

INTRODUCTION

In India, undergraduate medical education follows a structured curriculum set by the National Medical Commission (NMC) for (Bachelor of Medicine and Bachelor of Surgery) MBBS course [1,2]. The NMC began implementing Competency-Based Medical Education (CBME) for Indian Medical Graduates (IMG) in 2019. This CBME emphasises the development of basic clinical skills required to practice including soft skills related to attitude, communication, doctor-patient relationship, ethics, and professional conduct [3].

Competency is defined as "the ability to do something successfully and efficiently," and CBME is an approach to ensure that the IMGs develops competencies necessary to meet patients' health needs thereby preparing students for actual professional practice [4]. CBME is a learner-centered and outcome-oriented model promoting accountability and flexibility among students [5]. Teaching-learning activities become more skill based, involving more clinical, hands-on experience and assessment pattern focuses on outcomes or competencies achieved [6]. However, time constraints are a problem in CBME since it is challenging to provide continued training until desired competency is achieved within the prescribed course period [7]. Furthermore, there has been substantial shifts in pedagogy, clinical exposure, and assessment strategies in the CBME curriculum [3]. There is a pressing need to evaluate how these reforms have impacted student engagement and preparedness in less prioritised subjects. Existing research indicates variability in the teaching methods employed across institutions, ranging from traditional didactic lectures to case-based discussions, training with simulated patients, virtual reality and online learning [8].

Ophthalmology is a critical component of undergraduate medical education which was taught previously during the third year (final year part I) but now in the fourth year (final year part II) of the MBBS course [2,9]. Moreover, Ophthalmology makes up a significant proportion of primary care consultations which necessitates a basic knowledge and skill in ophthalmology for diagnosing and managing common ocular conditions [10]. Despite the relevance of ophthalmology to medical practice, medical students receive limited ophthalmic training and the majority of primary care physicians do not feel that they have received adequate undergraduate ophthalmic education [11]. Although several studies have explored the adequacy of ophthalmology training among medical students globally [12,13], there is limited literature from India that specifically examines students' perspectives using a comprehensive mixed-method approach [1,14]. Some studies tend to focus on knowledge assessment or curriculum review from the faculty's viewpoint, with few capturing the lived experiences and nuanced feedback from students themselves [15,16]. Existing studies have largely overlooked how students interpret and experience these curricular changes at

the ground level, especially in specialty subjects delivered in the later stages of MBBS training [9,17].

The current study study is novel in its design and scope, as it employs a mixed-methods approach to triangulate quantitative data from a structured survey with qualitative insights from FGDs. Conducted in the unique setting of a private medical college in Puducherry, South India, the study provides context-specific insights that can inform regionally tailored improvements in ophthalmology education. By integrating student perspectives on both systemic and pedagogical factors, the study offers actionable recommendations to bridge the gap between curricular intent and educational outcomes ensuring that medical graduates possess the necessary competencies to identify and manage common ophthalmic conditions in primary care settings. With this background, this study aimed to assess the attitude, interest and challenges in learning ophthalmology among medical undergraduate students. Further, to explore the experiences, perceived factors influencing learning and suggestions for improvement in teaching - learning ophthalmology among medical undergraduate students and Puducherry, South India.

MATERIALS AND METHODS

The present facility-based sequential explanatory mixed-method study involving cross-sectional survey in the quantitative part and FGDs in the qualitative part was conducted among 250 undergraduate medical students at a private medical college (Mahatma Gandhi Medical College and Research Institute, Sri Balaji Vidyapeeth) in Puducherry, South India for a period of three months from February to April 2025. Necessary permission from the Institutional Research Committee and Institutional Human Ethics Committee were obtained before the start of the study (Reference no.: MGMCRI/2024/03/04/IHEC/95). Written informed consent was sought from all the students who participated in the study.

Inclusion and Exclusion criteria: All 250 medical students aged >18 years who have attended ophthalmology as a subject of study in their third year irrespective of their university exam results in ophthalmology were included. No students were excluded from the study.

Sample size calculation: The sample size was calculated using the formula n=4pq/d [2,18], where the 'p' was considered to be 82.6% from a previous study [19], q=1-p=17.4%, absolute precision (d) of 5%, 95% confidence interval and a non-response rate of 10%. Thus, the estimated minimum sample size was found to be 243. Universal sampling was employed for including all 250 medical students from the final year batch who have attended ophthalmology as a subject of study in their third year irrespective of their university exam results in ophthalmology.

Study Procedure

A pre-tested, semi-structured, face validated, self- administered questionnaire was employed for quantitative data collection. A 15-item questionnaire was devised by the authors after extensive review of existing literature [20,21]. Anonymity of the students was maintained as their personal details like name, university registration number, email ID were not captured. The questionnaire included only the students' gender and age regarding the demographic details. Multiple parameters related to medical undergraduate students' perspectives on learning ophthalmology was recorded using a 5-point Likert scale. Key domains included curricular adequacy, such as time allotted and relevance to the IMG competencies; teaching methodologies, including the effectiveness of didactic sessions and use of newer modalities.

For the qualitative component of the study, purposive sampling was employed to select participants who could provide in-depth insights into their learning experiences in ophthalmology. Out of the total study population, 24 undergraduate medical students were chosen based on their willingness, communication ability, and openness

to share perspectives freely and spontaneously. Efforts were made to ensure diversity in gender and academic performance to capture a broad range of experiences and viewpoints. The selected students were invited personally, and their informed consent was obtained. Four FGDs were conducted, with six students in each group, ensuring manageable group size to facilitate meaningful engagement and interaction. The FGDs were held in a neutral, student-friendly environment such as seminar rooms or discussion halls to encourage open dialogue. Each session lasted approximately 35 to 40 minutes and was conducted in English, moderated by the principal investigator with assistance from a trained note-taker, until data saturation was achieved. A 7-item interview guide for the FGD was developed by the investigators based on the findings of the quantitative part of the study. The quantitative data highlighted key areas of concern and interest among medical undergraduate students regarding their experiences in learning ophthalmology. These insights informed the formulation of open-ended questions aimed at exploring, in greater depth, the students' attitudes, perceived challenges, enabling factors, and suggestions for improvement. The structured yet flexible format of the guide ensures a comprehensive exploration of themes emerging from the earlier phase while allowing participants the freedom to share their unique perspectives, thereby enriching the overall understanding of the research problem through qualitative triangulation. The interview guide was pre-tested and face validated by the authors.

The manual content analysis for the qualitative data began with the transcription of each interview immediately after its completion to ensure accuracy and completeness. The transcripts were then read multiple times to gain a comprehensive understanding of the content. Meaning units were identified and systematically coded. These initial codes were then grouped based on similarities to form broader categories that reflected common patterns within the data. Finally, latent content-the underlying meanings and themes-was interpreted to provide deeper insight into the participants' perspectives [22]. This methodical process ensured a rigorous and credible analysis of the qualitative data.

STATISTICAL ANALYSIS

The quantitative data collected through the Google forms was analysed using standard software SPSS (v20.0; IBM Corp, Armonk, New York) software. The data were presented in the form of numbers and percentages for qualitative variables and mean and SD/median and IQR for quantitative variables.

RESULTS

The mean±SD of the age of the students who participated in the study was observed to be 22.03±1.35 years. [Table/Fig-1] shows the distribution of students based on gender. A 135 (54%) participants were females.
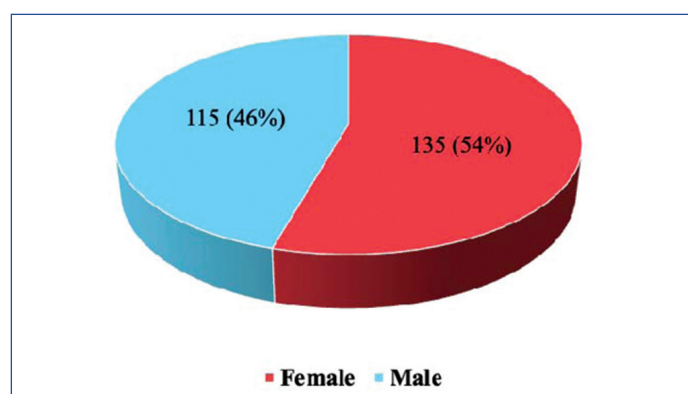
[Table/Fig-1]: Distribution of study participants based on gender.

The [Table/Fig-2] shows that a majority of students 126 (50.4%) agreed that the time allotted for ophthalmology teaching was adequate, and 137 (54.8%) felt that regular assessment methods

S. No.	Items	N=250 (%)				
		I	II	III	IV	V
1.	The time allotted for ophthalmology teaching was adequate	12 (4.8)	4 (1.6)	45 (18.0)	126 (50.4)	63 (25.2)
2.	One-way didactic teaching was effective in learning ophthalmology	13 (5.2)	13 (5.2)	74 (29.6)	113 (45.2)	37 (14.8)
3.	Newer teaching modalities were employed in teaching the subject content	17 (6.8)	21 (8.4)	78 (31.2)	94 (37.6)	40 (16.0)
4.	Hands-on experience was adequate in clinical postings	19 (7.6)	18 (7.2)	72 (28.8)	91 (36.4)	50 (20.0)
5.	I acquired the ability to independently diagnose ophthalmic conditions using basic equipment in clinical posting	15 (6.0)	17 (6.8)	59 (23.6)	102 (40.8)	57 (22.8)
6.	I acquired the ability to perform community-screening with torch and ophthalmoscope for cataract and other common ophthalmic conditions	13 (5.2)	9 (3.6)	59 (23.6)	109 (43.6)	60 (24.0)
7.	After completing my ophthalmic clinical postings, I am confident in diagnosing common ophthalmic conditions	12 (4.8)	12 (4.8)	50 (20.0)	122 (48.8)	54 (21.6)
8.	I feel the current curriculum is relevant to the degree of competence I am expected to have as an Indian Medical Graduate (IMG)	12 (4.8)	9 (3.6)	59 (23.6)	117 (46.8)	53 (21.2)
9.	My teachers had set clear objectives for my clinical postings	13 (5.2)	6 (2.4)	47 (18.8)	117 (46.8)	67 (26.8)
10.	I was encouraged to be an independent learner through self-directed learning	11 (4.4)	7 (2.8)	57 (22.8)	121 (48.4)	54 (21.6)
11.	My teachers had good demonstration and explanation skills	11 (4.4)	3 (1.2)	46 (18.4)	129 (51.6)	61 (24.4)
12.	My teachers were enthusiastic in teaching the subject	15 (6.0)	8 (3.2)	59 (23.6)	113 (45.2)	55 (22.0)
13.	My mentors were accessible for clarification of any doubts	11 (4.4)	4 (1.6)	58 (23.2)	125 (50.0)	52 (20.8)
14.	Regular feedback mechanism was in place regarding my strengths and weakness in my academic performance	14 (5.6)	12 (4.8)	61 (24.4)	122 (48.8)	41 (16.4)
15.	Appropriate and regular assessment methods were in place for evaluating the students	11 (4.4)	7 (2.8)	41 (16.4)	137 (54.8)	54 (21.6)

[Table/Fig-2]: Students' attitude, interest and challenges towards learning ophthalmology.
I=Strongly disagree; II=Disagree; III=Neutral; IV=Agree; V=Strongly agree

were appropriate and consistent. However, only 91 (36.4%) agreed that hands-on clinical experience was adequate, with 72 (28.8%) remaining neutral, indicating a relative gap in practical exposure, while demonstration and explanation skills of faculty were rated positively by over 129 (51.6%) of students.

There was a total of four FGD conducted till the point of saturation. Each FGD comprised of six students and a total of 24 participants were involved. The mean±SD age of the students who participated in the FGD was 20.03±1.28 years. There were 14 (58.3%) females and 10 (41.7%) males in the FGD.

The [Table/Fig-3] illustrates the FGD among the Indian medical undergraduate students which identified two major themes: factors influencing students' learning experience in ophthalmology as well as student-driven suggestions for improving teaching methodologies.

Themes	Subthemes	Codes
Factors influencing learning experience	Perceived facilitators	• Small group teaching • Case presentations • Positive attitude of faculty • Interest in subject • Small subject
	Perceived barriers	• Exam-oriented teaching • Workload of the faculty • Lack of knowledge application
Suggestions for better learning experience	Classroom teaching	• Use of multimedia in teaching • Prefer competitive exam-oriented training • Implement formative assessments • Incorporate blended teaching learning techniques
	Bedside teaching	• More hands-on training • Regular clinical posting rotations • Use of simulation models • Proper visualisation of surgeries

[Table/Fig-3]: Manual content analysis of FGD among medical students.

Factors Influencing Learning Experience

Both facilitating and hindering factors influencing students' learning experience were identified as subthemes. Students appreciated small group teaching, which facilitated better interaction with faculty. One participant stated, "*In small groups, we get more chances to ask doubts and understand the concepts better*". Case presentations were also valued as they encouraged active participation and critical thinking, with a student mentioning, "Presenting cases forces us to think logically and apply our knowledge rather than just memorising". Faculty with a positive attitude were recognised as instrumental in enhancing student engagement. Additionally, the concise nature

of the subject was perceived as an advantage, making it easier to grasp within the given time.

Despite these perceived facilitators, students expressed concerns regarding exam-oriented teaching, which limited conceptual understanding. One participant stated, "We are often taught only what is needed to pass exams, not what is necessary for clinical practice". The workload of the faculty was a recurring concern, with one respondent remarking, "we are not given enough time and attention as some of the faculty are holding other administrative responsibilities and some faculty are busy with patient care…. Moreover, the junior level faculty who engage us keeps changing frequently…." Additionally, a lack of opportunities for knowledge application in clinical settings was highlighted, as a student commented, "We read about conditions in textbooks, but we hardly get to see them in real patients".

Suggestions for Better Learning Experience

Classroom and bedside teaching were identified as subthemes. Students suggested the use of multimedia in lectures to make learning more engaging. One participant noted, "*Videos and animations help us visualise concepts better than just reading from slides*". Many students preferred competitive exam-oriented training, stating, "*A focus on NEET-PG and NEXT pattern questions would help us prepare better for the future*". They also recommended formative assessments, arguing that regular case presentations, tests and feedback sessions would aid retention. Lastly, they emphasised the need for blended teaching-learning techniques, integrating traditional lectures with online modules for flexible learning.

Students strongly advocated for more hands-on training in ophthalmology. One remarked, "We need more practical exposure; just watching is not enough". They recommended regular clinical posting rotations to ensure consistent exposure to real patients. Additionally, the use of simulation models was encouraged, with one student stating, "Practicing fundoscopy on mannequins before examining real patients would boost our confidence". Finally, students stressed the importance of proper visualisation of surgeries, with a participant explaining, Most of the time, we can't see what's happening in the OT. A live projection would be really helpful.

DISCUSSION

This mixed-method study provides valuable insights into the perspectives of Indian medical undergraduate students in learning

ophthalmology. The findings highlight the strengths of current teaching methodologies while identifying areas that require improvement to enhance student engagement, competency development, and overall learning experience.

A significant proportion of students (50.4%) agreed that the time allotted for ophthalmology teaching was adequate. However, concerns were raised regarding the effectiveness of one-way didactic teaching, with 29.6% of students remaining neutral and 10.4% disagreeing. This suggests that while traditional lecture-based teaching remains relevant, there is a need to integrate more interactive and student-centered teaching methods such as problem-based learning and flipped classrooms. Previous study has also highlighted the effectiveness of active learning strategies in medical education, leading to improved knowledge retention and clinical application [23].

The current study found that although 37.6% of students agreed and 16.0% strongly agreed that newer teaching modalities were employed, a considerable proportion (31.2%) remained neutral. This indicates that despite the implementation of CBME, the adoption of modern teaching tools such as simulation models, online learning platforms, and virtual reality remains inconsistent. While the existing literature reports that the integration of technology-enhanced learning, including virtual patients and digital modules, has been demonstrated to improve clinical reasoning and student engagement in ophthalmology education [24-26].

Clinical exposure is a key component of CBME, emphasising hands-on experience in medical training. In the present study, 36.4% of students agreed and 20.0% strongly agreed that they received adequate hands-on experience during clinical postings, while 28.8% remained neutral. Similar concerns have been noted in previous research, where medical students reported limited clinical exposure and inadequate opportunities to perform ophthalmic examinations independently [27-29]. The use of simulation-based training has been recommended to bridge this gap, allowing students to practice fundoscopic examinations and common ophthalmic procedures before encountering real patients [30].

Students' self-reported confidence in diagnosing ophthalmic conditions was moderate, with 48.8% agreeing and 21.6% strongly agreeing that they felt confident after completing clinical postings. However, FGDs revealed that exam-oriented teaching and a lack of knowledge application hindered their clinical competence. This aligns with previous findings that highlight the mismatch between theoretical knowledge and practical skills in undergraduate ophthalmology education [31]. Enhancing problem-based learning and structured clinical examinations could help reinforce the application of theoretical knowledge to real-world scenarios.

Faculty engagement and mentorship were positively perceived, with 51.6% of students agreeing that their teachers demonstrated good explanation skills, and 50.0% acknowledging mentor accessibility. Enthusiastic teaching has been shown to positively influence student motivation and learning outcomes [32]. However, a notable barrier identified in FGDs was the shortage of faculty, which limited personalised training opportunities. Addressing faculty shortages and implementing near-peer teaching models, where ophthalmology postgraduates assist in teaching the undergraduate students, could be potential solutions to improve clinical learning experiences [33,34].

Suggestions from students emphasised the need for blended learning approaches, increased use of multimedia, and structured formative assessments. In particular, students advocated for a competitive exam-oriented approach, aligning ophthalmology education with postgraduate entrance examination patterns. This preference is supported by earlier research that highlight the growing trend of integrating National Eligibility cum Entrance Test (NEET) style questions into undergraduate teaching to enhance student preparedness for competitive exams [35]. Additionally, the use of live surgical projections

and simulation-based training were recommended to improve visualisation as well as understanding of ophthalmic surgeries, which has been found to significantly enhance surgical education [36,37].

The strengths of the present study include its mixed-method design, which provided both quantitative data and qualitative insights into student perceptions. The use of universal sampling ensured comprehensive representation of the study population.

Limitation(s)

As it is a single-center study design it may affect the generalisability of findings. Additionally, self-reported data may introduce response bias. Future studies should explore multi-institutional research to capture a broader perspective on ophthalmology education in India.

CONCLUSION(S)

The study provides valuable insights into the learning experiences of medical students in ophthalmology. The current ophthalmology curriculum under CBME has been positively received by students but there remains a need to enhance interactive learning, clinical exposure, and technology integration. Factors influencing learning and suggestions for better learning were identified as two major themes in FGD. By strengthening the facilitators and addressing the barriers, the curriculum can be better aligned with the competencies expected of IMGs, ensuring improved preparedness and confidence in ophthalmic practice. To optimise ophthalmology education, the integration of multimedia tools, blended learning techniques, structured formative assessments, and enhanced clinical exposure should be prioritised.

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