Original Article

Researching the research: Ophthalmology residents' perspective

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Abstract

Background & Objective: To assess the knowledge, attitude, and practice of research methodology among ophthalmology residents.

Materials & Methods: The study was conducted by sharing a pretested semi-structured questionnaire to ophthalmology residents using an online Google form. Responses were collected, which were analyzed using IBM SPSS software version 28.

Results: In our study, 372 responses were analyzed, and among respondents (71%) were females. Most residents had good knowledge (74.2%) and a positive attitude (91.9%) whereas only 64.5% had a good practice. The poor practice was attributed to barriers like lack of guidance (56.7%), lack of orientation (55%), and lack of time (48.3%). Among the participants, only 43.5% had been part of a research work other than a mandatory dissertation and publication. The practice levels were significantly good in respondents with good knowledge (p=<0.001). Residents who had taken part in research activity in their MBBS course has been part of research work in their post-graduation (p<0.001).

Conclusion: In our study, we found that ophthalmology residents had good knowledge and attitude towards research methodology but they were unsuccessful in transforming their good knowledge and positive attitude into a good practice because of barriers like lack of guidance, orientation, and time. There is a necessity to encourage Ophthalmology residents to carry out research by providing proper guidance, funds, conducting more workshops, and by including research methodology sessions in all ophthalmic conferences.

Keywords: Curriculum; Knowledge; Ophthalmology; Research; Residents

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Introduction

Medical research is the broad area of science that looks for ways to prevent and treat diseases in people and in animals. The research activity of Post Graduate (PG) medical trainees is important because it promises better clinical care, critical reasoning, lifelong learning, and future research activity (1). Indian medical post-graduate students in their PG curriculum have to undertake a dissertation project through which they will be exposed to the concept of design and conduct of research activity for the first time (2). The majority of postgraduate students conduct their research projects during their second or third years of PG course (3). MCI (Medical Council of India) [currently National Medical Commission (NMC)] has made it compulsory for PG students to not only attend one conference but also give a research poster and research paper presentation and publish one research article in an indexed journal to encourage PG students towards research (4). Other than these mandatory programs, NMC in India didn't specify any regular/mandatory research program in the PG curriculum. Medical science is ever-developing. With

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time, there will be an evolution of new diagnostic methods, new drugs, and new treatment options. As postgraduates will be future specialist consultants, it is important to be in touch with the current concepts and any ongoing research activity and be competent enough to design and conduct research activities of their own.

In developed countries, we can see many powerhouse universities and teachings, academic research, and institutions that contributed to their national economic growth and advancements. Whereas in India, though we have glorious scientific achievements in the past, the current modern era India's financial projects in research are lesser than that of advanced countries, which leads to less access to modern instrumentation and research facilities and becomes a barrier for Indian research at a higher level (5).

Over the last 40 years, there is a fast and tremendous evolution in ophthalmology (6). There are many advancements happening in ophthalmology every day and there is a lot of scope for research in various subspecialties. Researchers have to face many challenges while conducting research in India (7). In developed countries like the United States of America, a study was conducted by Sun MT et al., about trends and effects of ophthalmology research in which, among 2080 studies presented, 881 (42.4%) were published in journals (8). Whereas in India, among 200 studies presented at the All India Ophthalmic Society annual conference, only 33 were published in indexed journals (9). The total number of postgraduate seats in ophthalmology in India is around 1400 per year, but the number of research activities is less. This shows where India stands in ophthalmology research activities.

Therefore, inculcating interest in medical research among ophthalmology residents will benefit the field of ophthalmology in the future. Hence, in our current study, we aim to assess the knowledge, attitude, and practices about medical research among ophthalmology residents in India.

Materials & Methods

Design and setting(s)

This was a cross-sectional study to assess the knowledge, attitude, and practices of research methodology among Ophthalmology residents across India. The study was conducted using a semi-structured questionnaire using a Google form. The questionnaire was prepared in English, using questions based on research methodology literature by subject experts.

Participants and sampling

The questionnaire was pretested on five ophthalmology residents and, after confirming that there were no ambiguities, then it was dated for data collection. The study was approved by the Institutional ethics committee. There are around 1400 ophthalmology PG seats in India. Responses from 382 ophthalmology residents were obtained through convenience sampling techniques via online platforms. This study has strictly adhered to the tenets of the declaration of Helsinki.

Instruments / Data collection methods

After obtaining ethical clearance, forms were shared to ophthalmology residents across India and circulated via online platforms WhatsApp and Email as a Google form link. Informed consent was got from all the participants and then responses were collected over two weeks. The Google form comprised a consent form, after accepting which the respondents were directed to the rest of the questions. The participants submitted their responses via Google forms online.

Data analysis

This questionnaire was made with 20 questions, of which 10 questions were knowledge domain questions, which were scored as '1' for correct and '0' for a wrong response, with a total score ranging from 0 to 10. The total knowledge scores, which were ≤5, were categorized into 'Poor', and >5 as 'Good' Knowledge levels using cut-off scores at the 50th percentile. Five attitude-based questions were assessed using the Likert scale and scores were given with a positive approach as strongly agree = 5, agree = 4, neither agree nor disagree = 3, disagree = 2, and strongly disagree = 1 with total scores ranging from 5 to 25. The total Attitude scores were then categorized into negative, average, and positive attitude levels using cutoff scores at the 33rd and 66th percentiles. The practice was assessed using 4 questions, which were scored as '0' for poor practice and '1' for good practice. Total practice score ranged from 0 to 4, the total practice score was categorized into poor and good practice using a cut-off score at 50 percentiles. The barriers to research faced by the students were also assessed.

Data was entered Excel sheet and analyzed using IBM SPSS Statistics for Windows, version 28.0 (IBM Corp., Armonk, N.Y., USA) (10). Frequencies, percentages, confidence intervals, and IQR were used for descriptive statistics. Chi-square test and good for the fit–chi-square test were used for analysis. P-value <0.05 was taken as the level of significance.

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Results

A total of 382 participants responded, of which only 379 gave consent and completed the questionnaire. After excluding missing values, 372 responses were analyzed. Among 372 from different states and Union territories across India, the mean age of respondents was 26.61±1.4 years. Among participants majority of the students were from Karnataka state (9.4%) followed by Andhra Pradesh (7.52%), Kerala (7.25%), and Telangana (6.45%) states. The state and union territory-wise distribution of responses from all over India is shown in Figure 1. States and union territories were grouped into northern (59%) and southern (41%) states.

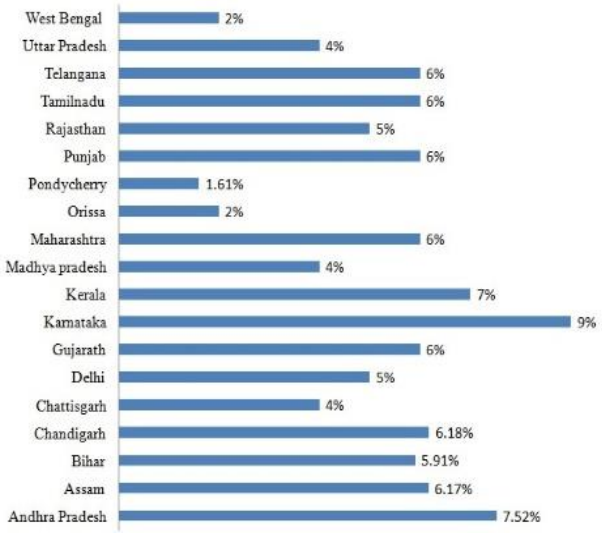

Figure 1. State and Union Territory wise distribution of responses from ophthalmology residents across India

Among respondents, females accounted for 71% (n=264) and males were only 29% (n=108). Around 79% (n=294) of the respondents studied in colleges where post-graduation admissions was started over ten years ago, whereas 12.9% (n=48) of the respondents studied in colleges where the PG admissions was started between 5-10 years ago and 8.07% (n=30) of the respondents belonged to colleges where PG admissions was started less than 5 years ago.

Our study participants were Ophthalmology residents of all three academic years, among them 13 (3.5%) residents joined their Master in Surgery (MS) course in 2019-2020 academic year whereas 210 (56.5%) of residents joined PG course during 2020-2021 academic year and 149 (40.10%) residents who joined in the present academic year of 2021-2022. In our study majority of the residents' (79.03%) college admissions for PG started over 10 years ago and 12.9% of the respondents' medical college started their PG admission between 5-10 years whereas only 3.23% of the ophthalmology residents' college admitting PG students between 1-5 years.

Knowledge

The overall knowledge score in our study was 6.16±1.7 and the median score was 6 (IQR: 4-8). Among residents, 74.2% (n=276) of them had good knowledge. In our study, 90.3% {95% CI [0.82, 0.97]} of the residents knew that "Institutional ethics committee's permission is mandatory to carry research among human volunteers." Whereas around 90.3% {95% CI [0.82, 0.97]} knew the correct order of writing a research paper. Around 32.3% {95% CI [0.20, 0.44]} knew the definition of precision. Around 48.4% {95% CI [0.35, 0.61]} Ophthalmology residents knew that "simple random sampling is the sampling method that based on an equal chance of selection." The distribution of correct responses to the knowledge domain questions regarding the research methodology is shown in Table 1.

Table 1. The distribution of correct responses of the ophthalmology residents to the knowledge domain questions regarding the research

S.no	Questions on knowledge domain	Frequency of correct responses, *n* (%)	CI_1^* (95%)
K1	What is the highest level of research evidence available in literature?	240(64.5%)	0.52-0.76
K2	Informed consent is not needed in all except	186 (50.0%)	0.37-0.62
K3	All are medical research databases except	180 (48.40%)	0.35-0.61
K4	Whose permission is required to conduct studies on human volunteers?	336 (90.3%)	0.82-0.97
K5	What is the correct order of writing the research paper?	336 (90.3%)	0.82-0.97
K6	Which is the way for citing references for medical dissertation in India?	246 (66.1%)	0.54-0.78
K7	Which software is most commonly used for biostatistics in medical research?	234 (62.9%)	0.50-0.75
K8	Ability of a study to predict the presence of an association is known as?	120 (32.3%)	0.20-0.44
K9	Which is the appropriate measure of association in a case control study?	234 (62.9%)	0.50-0.75
K10	Sampling based on equal chance of selection is called	180 (48.4%)	0.35-0.61

*Confidence Interval

Attitude

In our study, the mean attitude score was 20.37±2.58 with a median score of 20.00 (IQR: 18-21). Among residents, two third (67.7%, [n=252]) agreed that all resident doctors should be familiar with scientific research methodology and scientific writing. Fifty-nine

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percent of the respondents (n=220) agreed that learning research methodology as part of the PG curriculum is going to benefit their academic and clinical career in the long run. Most of the respondents (66.10%, [n=246]) will participate in exclusive research methodology classes and/or workshops. Around 53.2% (n=198) agreed that all medical residents should be able to design & complete a research project and write a scientific paper independently by the end of their course. Among participants, 48.4%, (n=180) felt that all the PG teaching institutes must reserve dedicated fund for research activities. The responses to the attitude questions regarding the research methodology are shown in Table 2.

Table 2. The distribution of responses of ophthalmology residents to the attitude questions regarding research

S.no	Questions on attitude	Strongly disagree n (%)	Disagree n (%)	Neither disagree nor agree n (%)	Agree n (%)	Strongly agree n (%)	P-value
A1	Every resident doctor should be familiar with scientific research methodology and writing	0	0	30 (8.1)	252(67.70)	90 (24.20)	0.025
A2	Learning research methodology as a part of curriculum is going to benefit your academic and clinical career in a long run	6(1.6)	0	48 (12.9)	222 (59.7)	96 (25.8)	0.251
A3	Willing to participate in exclusive research methodology classes, training, workshops	3 (0.8%)	15 (4.08)	54 (14.5)	246 (66.1)	54 (14.5)	0.259
A4	Every resident should be able to design and complete a research project and write a scientific paper independently by the end of their course	12 (3.2)	15 (4.08)	66 (17.7)	198 (53.2)	78(21.0)	0.201
A5	Every PG teaching institute must receive dedicated fund for research activities	0	0	24 (6.5)	180 (48.4)	168(45.2)	<0.01

Practice

The mean practice score was 1.741±1.34 and the median score was 2.00 (IQR: 1-3). The practice scores were slightly high in southern states (1.82±1.1) in India than in the northern states (1.64±1.3). Among the respondents, 135 (43.5%) {95% CI [0.30, 0.56]} have been part of any research work other than mandatory dissertation work during PG residency. Only 35 (11.3%) {95% CI [0.03, 0.19]} published in any peer-reviewed indexed journal (Medline, PubMed, Central, Citation Index, Sciences Citation Index, Expanded Embase, Scopus, Directory of Open access. Journals (DOAJ) as per current NMC recommendation. Among respondents, 155 (50%) {95% CI [0.37, 0.62]} had taken part in research activity during their MBBS (Bachelor of Medicine Bachelor of Surgery) course. Two hundred and five respondents (66.10%) {95% CI [0.54, 0.78]} received formal education/training on research methodologies from their institute. The distribution of responses to the practice questions regarding research methodology is shown in Table 3.

Table 3. The distribution of responses of the ophthalmology residents to the practice questions regarding research

S.no	Questions on practice domain	Frequency n (%)	95%CI_1*
P1	Have you been part of/ undertaken any research work other than mandatory dissertation work during PG residency?	162 (43.5%)	0.30-0.56
P2	Have you done any publications in any peer reviewed index journal as per NMC recommendation?	42 (11.3%)	0.03-0.19
P3	Have you been part of any research project during your MBBS course	186 (50.0%)	0.37-0.62
P4	Have you received any formal education/ training on research methodologies by your institute?	246 (66.10%)	0.54-0.78

*Confidence Interval

Respondents felt many hurdles regarding research activities. The majority of the residents 56.7% felt that lack of guidance is the barrier to not participating in research activities. Around 55% of residents felt a lack of knowledge and orientation as a reason for not participating and 48.3% of post-graduates felt a lack of time as the reason other common barriers felt by future ophthalmologists were depicted in Figure 2.

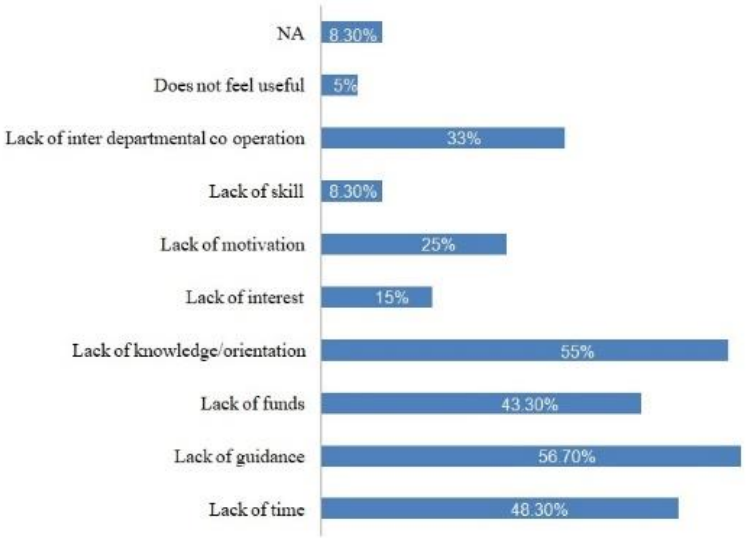

Figure 2. Chart showing various barriers felt by ophthalmology residents towards research

In our study, residents had good knowledge (74.2%) and attitude (91.9%) whereas their practice (64.5%) was comparatively poor. Among respondents residents who had good knowledge had good practice with p<0.001, which is statistically significant. A scatter plot graph showing the linear relation between the knowledge and practice of ophthalmology residents about research is shown in Figure 3.

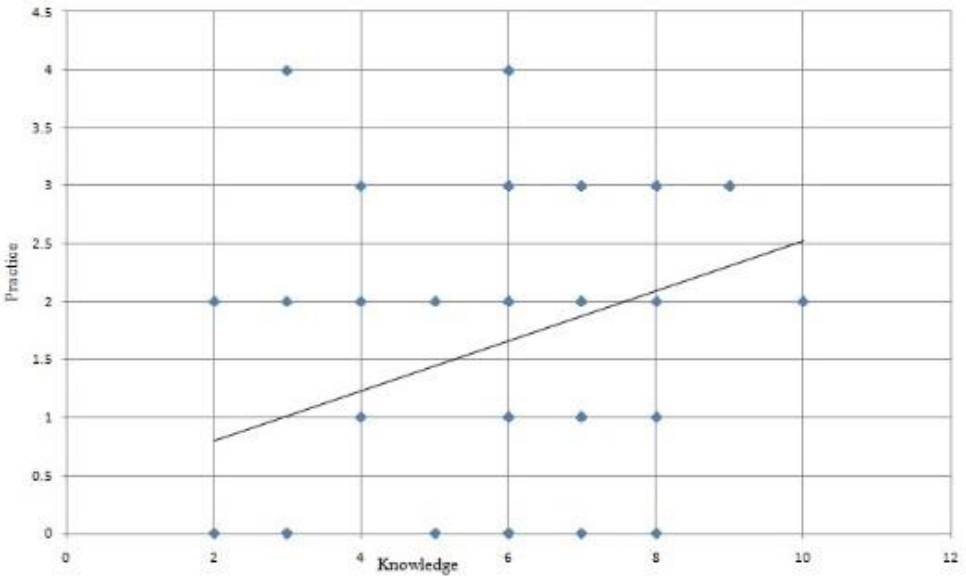

Figure 3. Scatter plot showing linear relationship between knowledge and practices of ophthalmology residents towards research

Among ophthalmology residents who had been a part of research activity during their MBBS course had good knowledge with a significant p-value (p< 0.001). Residents who received formal education /training in research methodology from their institute had good knowledge and this association was significant (p< 0.001). Post-graduates who had publications in any peer-reviewed index journal had good knowledge (p=0.003). Post-graduates who had taken part in research projects during their MBBS course had also taken part in research work other than their mandatory dissertation work (p<0.001).

Ophthalmology residents who received formal education/training on research methodologies from their

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institute were part of research work other than their compulsory dissertation work (p=0.005). Respondents who took formal education and training in research had published their research work in any peer-reviewed indexed journal (P=0.04). Participants who were part of a research project during their MBBS course took part in research training by their institute during their PG course (p<0.001)

Discussion

In our study, 372 ophthalmology residents' responses across India were analyzed. The mean age of the respondents was 26.61±1.4 years whereas it was 20.32±2.34 in a study conducted by Pallamparthy et al. (11), this variation in age was because of that the other study was conducted among MBBS students. Among residents, the majority 71% were females, which was a contrast to the study conducted by Giri PA et al. (12) where the majority (59.5%) were males. Among respondents, 56.5% were in the second year of their PG course and 40.10% and 3.5% were in their second and third year of PG course, respectively. In a study conducted by Pawar et al. (2) the students were from the second and third years of their course, respectively. The variation in the distribution of residents' year of PG course was because of the delay in joining the PG course academic year because of the Novel Coronavirus pandemic. In our study Majority of the residents' (79.03%) college admissions for PG started over 10 years ago and 12.9% of the respondents' medical college started their PG admission between 5=10 years whereas only 3.23% of the ophthalmology residents' college admitting PG students between 1-5 years, but there is no significant relationship between their medical college PG starting year with their knowledge, attitude and practice scores about research.

In our study, the mean knowledge score was 6.16±1.74 implying good knowledge. In our study majority of the ophthalmology residents (74.2%) had good knowledge; this is in contrast to a study conducted by Sharma et al. (13), where the percentage for a correct response was 54% among dental post-graduate students in Bangalore in 2014. Knowledge score was found to be relatively higher in females in our study, which is like a study conducted by Memarpour et al. (14).

In our study, more than fifty percent of the students (64.5%) knew that RCT (Randomized Control Trials) is the highest level of research evidence available in the research literature. Whereas it is 58.85% in a study conducted by Madhavrao et al. (15) among postgraduates of different specialties in a tertiary care center and it is 78% in a study conducted by Pawar et al., (2). Around fifty percent of the students knew that informed consent is unnecessary if the patient is incapacitated, in life-threatening emergencies where there is no adequate time to get consent voluntarily waived consent and informed consent is mandatory in clinical trials involving human beings. However, over ninety percent of the dental postgraduates knew when to take consent in a study conducted by Sharma et al. (13) in Bangalore dental colleges. Less than fifty percent of the residents knew EndNote is not a medical research database, whereas the majority (60.9%) knew about research databases for medical research in a study by Khan H et al. (16).

The majority of the ophthalmology residents knew the correct order of writing a research paper, whom to take permission to conduct research among human volunteers, the most typical way of citing references, software used for biostatistics, around half of the respondents knew about sampling, what is Odds ratio and precision. This shows that Ophthalmology residents' knowledge status which is adequate for how to write a research paper and how to publish a research paper.

The total mean attitude level is good (20.37±2.58). Our study shows most of the ophthalmology residents have a positive attitude towards research, similar results were seen in studies conducted by Pawar et al. (2) and Khan H et al. (15). Attitude towards research is relatively positive in male students when compared with females in our study, which is like studies conducted by Bilal et al. (17). In our study, 92% of the residents either agreed or strongly agreed that familiarity with scientific research and writing should be there in all resident doctors this is similar that dental PG students in Bangalore also agreed with the same in the studies conducted by Sharma et al. (13). Majority (85.8%) of the residents is believing that mandatory learning of research methodology as a part of their PG curriculum will have benefits in their academic and clinical career in a long run. But in another study conducted by Johar et al. (18). 89% of the postgraduates think that undertaking research will increase the burden on already overworked residents. Maximum (80%) of the post-graduate students were willing to participate in exclusive research methodology classes, workshops, and training whereas it is 92.3% and 70.6% of PGs think there is a requirement of conducting research training and workshops in studies conducted by Madhavrao et al. (15) and Giri et al. (12), respectively. This shows the

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willingness of the postgraduates to take part in the research. The highest portion of the respondents 75% strongly agreed or agreed that every medical resident should be able to design and complete a research project and write a paper independently by the end of their course whereas 81% of the undergraduate medical students think that they can plan and conduct a research project and write a scientific paper in a study conducted by Wahdan et al. (19). Nearly every resident felt that devoted fund to be reserved for PG teaching institutes for research activities.

The total mean practice score in our study was 1.741 ±1.34 where 64.5% of the postgraduates had a good practice. The practice scores were marginally higher in the southern part of the country than in the northern part of the country. Half of the ophthalmology residents that responded had been part of research work other than dissertation work during PG residency, whereas it was 61.2% in a study conducted by Giri PA et al. (12). In our study only 11.3% of the future Ophthalmologists had published their research work in any peer-reviewed indexed journal and similar results were seen in a study conducted by Madhavarao et al. (15) where 92.3% of the postgraduates didn't have any published research work, whereas it is comparatively high 39.4% in dental PG students in a study conducted by Sharma et al. (13). The respondents who had published articles in any index journal had good knowledge with a p-value of 0.003, which is significant. Among respondents who took part in research at their undergraduate level had good knowledge of our study and this association is statistically significant ($p<0.001$). Similar results were seen in a study conducted by Alghamdi et al. (20) where 55.3% of respondents participated in research methodology during their medical school. Residents who took part in research during their undergraduate course also participated in research activities other than their mandatory dissertation work, which is statistically significant ($p<0.001$). The knowledge score was good in residents (60%) who obtained formal education and training in research activities from their institute, which was statistically significant ($p<0.001$). These residents who took formal education and training in research activities were also doing research activities other than their mandatory dissertation work ($p=0.005$) and also publishing research work ($P=0.04$), these associations were statistically significant. Participants who were part of the research project during their MBBS course showed interest in research activity by participating in training on research methodology conducted by their post-graduation institutions ($p<0.001$).

The practice score was comparatively low as compared to attitude and knowledge. In our study, this variation in practice score it could be because of various barriers faced by the Ophthalmology residents in the research field. The most common barriers faced by the respondents in our study were lack of guidance and lack of orientation toward research, whereas it is inadequate to finance and inadequate technical resources in postgraduate dental students in a study conducted by Sharma et al. (13) Lack of time, lack of funds and lack of interdepartmental co-operation is the other common hurdles faced by the residents in our study. Lack of time is the main obstacle faced by residents in a study conducted by Madhavrao et al. (15) and majority (86%) of the residents think that research time should be allotted separately in PG curriculum in Pawar et al. study (2). The barriers should be addressed and solutions to be made towards barriers for the increase in participation of the ophthalmology residents in the research activities helps in the development of research in ophthalmology that discovers advances in diagnosis, and treatment of ophthalmological conditions which favor mankind.

Conclusion

Medical research provides significant development, discoveries, and improvement in the healthcare system. Ophthalmology is one of the fast-evolving branches in the medical field. In our study, we found that ophthalmology residents had good knowledge and attitude toward research methodology but their practice levels were comparatively poor because of barriers like lack of guidance, orientation, and time. There is a necessity to encourage Ophthalmology residents to carry out research by providing proper guidance, funds, conducting more workshops, and by including research methodology sessions in all ophthalmic conferences. This in turn upsurge young researchers and scientists in the research field, which uplifts ophthalmology research in India.

Ethical consideration

The institutional ethics committee approved the study (KVGMCIEC20220421).

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