

# Motivators and barriers to research among doctors in the Indian medical scenario: A cross-sectional study from Karnataka, India

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## ABSTRACT

**Background:** The fundamental principles of healthcare practices and policies are derived from good quality research. Doctors collectively are a source of vast sums of invaluable information. This information if effectively utilized can improve and strengthen the healthcare system. Our study provides a comprehensive overview of the ecosystem of an Indian medical researcher. **Objectives:** To understand (1) the obstacles faced by medical professionals (2) the challenges encountered at various steps (3) the gaps in research knowledge and (4) the means to rectify them. **Method:** Doctors from medical schools, hospitals, and in private practices were approached. Data were collected through online and physical questionnaire. Data were analyzed and studied. **Results:** The total number of participants in this study is 212. Case reports (51.9%) and case-control studies (51.14%) are the most frequently conducted types of research. Lack of access to research journals (43.9%) and absence of proper guidance or mentorship (37.39%) are the commonly faced challenges among individuals who have pursued research, whereas busy schedule is the top-cited reason for not pursuing research (34.24%) and discontinuing research (57.4%). Coordinating time schedule with mentees is a challenge for mentors (49.2%). Doctors also face the greatest difficulty (48.12%) and delay (47.4%) in the publication process. On the other hand, personal interest (60.15%) and job requirement (46.61%) are the top facilitators for research. A small percentage has or knows someone that has plagiarized (21.32%) or falsified data (33.49%). Most of the doctors agree that research experience should be a mandatory part of undergrad training (81.6%). **Conclusion:** We believe interest, impact and importance of research can be the best developed and emphasized in the training years. Institutional support, adequate mentorship and an uplifting research environment can go a long way in motivating the doctors and tackling the challenges they face.

**Keywords:** Barriers, challenges, data falsification, mentorship, motivators, plagiarism, research

## Introduction

A novel approach, clearly defined objectives, methodical analysis and intelligible scientific writing are some of the

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attributes of a good quality research study.<sup>[1]</sup> Only results from such studies can contribute to identifying patterns and trends in health and disease and can consistently add to the knowledge pool. Furthermore, research is vital to ensure the optimization of healthcare practices, policies, delivery as well as standardization of treatment protocols and long-term interventions. This, in turn, leads to overall sustainable development of the nation.

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Various geographical, cultural, genetic and dietary differences make populations distinct from one another. These differences should be taken into account while tailoring medical recommendations to a population. Sound research of substantial quality and quantity, privy to these subtleties, can uplift the nation to a better state of physical and mental wellbeing.

On literature review, there has been one such study from AIIMS in India, which shows that difficulties related to statistical analysis, lack of support from the institution, shortage of time, lack of interest in research, high workload, budget difficulties, social responsibilities and lack of resources, hinders research.<sup>[2]</sup> No similar study is available from South India.

Our aim, via this study, is to address inefficiencies in the research processes that can be corrected and to recognize facilitators that can be strengthened. We have attempted to not oversimplify the multi-dimensional medical research ecosystem in India but to lay a foundation upon which further studies can be based on.

## Materials and Methods

### Study type

A cross-sectional<sup>1</sup> study using the postal/questionnaire method.<sup>[3]</sup>

### Study population and data collection

The study sample was collected using purposeful sampling due to the absence of prior studies and the inability to calculate theoretical saturation owing primarily to the vast scope of the questions posed and the postal/questionnaire format used. We have attempted to overcome this by increasing the sample size ensuring that theme saturation was obtained.

### Ethical clearance

Obtained from Father Muller Medical College Institutional Ethics Committee, Mangalore. Reference no: FMMCIEC/CCM/4092018. Ethical committee clearance obtained on 17.07.2018.

### Eligibility Criteria

- Inclusion criteria: Graduates of Bachelor of Medicine and Bachelor of Surgery (MBBS)
- Exclusion criteria: Students studying MBBS.

### Data collection

Data was collected via both online and physical questionnaire. The questionnaire focused on obtaining qualitative data. The study was designed to maintain the anonymity of the participant. For the purposes of the study, a paper was defined as a completed, published or not published work that included case reports, case series, cross-sectional studies, cohort studies, case-control studies, randomized control trials, meta-analysis or reviews. The questionnaire was designed to focus on whether a participant had written a paper and factors that facilitated or acted as a barrier to writing a paper. The questionnaire also focused on

other facets of research such as falsification of data, plagiarism, mentoring and the use of technology in research.

Doctors from medical schools, hospitals, and private practice were approached. They were selected based on convenience and accessibility. The online questionnaire permitted a small amount of non-discriminant snowballing sampling.

Responses were entered into Microsoft Excel and data compiling and analysis was carried out.

## Results

### Total population

There were total 212 responses of which 63.7% (135) of doctors have written or published at least one paper and 36.3% (77) have not.

The responses to the questionnaire were collected from various institutions; 80% of which were collected from Bangalore City and the rest were either from the state of Karnataka or unknown. 33% of responses were from medical colleges, 37% from hospitals, and the remaining 30% were from unknown institutions. Of the people that answered the questionnaire, 58% were males and 42% were females. The socio-demographic characteristics of our patient population have been listed in Table 1.

In the study population, the mean number of years since graduation was 12.73 years, with 49.5% of the population having graduated less than 10 years ago. 50.5% were specialized in clinical fields, 24% in non-clinical fields and 25% were graduates.

### Participants that have written one or more papers

Of the participants that have written a paper (135), the average number of years since their last publication was 2.53 years with SD of 3.91 years; 53% were women and 47% were men ( $\chi^2 = 0.089$ ). The average number of papers written by male participants was 7.6 papers compared to the 5.85 papers written by female participants ( $p > 0.05$ ). The mean number of papers written by those who have worked in a medical college is 8.31 papers while those that have not are 3.14 papers ( $p < 0.05$ ). 47.69% of participants ( $n = 130$ ) published the majority of their papers while working in a medical college; 30.76% as postgraduates and 13.84% as students.

The descriptive statistics, that is, mean, median, mode, SD of the total number of papers published is 6.67, 3.00, 1.00, 9.36; of papers published in journals is 6.11, 3.00, 1.0, 9.64; of papers indexed in PubMed is 2.64, 1, 0.0, 4.97, respectively.

38.3% of the doctors have published their postgraduate thesis paper.

In the following questions, participants were allowed to pick multiple, all, no options or give their reasons; therefore, each

option is represented as a percentage of the number of people that could have picked it. The most common options are described below.

The following multiple-choice questions have been summarized in Tables 2 and 3: (i) types of research done by the participants; (ii) reasons for pursuing research; (iii) research processes causing the greatest difficulty and delay; (iv) challenges faced while doing research; and (v) if doctors used advances in technology such as video calling, online shared documents, etc., to work with their research team.

### Participants that have not written any papers

The multiple choice questions listing the reasons for not pursuing research has been summarized in Table 4.

**Table 1: Socio-demographics**

1. City	Frequency	Percentage
a. Bangalore City	170	80.18
b. Other cities in Karnataka or unknown	67	19.81
<b>2. Gender</b>		
a. Male	123	58.1
b. Female	89	41.9
<b>3. Institution</b>		
a. Medical Colleges	70	33.01
b. Hospitals	78	36.79
c. Unknown	64	30.18
<b>4. Subspecialty</b>		
a. Clinical	107	50.47
b. Non clinical	51	24.05
c. Post MBBS	54	25.47

**Table 2: Participants that have written one or more papers**

1. What are the types of research that you have done? * (131 responses of 135 participants)	Frequency	Percentage
a. Case report	68	51.90
b. Cross-sectional study	67	51.14
c. Case series	43	32.82
d. Case control	35	26.71
e. Cohort	19	14.50
f. Randomized Control Trial	17	12.97
g. Meta-analysis	9	6.87
2. What are your reasons for pursuing research? * (133 responses of 135 participants)	Frequency	Percentage
a. Personal interest	80	60.15
b. Mandatory job requirement/requirement for promotion	62	46.61
c. To improve knowledge of field	56	41.35
d. To present in conferences and CMEs	49	36.84
e. Requirement for completion of degree	40	30.07
f. For recognition/acclaim	27	20.30
g. To become a prominent doctor in the field of study	10	7.51
h. To pursue career abroad/education abroad	9	6.76
3. How much do you use advances in technology (video calling, online shared documents) for working with your research team? (132 responses of 135 participants)	Frequency	Percentage
a. Not at all	7	5.3
b. Don't know how to use it	32	24.2
c. Use it but not comfortable using it	61	46.2
d. Use it and comfortable using it	29	22

### Questions relevant to both groups

Questions detailing the following: (i) reasons for discontinuing research, (ii) reasons for failure to publish completed papers, (iii) early correctional steps that could have contributed maximally towards pursuing research, and (iv) challenges faced as a mentor has been summarized in Tables 5 and 6.

Questions enumerating (i) participant's interest in mentoring, (ii) participant's knowledge to mentor, (iii) if the participant has or knows someone that has plagiarized or falsified data, and lastly, (iv) if research experience should be a mandatory part of undergraduate experience has been summarized in Figure 1.

## Discussion

### Participants who have written one or more papers

#### I. Gender

In our study population, more papers were written and published by male doctors compared to females ( $p > 0.05$ ). This corroborates with the overall global statistics of fewer papers being published by women. Studies have shown that women publish less and are less likely to be the first authors in published papers.<sup>[4]</sup> This can be attributed to several factors such as women experiencing greater work exhaustion, lack of control over work time and pace as well as inadequate institutional support for research compared to their male counterparts. In addition, women are financially disadvantaged owing to the uneven distribution of grants between male and female researchers.<sup>[5]</sup> Statistics specific to India are not available.

**Table 3: Challenges faced by participants that have written one or more papers**

<b>1. Which of the following processes did you face the greatest...? * (133 responses of 135 participants)</b>	<b>...Difficulty in? Frequency (%)</b>	<b>...Delay in? Frequency (%)</b>
a. Publication process	64 (48.12)	67 (47.40)
b. Data collection	52 (39.09)	53 (39.25)
c. Statistical analysis	49 (36.48)	20 (14.81)
d. Writing up the paper	45 (33.83)	53 (39.25)
e. Conception of idea	24 (18.04)	15 (11.11)
<b>2. What are the challenges you faced while doing research? * (123 responses of 135 participants)</b>	<b>Frequency</b>	<b>Percentage</b>
<b>I. Challenges of knowledge</b>		
a. Difficulty performing statistics	38	30.89
b. Inadequate knowledge of research methodology	35	28.45
c. Inability to identify potential research topics	21	17.07
d. Deficit in skill set for collection of data	13	10.56
<b>II. Challenges of support</b>		
e. Lack of access to journals for literature review and references	54	43.90
f. Lack of proper guidance/dedicated mentor	46	37.39
g. Insufficient or absence of funding	46	47.49
h. Lack of a team	33	26.82
i. Lack of support/encouragement in work place/institution	32	26.01
j. Unaware of means to obtain funding	22	17.88
k. Inadequate dedication from members of the team	13	10.56
<b>III. Other challenges</b>		
l. Lack of access to statistical software like SPSS	21	17.07
m. Social responsibilities	29	23.57
n. Loss of interest/motivation	25	20.32

### II. Place of work

Our data showed a higher number of publications by those who at one point worked in medical colleges ( $p < 0.05$ ). Job promotions, recognition of academic advancements, funding and support available in medical colleges are some of the reasons, we believe, contributed to this finding.

### III. Publication statistics

It is essential that physicians not only read published articles to update themselves but also to publish high-quality papers themselves.<sup>[6]</sup> Focusing on the number of publications alone would be an unhealthy and skewed view of the reality of “academic productivity” but it was the most easily available data (better options would be impact factor, number of citations, h-index, and g-index).<sup>[7]</sup>

An attempt was made to improve this view by compounding it with publications in PubMed as a stand-in for evaluation of quality. While most studies that were written were published, there was a drastic drop in papers published in journals indexed in PubMed. This raises the concern of medical researchers focusing on quantity over quality thereby hindering the progress of healthcare research.<sup>[8]</sup>

This is mirrored at a global level where India ranks 12th in the total number of publications worldwide but with citation per document of only 9.95 and h-index of 336 (c.f. the average number of citations per document and h-index of the first 10 countries are 21.29 and 758.8, respectively).<sup>[9]</sup>

### IV. Evidence-based medicine

The hierarchy of evidence is the core principle of evidence-based medicine. The hierarchy is as follows (from bottom to top): case series/cross-sectional studies (level IV) < case-controlled studies/cohort studies/non-randomized experimental trial (level III) < pseudo-randomized controlled trials (level II) < systematic review (level I).<sup>[10]</sup> In our study, the two most common types of papers written were case reports and cross-sectional studies, both belonging to the lowest level of the hierarchy. Higher the level of the study design, the more rigorous the methodology and the more likely it is that the results can be applied to the general population.

### V. Delays and difficulty in the research and publication process

The publication process includes the steps of submission of the manuscript, first check by editor in chief, subsequent checks by assistant editor, editor, and managing editor followed by a review by reviewers, revisions, and ultimately the final nod of approval for publication.<sup>[11]</sup> This is a thorough and long process with each paper going back and forth multiple times. In the era of online submissions and communications, any delay can, understandably, be a source of frustration and anxiety for the authors. This is reflected in our data where up to 50% of the individuals face the greatest difficulty as well as a delay in the publication process. The authors should strive to adhere to the guidelines of the journal, approach a journal suited to their study and ensure their write up is grammatically sound in order to avoid unnecessary delays.<sup>[12]</sup>

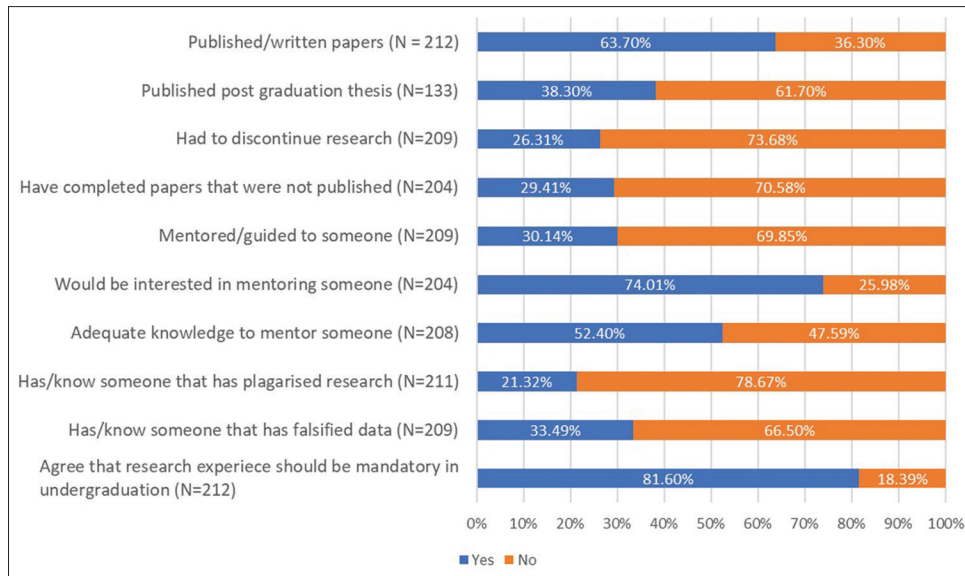


Figure 1: Graphical representation of questions applicable to both groups

If you have not pursued research, why not? * (73 responses of 77 participants)	Frequency	Percentage
a. Busy schedule	25	34.24
b. Did not come across opportunities	24	32.87
c. Never obtained any adequate/training for research	24	32.87
d. No knowledge regarding research methodology	21	28.76
e. Did not receive support/encouragement	13	17.80
f. Research is expensive	10	13.61
g. Absence of a guide	10	13.61
h. Not interested	8	10.95
i. No other colleague/friend interested in doing research	7	9.58
j. Research is only meant to be done in medical colleges	2	2.73
k. Inability to obtain ethical clearance	1	1.36
l. Research does affect my medical practice in a significant manner	1	1.36

Difficulty and delay in data collection were also faced by a sizeable proportion of the participants. This can be tackled by effective communication with the participants, building trust, having uninterrupted funds, open-minded approach, preparedness and compensation when needed.<sup>[13]</sup>

### VI. Reasons for pursuing research

In our study, personal interest is the main reason for pursuing research, followed by papers being written for job requirements or for promotions at the workplace [Figure 2]. Focusing on higher objectives such as adding to the knowledge pool or striving for excellence in their respective fields will lead to betterment in the quality of research. We believe this drive to pursue research can be instilled in individuals (as demonstrated by a Swedish cohort study over a 12-year period by Helena Mortenius *et al.* where

Have you ever mentored someone in research? What challenges did you face?	Frequency	Percentage
a. Yes	63	30.14
b. No	146	69.85
Challenges* (60 responses of 60 participants)		
a. Coordinating time schedules	31	49.20
b. Maintaining mentee’s focus and interest	25	39.68
c. Mentee had difficulty with statistics	20	31.74
d. Mentee’s busy schedule	19	30.15
e. Mentee had difficulty with data collection	18	28.57
f. Mentee’s poor knowledge of research	15	23.80
g. Inability of mentee to choose appropriate research topic	15	23.80
h. Gaps in your knowledge	13	20.63

oral [seminars, conferences] written [research bulletins, scientific reports] and digital media evoked a significant interest in research and development among healthcare professionals at a primary healthcare center).<sup>[14]</sup> Furthermore, the responsibility each individual bears towards research together with its significance and benefits should be emphasized early on in the researcher’s career.

### VII. Challenges faced while doing research

(a) Challenges of knowledge: We believe that with the clinical practice being the primary focus of the medical environment in India, doctors rarely develop or hone their research skill set. In our study, lack of access to journals for literature review and references, difficulty performing statistics, inadequate knowledge of research methodology, inability to identify research topics and deficiency in skill set for collection of data were the most commonly faced challenges [Figure 2]. Institutions should develop programs aimed at training physicians/students in research in addition to providing

**Table 6: Discontinued or unpublished research and correctional steps**

1. Have you discontinued research? If yes, why?	Frequency	Percentage
a. Yes	55	26.31
b. No	154	74.68
Reasons* (54 responses of 55 participants)		
a. Busy schedule	31	57.40
b. Poor quality data collection	23	42.59
c. Difficulty coordinating tasks with co-authors	19	35.18
d. Inadequate dedication from members of the team	19	35.18
e. Lack of support/encouragement	18	33.33
f. Loss of interest in completing the study	8	14.81
g. Difficulty performing statistics	7	12.96
h. Improper literature review	7	12.96
i. Discontinued funding	5	9.25
3. Do you have completed unpublished papers? Why?	Frequency	Percentage
a. Yes	60	29.41
b. No	144	70.58
Responses* (56 responses of 60 participants)		
a. Paper not accepted in esteemed journals	18	32.14
b. Similar study already done	16	28.57
c. Quality of paper not satisfactory	14	25
d. Multiple rejections	12	21.42
e. Lack of funds	11	19.64
f. Improper methodology	5	8.92
4. Which of the following correctional steps if done early, would have contributed maximally towards starting research? *(199 responses of 212 participants)	Frequency	Percentage
a. Mandatory research project in under-graduation	125	62.81
b. Mandatory research training in under-graduation	120	60.30
c. Compulsory research facility	110	55.27
d. Greater value for research in job placements	95	47.73

support and encouragement in their pursuits. Literature review in PubMed brings forth only a few articles that emphasize the gaps in research related knowledge.<sup>[2,15,16]</sup> Further studies are necessary to address these core issues and resolve them.

- (b) Challenges of support: The right support leads to a better research environment which in turn leads to a better support system resulting in a positive and constructive cycle. In addition, researchers themselves play an influential role in their colleagues, encouraging them to get involved in research as well.<sup>[14]</sup> Lack of proper mentors, insufficient funding points towards foundational problems in the research environment of doctors.
- (c) Other challenges: Social responsibilities, loss of interest/motivation. Challenges of inadequacy in medical recording keeping and data retrieval further compound the hassles faced by a researcher to conduct clinical studies.<sup>[17]</sup> (Note: This factor was not evaluated in our study.)

### VIII. Using advances in technology (video calling, online shared documents) for working with your research team

Although 68.2% of participants who have done research have used technology to share documents and help ease communication, only 22% are comfortable using technology. In literature review, multiple studies have focused on using technology to improve communication between the clinician and patients for the purpose of better medical care as well as follow-up of patients enrolled in clinical trials.<sup>[18,19]</sup> However, studies on the use of technology to assist working with the research team are lacking. We believe that the use of online resources reduces the traditional need for a common location to work. It also makes work hours flexible and improves communication between researchers resulting in a more efficient research team. It also helps address distance as a hindrance for interinstitutional, interstate and international studies.

### Participants that have not written any papers

Most common reasons cited for not writing papers were busy schedule, not being able to identify opportunities for research, inadequate training for research, lack of knowledge of research methodology, and lack of support and encouragement. These reasons are corrigible either by ensuring adequate training of the medical researcher or by policy changes at the level of the institution. Focusing on correcting these deficiencies will result in more doctors participating in research as evidenced by trends found in other studies on barriers to research.<sup>[20]</sup>

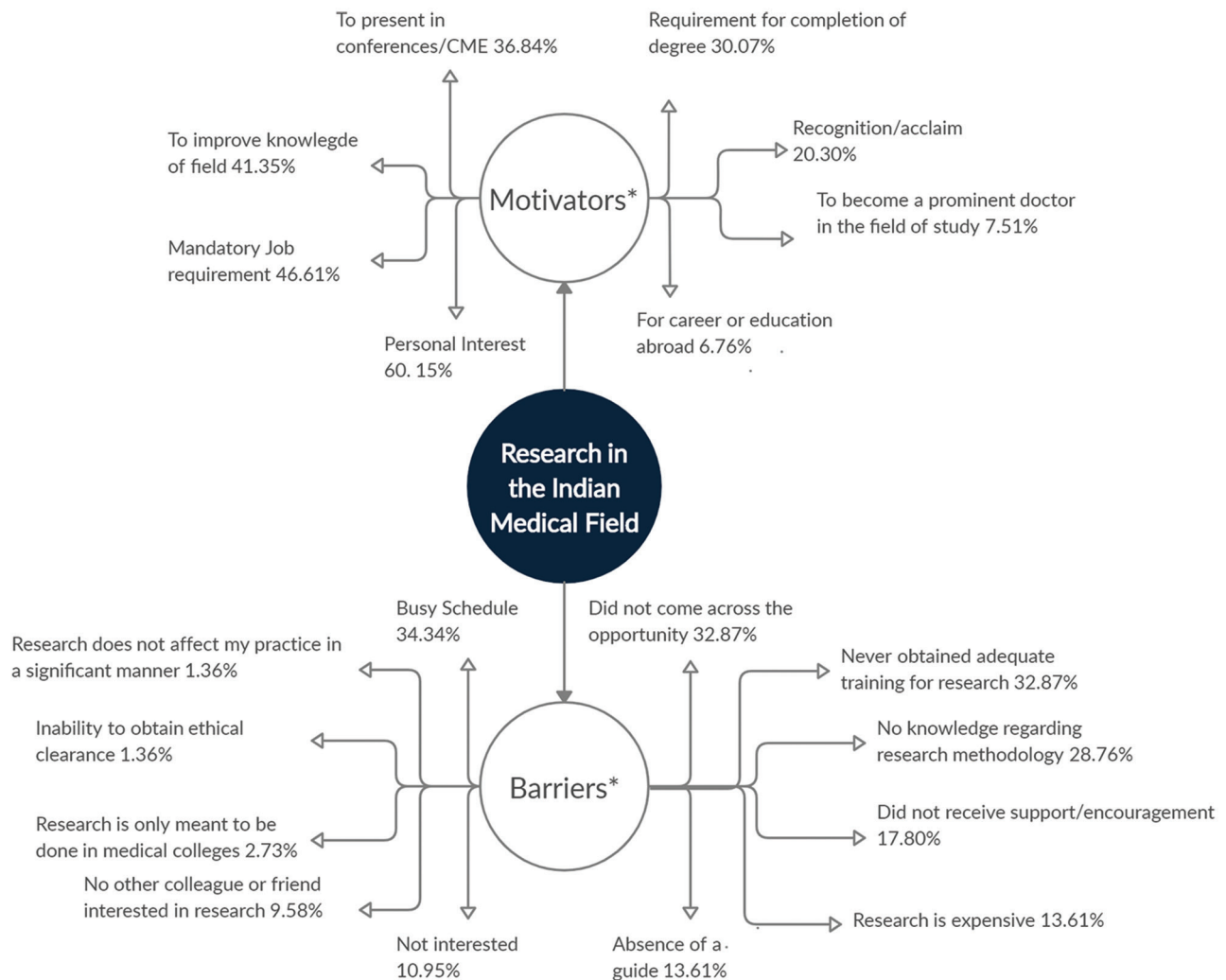
### Questions relevant to both groups

#### I. Research discontinuation or failure to publish

In our study, 26% of the participants have discontinued research (busy schedule being the most frequently picked choice followed by poor quality data collection) and 29.41% of the participants have failed to publish completed papers (rejection of manuscripts in esteemed journals and similar studies being done previously being frequent reasons). We believe that prematurely terminated research projects lead to monetary losses, futile labor and time. Many reasons can be avoided if thorough planning is undertaken at the start of the study.<sup>[21,22]</sup> Rejections can be disheartening especially since long hours are spent in writing and perfecting the manuscript. Oftentimes, incorrect journal selection can be a reason for non-acceptance. Inadequacies in the manuscript, if present, should be corrected or the paper redrafted to improve its standards. Suggestions should be taken positively to avoid feeling discouraged.<sup>[21,23]</sup>

#### II. Mentorship

A mentor is defined as “that person directly responsible for the professional development of a research trainee”.<sup>[24]</sup> They not only serve as role models but influence and hone the skills of their mentees through guidance, advice, critique and more.<sup>[25]</sup> While the right mentor can inspire, the wrong one can be equally detrimental to the growth of his/her student. The challenges encountered in a mentor-mentee relationship can arise from misaligned priorities, lack of communication, absence of mutual respect



\* Percentages indicate the percentage of all people who have answered the questions on motivators/barriers to research

**Figure 2:** Pictorial representation of the motivators and barriers to research in the Indian medical field

and understanding, mentor’s inadequate knowledge and ability to fill in the mentee’s knowledge gaps.<sup>[24,26]</sup> The latter is further demonstrated by the fact that three-quarters of the study group are interested in mentoring someone in their pursuit of research despite the results of the succeeding question where more than half of the study population does not have the adequate knowledge to mentor someone. Academic expertise together with communication and organization skills are essential qualities to take on the role of a mentor.<sup>[27]</sup> We believe that recognizing and addressing these at the onset can forestall unfruitful mentor-mentee relationships.

**III. Plagiarism and data falsification**

Plagiarism or the act of copy pasting information from another’s work and passing it off as one’s own without citation, has been aptly described as a ‘menace’ and an ‘epidemic’ that is in urgent need of curtailment.<sup>[28]</sup> In all, 21% of our study population have claimed to have or to have known someone

that has indulged in plagiarism. Falsification of data including statistics and images, like plagiarism, comes under the umbrella of scientific misconduct; 33% of our study group has or knows someone that has falsified data. Notwithstanding the reasons for their occurrence, plagiarism and data distortion of any form is condemnable, jeopardizing the credibility of the author, the research and the journal. The rise of scientific misconduct in India hurts the integrity of the entire research body on a global platform.<sup>[28]</sup> Anti-plagiarism technologies, penalties, transparent institutional processes, training in scientific writing and the importance of unadulterated research emphasized at undergraduate and postgraduate levels are some of the steps to curb these wrongdoings.<sup>[29,30]</sup>

**IV. Undergraduate training in research**

In all, 81% of our study population agreed that research experience should be a mandatory part of undergraduate training. We believe that this would not only incline students

towards purposeful research but also enhance their competency, increase their awareness and draw attention to the importance of translating clinical medicine into research and vice versa. The students would possess an overview of the entire research process, statistics, scientific writing and publication. In addition, medical students need to be encouraged to nurture an inquisitive and questioning mind through which they can identify and develop research topics. The deficits in research, their correction as well as the need and benefits of integration of research experience into the medical curricula is reiterated in several papers.<sup>[31,32]</sup>

### A note on the role of primary care doctors

Primary care in India is a growing field with one of the largest collection of doctors who work at the grass root level. While the ability to produce good quality research will show benefits throughout the medical field, we believe that the field of primary care will bear the most fruit. Such a large population of doctors is an untapped source of data and research. Primary care researchers will be able to gather a sample that is representative of the entire population. Increased funding should be directed towards research in primary care as they are the first line of contact for patients. More and more primary care physicians should be encouraged to participate in national level research as its results can lead to improve care throughout the country.

### Conclusion

According to the World Health Organization, “High-quality research is essential to achieve its constitutional objective, namely, “the attainment by all peoples of the highest possible level of health”. Research and the evidence that research yields are critical elements for improving global health and health equity, as well as economic development.” This can be made possible by every healthcare provider who is, wittingly or unwittingly, a researcher, producing data, identifying trends, implementing and testing solutions until an effective one is found. Therefore, gaining an understanding of the ecosystem of a medical researcher helps strengthen it. We believe that interest, impact and importance of research can be the best developed and emphasized in the training years. Institutional support, adequate mentorship and an uplifting research environment can go a long way in motivating the doctors and tackling the challenges they face.

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Nil.

### Conflicts of interest

There are no conflicts of interest.

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