

Original Research Article

Perception of medical interns and residents about specialty of microbiology and the role of microbiologists during COVID-19 pandemic

Imran Ahmed Khan¹, Amresh Kumar Singh^{2*}, Kamran Zaman³, D. K. Shrivastava¹

¹Department of Community Medicine, ²Department of Microbiology, BRD Medical College, Gorakhpur, Uttar Pradesh, India

³Scientist E, ICMR, Regional Medical Research Centre, Gorakhpur, Uttar Pradesh, India

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*Correspondence:

Dr. Amresh Kumar Singh,

E-mail: amresh.spggi@gmail.com

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ABSTRACT

Background: The speciality of microbiology is closely associated with keeping people healthy and disease free by accurate diagnosis of infectious diseases. In spite of this, awareness about the speciality seems to be scarce. In the present scenario, public perception about microbiology has been changed a lot. The SARS-CoV-2 pandemic has highlighted the crucial role of microbiologists in the health care system. The aim of this survey was to determine the perceptions of medical interns and residents regarding the specialty of microbiology and the role of microbiologists in maintaining and promoting health of people.

Methods: On-line survey using google form to identify perception of medical interns and residents about the speciality of microbiology.

Results: A total 298 valid responses were obtained response rate 26.02% from the participants among them 167 (56.0%) were male and 131 (44.0%) females. Though, the attitude of medical interns and residents were found positive for the speciality of microbiology, they even recognize the importance of medical microbiology in their future role as medical practitioners, but only few (3.48%) wished to opt it as their career.

Conclusions: The risks and responsibilities of a microbiologist involved in managing patients seldom get due acknowledgement. Adequate measures need to be taken to enlighten the authorities about microbiology and various responsibilities of microbiologists. The health care providers and medical teachers needed to appreciate the perception of young medical students regarding current and future trends in specialty choice and take concrete steps to meet the unmet need of health care.

Keywords: Microbiology, Infectious diseases, SARS-CoV-2, Microbiologist

INTRODUCTION

Prime Minister Shri Narendra Modi, India emphasised on the 'test, track, treat and tika (vaccine)' strategy to deal with Coronavirus disease 2019 (COVID-19), while appealing to states with rising coronavirus cases to take proactive steps to prevent a third wave if it has to occur.

Testing is done through RTPCR in specialized microbiology labs by personals trained in clinical microbiology. Though it's a multifaceted field, there is minimal awareness among the people about this compelling field and the task played by the microbiologist. Career in medical field begin as students being undifferentiated and postgraduate training ends

with most doctors specialised for a specific area of practice.¹

The medical specialties chosen by doctors for their further specialization play a crucial role in the development of health-care services of the country.² Before entering into a discussion of how the budding doctors are believed to perceive clinical microbiology it is pertinent to highlight how clinical microbiology evolved historically to its present-day status of imparting profound and positive impact on medical science. After the concept of the germ theory of disease in the mid-1880s and the development of laboratory techniques for the isolation of microorganisms (particularly bacteria), the causative agents of many common diseases were discovered one after another. Few examples illustrate this fact: anthrax (1876), gonorrhoea (1879), typhoid fever (1880), malaria (1880), tuberculosis (1882), diphtheria (1883), cholera (1884), and tetanus (1884). Some other notable successes stories of medical microbiology include the development of vaccines in the 1790s, antibiotics during the mid-20th century, and the global eradication of smallpox by 1977. Even after such great advances in identifying and controlling agents of disease, the world is still facing the threat of diseases such as AIDS and re-emergence of age-old problems such as tuberculosis, cholera, and diphtheria, and the increasing resistance of microbes to antibiotics. Basic medical science knowledge is a prerequisite for the better understanding of clinical medicine and maximizing learning.³ Medical microbiology is a branch of medicine that is primarily concerned with the prevention, diagnosis and treatment of the infections of mankind. Medical microbiology is a foundation discipline in the training of medical undergraduates and taught in medical colleges across the world as an essential subject.

Though, in comparison to other medical disciplines, microbiology has received relatively little attention. Training during undergraduate stage, medical microbiology aims to help the student learn how the most frequent agents cause infections in different body sites and how an understanding of pathogenesis impacts sample choice for diagnostic tests and its interpretations. Understanding factors and influences that may negatively or positively impact selection of microbiology as a career choice may result in strategies to combat the current trend in decreasing applications to microbiology residencies.

To our knowledge, this is the first survey of its kind exploring medical interns and residents' perception about the specialty of Microbiology and the role of Microbiologists in healthcare sector. The aim of this survey was to determine the perception of medical interns and residents regarding the specialty of microbiology and the role of microbiologists in early diagnosis, effective treatment (organisms sensitive and/or resistant to particular drugs) and prevention and control of diseases. We also assessed preference of Microbiology as a career choice.

METHODS

Type of study

On-line survey through google form using semi structured, pretested questionnaire.

Study place and period

Interns and postgraduate medical students of Uttar Pradesh during October 2nd, 2021, through October 25th, 2021.

Study participants

Any intern, non-academic resident or postgraduate medical student of Uttar Pradesh were eligible to participate in this survey. Participants from other states, Faculty and Undergraduate medical students were not included in the study.

Sampling technique and sample size

Convenient sampling technique was used. We received 298 valid responses from WhatsApp/ email sent to maximum possible participants across different medical colleges of the state. So 298 participants were considered for analysis.

Methodology

This on-line survey was conducted in October 2021 among interns and postgraduate medical students of Uttar Pradesh through google form using semi structured, pretested questionnaire to identify their perception about the speciality of microbiology and the role of microbiologists in therapeutic and preventive care. Questionnaire was formulated after review of similar study materials and discussion with faculty and pilot tested on a sample of 30 participants who were not included in final study. Necessary amendments in the questionnaire were done on the basis of pilot study result.

Questionnaires were forwarded to participants as google forms through popular social media platforms particularly WhatsApp and e-mail and the survey was open from October 2nd, 2021, through October 25th, 2021. The follow-up email/message was sent at the midpoint of the survey window to encourage participation. The questionnaire contained data on participant's characteristics (age, sex etc) and questions asked specifically about the students' experiences and exposure to microbiology in their medical school curriculum and attitudes about and knowledge of the field of microbiology.

All responses were rated using a positive-point Likert scale ranging from Disagree (1), Neutral (2) and Agree (3).

Ethical approval

Ethical approval was obtained from institute’s ethical committee before the commencement of survey.

Statistical analysis

Data was downloaded by google form in Microsoft Excel and analysis was performed using SPSS software, version 21. P<0.05% was considered to be statistically significant. Appropriate Statistical test were applied for inferential statistics.

RESULTS

Survey responses reflect participation of students from different medical colleges. We sent google form link with a brief background about the survey to participants through WhatsApp/email with mandatory first part as consent. A total 298 valid responses were obtained from the participants among them 167 (56.0%) were male and 131 (44.0%) were female. The interns and non-academic residents 115 (38.6%), junior residents 132 (44.3%) and senior residents were 51 (17.1%). The preferred branches among interns and non-academic residents are compiled in Table 1.

Table 1: Preferred branch for specialization among interns and non-academic residents.

Sr. No.	Specialization branch	Frequency	Percent
1	Medicine	28	24.34
2	Paediatrics	18	15.65
3	Obstetrics and Gynaecology	14	12.17
4	Dermatology	9	7.83
5	Radiology	7	6.09
6	Not decided yet	7	6.09
7	Orthopaedics	6	5.22
8	Anaesthesiology	5	4.35
9	Surgery	5	4.35
10	Community Medicine	5	4.35
11	Ophthalmology	4	3.48
12	Microbiology	4	3.48
13	ENT	2	1.73
14	Pathology	1	0.87
	Total	115	100.0

Respondent’s specialty choice

Personal values have been found to represent among the leading factor in choosing a specialty training.⁴ In a study conducted by Monday et al they found most participants to opt medicine, paediatrics and surgery for their future career.⁵ We found extremely high interest among the participants to make clinical subjects as carrier choice

(Table 1). During COVID-19 pandemic everyone started talking about laboratory diagnosis of diseases. The diagnosis of COVID-19 was dependent on RT-PCR (Real time reverse transcriptase polymerase chain reaction).

Table 2: Factors associated with choosing microbiology as career option among interns and non-academic residents.

Why to choose microbiology	Why not to choose microbiology
<ul style="list-style-type: none"> • Because want to study more about disease causing organisms. • Want to prevent humanity from further epidemic and pandemic • Good future of microbiology • Interested in bacteriology • It keeps on evolving and in recent covid pandemic shows that it has a lot of potential • Opportunity of research work 	<ul style="list-style-type: none"> • Absence of thrill • A bit monotonous • I don’t have interest in microbiology • Less patient interaction • Fear of getting infection • Lesser scope in India • Microscope causes headache • Little appreciation amongst patients • Stigma of nonclinical branch

This made diagnostics and microbiology in limelight. This may also influence young doctors to choose microbiology as a career option.

All the survey respondents who did not considered microbiology as career were asked to comment as to why they did not consider microbiology as a career option. Respondents quoted some reasons including interest in a different specialty, lack of interest in microbiology, less patient interaction, fear of getting infection and not interested in working in a laboratory/using a microscope.

We obtained various concerns regarding choosing microbiology as career option among interns and non-academic junior residents for future medical practice as compiled in Table 2.

Respondent exposure during graduation and perceptions about microbiology

All respondents were asked to rate statements concerning their perceptions of their exposure to the field of microbiology and their perceptions of microbiology as a medical specialty. Agreement varied across items; however, many students were not sufficiently exposed to

microbiology to consider it as a specialty, information on social media and perception of the microbiology job market do not seem to be positive, and few respondents agreed that microbiology is a highly regarded specialty.

On the other hand, many students responded that microbiologists have a good work–life balance and

microbiology offer a satisfying degree of intellectual challenge.

It should also be noted that a sizable number of respondents reported they do not know enough about microbiology to rate many statements, reinforcing the perception of a lack of exposure to the field.

Table 3: Perception of microbiology as a specialty in medical specialty.

Perception of participants about Microbiology	Mean	Std. Deviation	Median
I understand the job activities of a microbiologist.	2.71	0.454	3.00
I received adequate microbiology knowledge and training during my undergraduate time.	2.52	0.657	3.00
I was sufficiently exposed to microbiology in medical school to consider it as a career choice.	1.92	0.779	2.00
The information and knowledge I have gained to date in medical microbiology is fundamental to my future role as a physician.	2.56	0.660	3.00
A physician can't effectively treat infection without adequate knowledge of medical microbiology.	2.85	0.424	3.00
Microbiology offers adequate scholarly and research opportunities.	2.72	0.505	3.00
Microbiology offers the opportunity to utilize newer technologies.	2.85	0.391	3.00
Microbiology has limited opportunities for direct patient contact compared to other specialty.	2.66	0.621	3.00
Microbiologists have good work balance.	2.54	0.621	3.00
Microbiology offers the flexibility to work part-time.	2.60	0.590	3.00
Microbiology residents have high job satisfaction.	1.78	0.580	2.00
The time and workload demand of a microbiology residency are reasonable.	2.58	0.615	3.00

Tables 4: Attitude of microbiology residents towards microbiology.

Reasons quoted for choosing microbiology	Number	Percentage
I found it a very interesting subject and I want to work on my laboratory practices	17	30.9
Best possible option at my PG entrance rank	12	21.8
Due to upcoming large scale modern investigations and their use in diagnosing vast majority of diseases in markedly less time.	7	12.7
For Clinical correlation of Infectious disease	4	7.3
Microbiology enhances our understanding of various diseases and their cures. It involves diagnosis, treatment and prevention of the spread of infection in hospitals and the community. This specialty is laboratory-based, but this specialty has a major contribution to clinical infection management.	4	7.3
It is an emerging branch in antibiotic resistance	4	7.3
A brighter future.	4	7.3
Because my spouse is pathologist	3	5.4
Total	55	100

Senior and junior residents were asked to comment as to why they ultimately did (55 respondents; 30.05%) or did not choose (128 respondents; 69.95%) microbiology as a career (Table 4).

Thematic analysis of these comments identified some common themes among respondents. For those respondents who chose microbiology for their career,

common reasons pointed out were their interest in clinical correlation of infectious diseases, found it interesting, expecting brighter future and best possible branch at their postgraduate entrance rank.

Binomial logistic regression analysis was done for residents of microbiology and other specialty residents with their attitude. The statistically significant relations are compiled in Table 5.

Table 5: Regression analysis of residents (senior and junior).

Reason/causes of opting Microbiology as a carrier	Sig.	Odds ratio	95% Confidence Interval	
			Lower	Upper
I was sufficiently exposed to microbiology in medical school to consider it as a career choice.	0.040	2.086	1.036	4.202
The information and knowledge I have gained to date in medical microbiology is fundamental to my future role as a physician.	0.001	5.903	2.078	16.765
Microbiology offers adequate scholarly and research opportunities.	0.016	41.128	1.972	857.670
Microbiology has limited opportunities for direct patient contact compared to other specialty.	0.010	0.210	0.064	0.687
The microbiology job market is strong.	0.000	0.094	0.025	0.349

DISCUSSION

There is a definite shortage of medical manpower in our country. The postgraduate aspirants prefer certain specialties to the neglect of others. This creates imbalance in workforce and difficulty in proper health care delivery. To the medical undergraduate, candidate will be faced with the question of what specialty he is interested in the moment he enters medical school. The medical specialties chosen by medical practitioners as their careers is an important determinant of the future supply of doctors in different specialties, and it is important for the planning of the workforce of health-care services.⁷ There are a number of factors affecting a resident's choice for opting a postgraduate stream. Few among them are the social status of the specialty, the expected economic benefit to be obtained, the existence of a role model and quality of education given in the selected residency program have been mentioned in many studies.⁸

Our study shows Internal medicine, surgery, gynaecology/obstetrics, paediatrics, orthopaedics, radiology as more preferred medical streams by young medical aspirants. Similar results were also obtained by few other researchers in past.^{9,10} A study conducted in India by Gupta et al revealed that medical students have a positive attitude to basic medical sciences.¹¹ But very little number opt for it as a career option. The majority of the participants agreed that medical microbiology is valuable to their training and practice as clinicians. Mohammed et al reported that only 4% of final year medical students in the University of Maiduguri were interested in studying medical microbiology at graduate level.¹²

Other studies have also shown that most medical students do not consider taking up a career in medical microbiology.¹³ Microbiology is the core component of any medical curriculum and important in clinical medical practices. Poor integration of basic medical sciences with clinical practice during medical education may undermine the relevance of these subjects and

microbiology too.¹⁴ Flexibility of working hours and the probability of having more free time were also found to be among important determinants of specialty choices of medical students.¹⁵ In a study conducted in turkey job satisfaction of infectious diseases and clinical microbiology residents was found high.⁶

In our study, these factors were also found relevant. This may-be related to stressful atmosphere and prolonged working hours in residency programmes in most clinical streams, which are shown as deterrent factors as found in literature.¹⁶ One interesting finding in our study was, adequate scholarly and research opportunities being provided by microbiology speciality. This was also seen during COVID-19 pandemic, when microbiology personnel were engaged in various training programmes of health man force, public sensitization and adding to existing literature in the form of publications.

The knowledge of microbiology could be used to understand causal mechanisms of a disease processes (especially infectious and immunological) that improve the accuracy of diagnostic formulations which reflect in overall control of such health issues. Additionally, this knowledge provides a consistent conceptual framework to which diagnostic information is applied to increase comprehension of disease processes.¹⁷

The role of microbiologists in the present era is not only confined to visualising organisms under microscope but also in developing new pharmaceutical products, vaccines, medicines, conducting research projects and training of healthcare workforce etc. they are also a valuable asset in food industry through testing of food/food products for microbial contamination.

Under its different methods suggested for prevention of food spoilage and preservation techniques monitored. The use of microorganism in production of a number of food products are new field of food industry and a lot has been done. Also, the concept of modern hygiene in clinical medicine as well as the development of

immunization and vaccination was devised through an understanding of infectious diseases and the immune response to infection.

Limitations

Recruitment via social media may exclude participants not routinely using these platforms and add to nonresponse pool. The study analysed only few variables but there may be additional influential variables, accordingly further researches should be devoted to find this knowledge gap.

CONCLUSION

This study shows that the young medical students recognize the importance of medical microbiology in their future role as medical practitioners. The risks and responsibility by microbiologists actually involved in managing patients are seldom get due acknowledgement. Adequate measures need to be taken to enlighten the authorities about microbiology and various responsibilities of microbiologists. Microbiologists, like many other researchers today, must work to meet the demand of generating scientifically sound research that is also socially and economically relevant. To achieve this, they must actively engage with funding incentives, a wide range of disciplines and technologies, and involvement of various stakeholders.

Recommendations

Finding of this study may guide health administrators and educators as they should act wisely to make a balanced medical manpower across the various specialties. Strategies must be made to attract medical students to such unpopular specialties like microbiology, pharmacology etc.

They may include the use of role models to encourage medical students, giving priorities to employment in such areas and due allowance for trainees and specialties in such field. Various stakeholders must work synergistically to develop a balanced workforce to manage different health problems. Health care providers and medical teachers needed to appreciate the perception of young medics regarding current and future trends in specialty choice and take concrete steps to meet the unmet need of health care.

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