




# Subspecialization, Senior Residency, or Private Practice: The Dilemma of Final-Year Radiology Postgraduate Residents in India

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## Abstract

**Background** Radiology is among India's top five speciality choices pursued by meritorious medical graduates. With the advent of the subspecialization degree courses, fellowships, the requirement of senior residency as faculty eligibility criteria, and the lucrative option of private practice, the final-year postgraduates are given opportunities to choose from but with little guidance on what and how to choose. This study aims to analyze the views of the final-year radiology postgraduate residents in India regarding their understanding of how to proceed in their professional life with options available.

**Materials and Methods** A cross-sectional, questionnaire-based study was conducted online via Google forms distributed via email and social media platforms. The questionnaire was prepared after going through previous literature, video blogs, and media available on the Internet and was further validated for content.

**Results** About half (48%) of them wished to pursue higher studies in the form of Doctorate of Medicine (DM) degree courses or fellowships. Almost three-quarters of the participants preferred short-term subspecialization via fellowships over 3-year DM courses (28%). Regarding clinical practice, 61.9% preferred to take up senior residency, while slightly over one-third (35.7%) expressed their will to move on to private practice.

**Conclusion** A relative conundrum was observed in the decision to take up senior residency or private practice or to go for DM but had to pursue a fellowship due to limited choice in topics and seats available in the country for subspecialization.

## Keywords

- ▶ radiology
- ▶ questionnaire-based study
- ▶ fellowship
- ▶ Doctorate of Medicine (DM)
- ▶ senior residency
- ▶ postgraduate residents

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## Introduction

Radiology epitomizes a perfect example of the amalgamation of technology in health care services. As with other medical sciences, radiology also has undergone incredible advancement trespassing its boundaries from diagnostic to minimally invasive therapeutics, thus, opening the gateway to several subspecialties.<sup>1</sup>

Many Indian studies have reported radiology among the top five speciality choices pursued by meritorious medical graduates.<sup>2-4</sup> Almost 10,000 radiologists are practicing across India, and over 1500 are added to this pool annually.<sup>5,6</sup> Previously, after investing nearly a decade in education and training, these meritorious radiologists would likely go for a decent-paying job in the private sector rather than pursuing academics. However, the last few years have observed a change in this approach due to the emergence of subspecialization degree courses (Doctorate of Medicine, DM) and short-term fellowship courses. As it is said, "Once an academic, always an academic," the charm of contributing to the pool of knowledge is likely preferred if given an opportunity.<sup>4,7</sup>

At present, the postgraduates of radiology are presented with the conundrum of whether to go for subspecialization, fellowships, or continue the clinical practice of patient services in private settings after the 3-year course. This can be attributed to the fact that radiology, as a postgraduate specialization, is presented as a terminal academic branch during the medical under-graduation tenure, a branch with no subspecialties. A similar dilemma was there three decades ago when super-specialization was introduced in medicine and surgery. However, now most of the postgraduates of general medicine and surgery prefer to go for a DM or Master of Chirurgiae (M.Ch.) or Diplomate of National Board (DNB) subspeciality or short duration fellowship courses, as subspecialization is the defining characteristics of today's health care services.<sup>3,8,9</sup>

The literature presents numerous citations in the form of editorials and brief communications on the importance of subspecialization in radiology and the direction in which the senior residency program has drifted in India.<sup>8,10-13</sup> However, the literature lacks any reported evidence presenting the thought process of radiology postgraduate residents regarding the path they would like to pursue after completing their postgraduation. The present study provides a window to these thoughts of young and talented minds regarding their approach to the avenues presented.

## Materials and Methods

The present cross-sectional, questionnaire-based study was conducted online from January to May 2022. The questionnaire was prepared on Google forms and was distributed in different medical institutes (government/central/private institutes) across all Indian states and union territories where postgraduate courses in radiology are being undertaken (**Supplementary Material**, available online only). The questionnaire was distributed via email and social media

applications like WhatsApp and Telegram. The form explained the study's aims and objective for the participant's pertinent information. It was mentioned that only participants willing to provide their informed consent should respond to the questions. A total of 210 participants provided their responses, which regionally comprised of 50 from institutes of Northern India (15—Delhi, 13—Uttar Pradesh, 8—Punjab, 2—Himachal Pradesh, 7—Haryana, 3—Chandigarh, 2—Jammu & Kashmir); 29 from East (10—West Bengal, 13—Orissa, 5—Bihar, 1—Jharkhand); 42 from West (29—Maharashtra, 9—Gujrat, 4—Rajasthan); 69 from South (26—Tamil Nadu, 3—Andhra, 5—Kerala, 17—Karnataka, 15—Telangana, 3—Pondicherry); and 10 each from central (10—Madhya Pradesh) and North-Eastern (6—Assam, 4—Meghalaya) parts of the India.

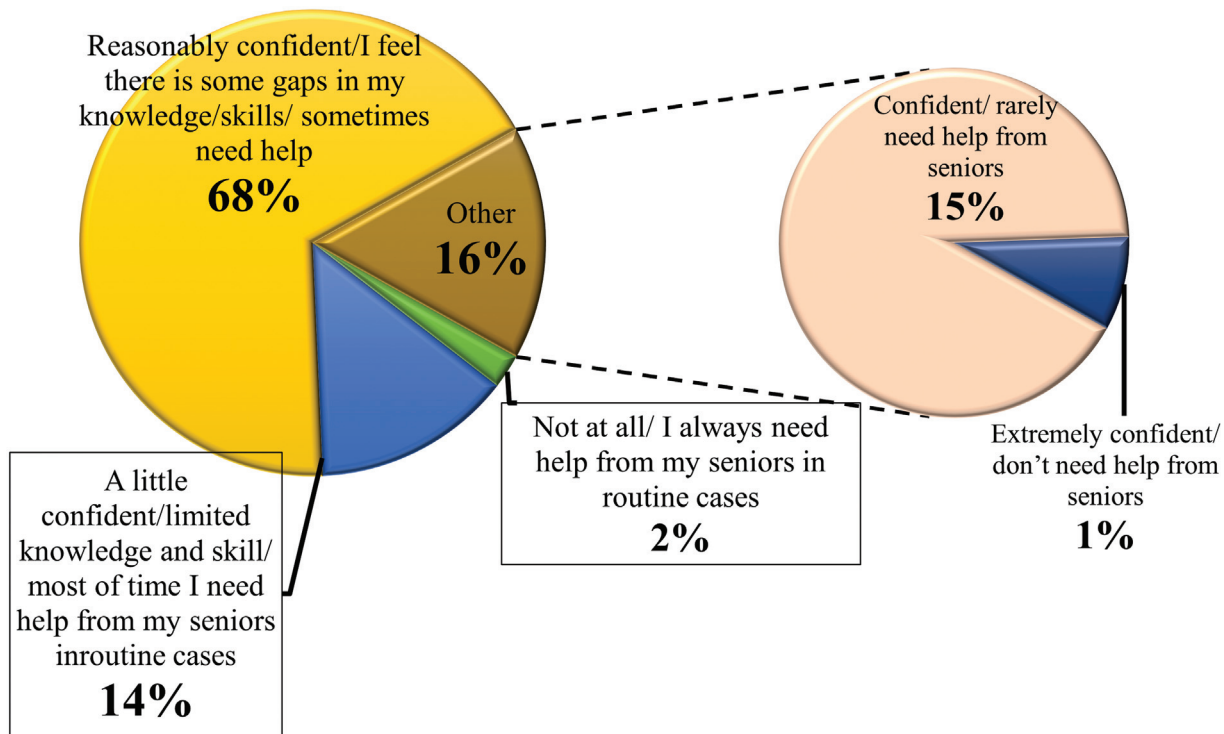
The study targeted the final-year or third-year postgraduate students pursuing MD (Doctor of Medicine) or DNB degree courses in the department of radiodiagnosis in different medical institutes across the country. The response of residents seeking diplomas in the respective subject was not included as the duration of the course is only 2 years, and they are not eligible to pursue subspecialization degree courses in India.

The questionnaire was prepared after going through previous literature, video blogs, and media available on the Internet regarding the new avenues of subspecialties in radiology. To begin with, the questionnaire had 22 structured or close-ended questions with multiple choice. The face validation to ensure the standard of readability, feasibility, layout, and clarity of words of the initial draft were done by three subject experts. Since multiple experts were involved, therefore to validate the content, the content validity index for the scale—average (S-CVI/Ave) was calculated for the structured questionnaires. The S-CVI/Ave values for eight questions came out to be 0.85. The rest of the questions whose S-CVI/Ave values were less than 0.8 were removed.

The experts advised that a close-ended or structured questionnaire does not allow the participants to explain the choice they have opted for while responding to a question, which on the contrary, was the main objective of the study, that is, to understand the perspective of the residents regarding their decision for the direction in which they wish to progress professionally. The literature also supports the view of the experts regarding the inclusion of open-ended questions. Thereafter, a few structured follow-up questions were provided with open-ended questions, which allowed the interested participants to write a few lines explaining the choice they had selected. This inclusion led the questionnaire to have a total of 29 questions.

The questionnaire was then divided into parts. The first part accumulated the demographic data such as age, sex, type of course being pursued (MD or DNB), the institute where the course is being taken, the state where the institute is located, and whether the institute belongs government/central/private sector.

The second part enquired the respondents regarding their satisfaction with the course they are pursuing, the level of



**Fig. 1** Pi-chart presentation showing the frequency distribution for the response of final-year radiology postgraduate participants on the question regarding the level of confidence they have in their skill and knowledge after 3 years of residency.

confidence they have in their knowledge and skill, and what will be their next step after completion of the degree course.

The third and most significant part of the questionnaire had both close and open-ended questions that probed around the choices made by the participant postgraduates related to their decision for the future.

The statistical application to the questionnaire response was limited to percentage evaluation only.

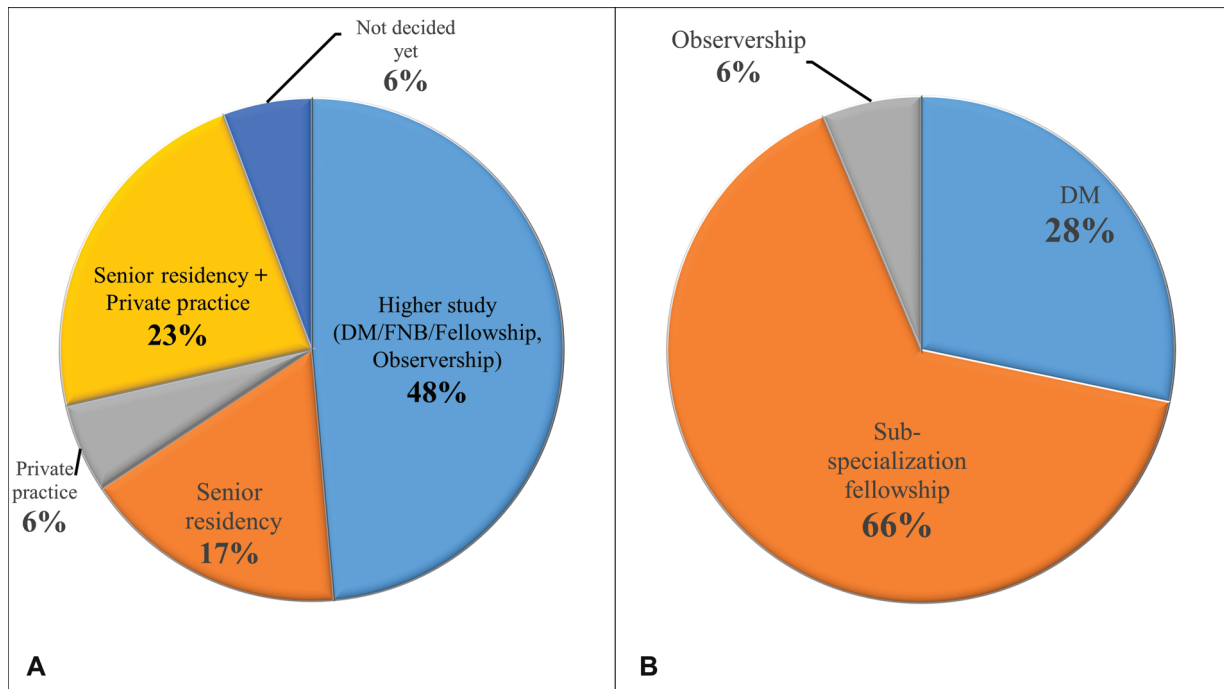
## Results

The age range of the participants was observed to be 24 to 40 years, with approximately two-thirds belonging to the male gender (63.3%, females = 36.7%). Most of the postgraduate respondents were pursuing MD degree course (81%) and only 19% were in the DNB course. The majority of the participants were from private institutes (47.6%), followed by state government institutes (41.9%) and central institutes (10.5%).

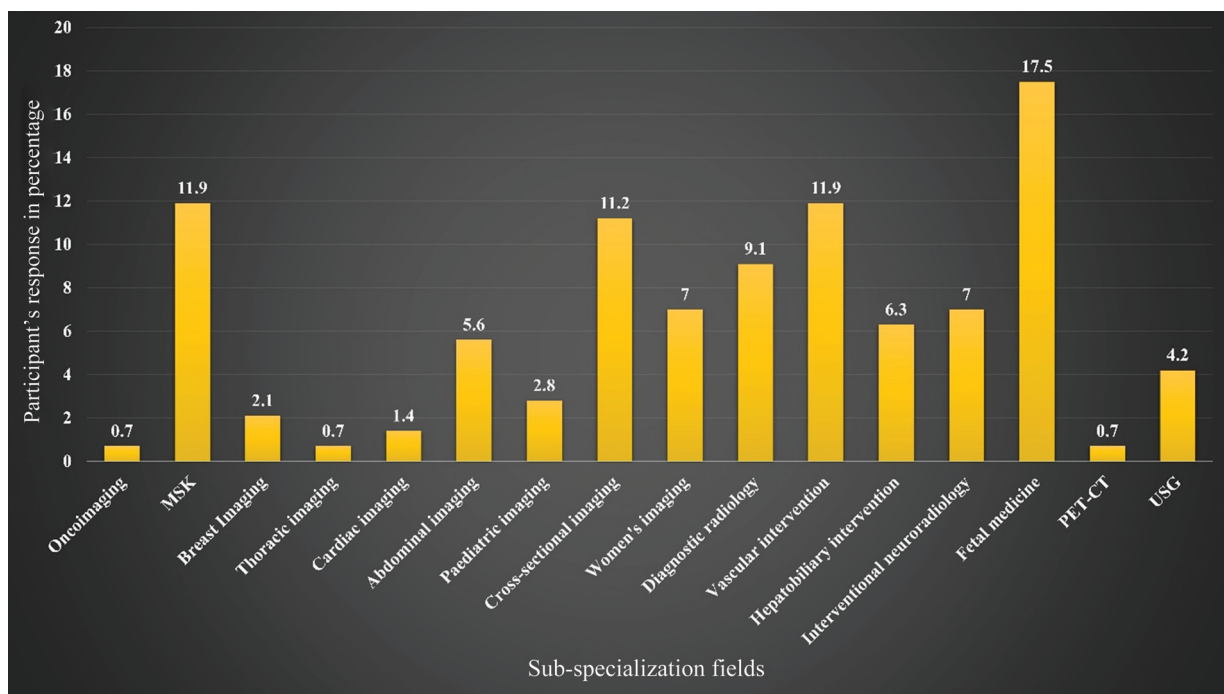
Slightly over two-thirds of the participants (68.6%) were reasonably confident and acknowledged that their skill and knowledge concerning radiology have minimal lacunae for which they need to consult their seniors. The rest of the respondents could be equally divided (16.2% each) between confident/ extremely confident ones who rarely/do not require any further consult and the ones who had little or no confidence in their acquired knowledge and skill and are in regular need of expert opinion on their diagnosis in routine cases (→ **Fig. 1**). Regional differences in confidence on their skill were observed among residents as 82% of North, and Eastern India residents were reasonably confident com-

pared to 66% of North-Eastern states, 60% of Southern states, and 54.8% of Western states of the country.

Among the participants, almost three-fourths (73.4%) were vastly satisfied with their choice of specialization, while one-fourth were little to reasonably satisfied. When regionally analyzed, it was observed that the residents of the institutes from North-Eastern states were most (66.7%) satisfied with their choice of specialization, followed by those from Central (57.1%), Northern (52%), Western (47.6%), Southern (45.3%), and Eastern (32.1%) states of India. On being asked about the direction in which they would like to steer their career, nearly half (48%) of the participants expressed their wish to pursue higher studies in the form of DM degree courses, fellowships, or observerships (→ **Fig. 2A**). Overall, most of these participants prefer higher studies in diagnostics (55.1%) over interventional (44.9%) radiology. While an equal number of participants from Southern (29.3% each) and North-Eastern (50% each) states opted for either form of higher study, those from North (38%), East (25%), and Western parts (38.1%) opted for diagnostic radiology. Most participants from Central India (57.1%) preferred interventional radiology for higher studies. Thereafter on being further quizzed about their choices of higher studies, it was observed that short-term subspecialization via fellowships or observerships was preferred (72%) over a 3-year DM degree course (28%; → **Fig. 2B**). Mostly the participants of North-Eastern (50% participant from the region) part preferred the 3-year DM degree course over the short-term subspecialization. For fellowships, fetal medicine (17.5%) was preferred over musculoskeletal, vascular intervention radiology (11.9% each), and the rest of the subspecialties



**Fig. 2** Frequency distribution for the response of final-year radiology postgraduates regarding (A) their preference they would pursue after residency; (B) their preference of higher academic affiliations. DM, Doctorate of Medicine; FNB, Fellowship of National Board.



**Fig. 3** Histogram showing the frequency distribution for the preference of topics for subspecialization by the final-year radiology postgraduate participants. PET-CT, positron emission tomography-computed tomography; USG, ultrasonography.

followed thereafter (→ **Fig. 3**). The residents favored fellowships in India (64.4%) over abroad institutes (35.6%).

Subsequently, 60% of the respondents were willing to appear for foreign fellowship examinations such as FRCR (Fellow of the Royal College of Radiologists), FRANZCR (Fellow of the Royal Australian and New Zealand College of Radiologists), and EDiR (European Diploma in Radiology), to name a few, wherein over half of them-all

believed in the added benefit of these academic affiliations.

A mixed response was observed to the notion of difference in career prospects for MD and DNB radiology residents. An equal number of responses was obtained in favor and against the notion (28.1%), while a large portion of 43% could not precisely determine their thoughts on the statement.



Among all the participants, regarding clinical practice, 61.9% preferred senior residency in the same institute where they are taking up their postgraduation, while slightly over one-third (35.7%) expressed their will for moving on to private practice in a diagnostic center (13.3%), or a corporate hospital (11.9%), or built a setup of their own (10.5%).

## Discussion

In India, health care services are primarily dedicated to providing basic facilities to the masses. Therefore, broad specialists in medicine, surgery, obstetrics, and radiology are immensely valuable to the system than the super-specialists or subspecialists. This is added to the country's medical undergraduate curriculum, which aims to generate a workforce of general practitioners to serve the population's health needs.<sup>14</sup>

The amalgamation of technology with medical facilities in the recent past has led to a revolution in health care services and has subsequently exposed the health care personnel to new avenues in different specialities. In the era of growing artificial intelligence, clinical culture in radiology, turf wars, and teleradiology, the future radiologists have to be skilled in a particular subspecialty to keep themselves a notch ahead.<sup>14</sup> But postgraduate residents often face the conundrum regarding the subspecialty they should pursue.<sup>3,15,16</sup> While choosing the speciality for postgraduation, the residents had time and also the guidance of seniors from the speciality of their choice. However, while selecting the topic of subspecialty after their postgraduation, they lack the time and, in most instances, proper guidance to select the same.<sup>2</sup> The present study allowed us to visualize and analyze the thought procedure of the final-year postgraduate radiology residents facing the conundrum of subspecialty.

The country has over 1,500 seats for MD and DNB radiology, which are chosen by the top rankers of the postgraduate entrance examinations conducted by the National Board of Examinations (NBE).<sup>2,5</sup> As per the response to the present study questionnaire, the radiology postgraduate residents are mostly satisfied with the confidence in the skill and knowledge they gained during their training of 3 years. Following postgraduate training, options for the subsequent stage include senior residency, private practice, or the most preferred ideology of acquiring further specialization via higher university affiliations. The higher academic affiliation can be in the form of a Doctorate of Medicine (DM), Fellowship of National Board (FNB), fellowship/observership in subspecialties via getting trained in private or government centers or by writing foreign fellowship examinations such as FRCR (Fellow of the Royal College of Radiologists), FRANZCR (Fellow of the Royal Australian and New Zealand College of Radiologists), and EDiR (European Diploma in Radiology).

Being a scholar, the academician in them always pushes these postgraduate residents to pursue higher academic affiliations. These affiliations are also termed subspecialization or super-specialization. In radiology, the subspecialization is divided into two broad categories: diagnostic and

interventional radiology.<sup>13,17-19</sup> Among the broad specialities, the residents prefer diagnostic radiology, citing the abundance of opportunities in terms of seats for taking up the training and in the number of centers where one can practice. Though the number of training centers and centers providing services of interventional radiology is on a rise in the country, only a three-year long Doctorate of Medicine (DM) in the course is being formally accredited as an academic affiliation by the National Medical Commission (NMC), the medical licensing authority of India.<sup>17</sup>

Fellowship/observership in subspecialty courses is usually of 1-year duration.<sup>9,20</sup> As only a few premier institutes provide these courses, the residents opt for a private center conducting the fellowship course. This allows ease in admission and bypasses the criteria of qualifying for any competitive examinations. Being a short-duration course provides the aspirant with an option to have fellowships in multiple subspecialties. The most preferred subspecialization topics for fellowship, as per the current study observations, are fetal medicine (17.5%) followed by musculoskeletal radiology (11.9%), and vascular intervention radiology (11.9%). The radiologists in the United States of America prefer to subspecialize in neuroradiology (10.1%) followed by breast imaging (8.4%) as per Rosenkrantz et al, which was regionally supported by the findings of Smith et al who observed the most preferred subspecialization to be neuroradiology followed by interventional and breast imaging.<sup>21,22</sup>

The participants of the current study equally opted for the option of doing these fellowships in India or abroad. The home country was favored for "being trained by the country stalwarts" or "simply being close to home." Abroad education attracts students for the reasons such as, "being trained in an environment of highly structured training protocols," or for having a variety of subspecialty topics to choose from, which are sparsely available in India (such as women, imaging, fetal medicine).<sup>15,23,24</sup> Also, as previously mentioned, that most of the fellowship courses in radiology in India are not recognized by the NMC; hence, they could not be presented as post-PG-academic qualifications. Another option for getting a fellowship degree was writing foreign fellowship examinations such as FRCR, FRANZCR, and EDiR. The demerit lies in the fact that these do not provide the candidate with any hands-on practical exposure, thus having no benefit regarding skill enhancements but adds to the academic portfolio.<sup>23,24</sup>

Other than higher academic affiliations, the resident can pursue the avenues of senior residency, private practice, or a combination of both. The NMC expects residents of any specialities to pursue a 3-year senior residency in their respective departments in an institute where they can get a seat. This is also mandatory for eligibility to become a medical college faculty member.<sup>8</sup> As per the response obtained in the present study, senior residency is preferred to "gain more knowledge," "to further improve their skill," "to avoid facing another competitive examination," or "just to have some time to decide the further course of their profession." Premier institutes such as All India Institute of Medical Sciences (AIIMS), Jawaharlal Institute of Postgraduate

Medical Education and Research (JIPMER), Postgraduate Institute of Medical Sciences (PGIMS), Sanjay Gandhi Postgraduate Institute of Medical Sciences (SGPGIMS), and Christian Medical College (CMC) are among the few which attract almost all the residents to pursue their senior residency. Still, due to limited availability of seats, a tough competition has to be cleared via written examination or interview or both.<sup>2</sup>

On the other hand, private practice is an open option for all, which can be pursued in a corporate hospital, diagnostic center, or a setup of their own.<sup>4</sup> Across the globe, the substantial economic benefits in private practice lure even the best in the academic field too. The opportunity of senior residency in India has been limited to just eligibility criteria one needs to fulfill to get a prestigious faculty post in a medical college. Whereas abroad, the senior residents are pushed to take up a subspecialty fellowship for the same duration.<sup>25</sup> In addition, very few centers in our country have subspecialty fellowship programs to absorb their passing-out residents. Thereafter, even if a resident gets decent exposure to a subspecialty for 3 years, they are handed over an experience certificate mentioning the completion of senior residency tenure as a general radiologist. This makes the senior residency program less attractive compared to private consultancy, where the pay package is much better, and at specific centers the radiologist might be able to pursue the modality and subspecialty of their choice.

Additionally, with the upcoming of several government and private medical colleges, there has been a distorted relationship between the number of required and the number of radiologists produced. To address the increasing demands, the authorities (NMC) have reduced senior residency tenure to 1-year duration. The skewed relation between the demand and supply of radiologists has evolved the senior residency program situation from being mandatory to being altogether avoided.<sup>3,25,26</sup>

A few steps taken by the regulatory authorities and the radiological bodies concerning subspecialization include initiation of FNB fellowships in radiology subspecialty (body magnetic resonance imaging, cross-sectional body imaging, breast imaging, neurovascular intervention) by the NBE in India since 2019, to which the residents can enroll via the FET (Fellowship Entrance Test). Also, the Indian College of Radiology and Imaging (ICRI), an academic wing of the Indian radiological imaging Association (IRIA), has initiated a 1-year fellowship in various subspecialties of diagnostic and interventional radiology through fellowship entrance tests.<sup>27</sup> This competency-based training will be provided by subspecialized faculties/consultants in tertiary-level premier institutes.

Recognizing the Fellowship/PDCC (postdoctoral certificate course) degrees by including them in the schedule of the Indian Medical Council Act of 1956 after consideration by the competent authority will further make students interested in taking up these higher studies. Multiple fellowships/PDCC courses are offered across different institutes, most of which are accredited by various state universities or deemed universities. Also, some institutes, primarily diagnostic centers, offer nonaccredited fellowships.<sup>28</sup> With the advent of digital transformation in education, few online/remote international fel-

lowship options are available with hands-on online training by expert mentors. These are short-term courses for skill enhancement, with a course duration of a few days to weeks, especially suited for busy radiologists.<sup>29,30</sup>

The government can further invest in creating opportunities for radiology training in premier central and state institutions. Furthermore, subspecialized consultants working in tertiary-level corporate or private hospitals can initiate 6 months short-term fellowship programs. The integrated approach to subspecialization will equip clinical radiologists to work in an interdisciplinary manner. This will further radiology's cause in resolving turf wars from other medical disciplines (such as obstetrics & gynecology, cardiology, orthopaedics, and rheumatology, among others), as mentioned by Dr. Christian Loewe in a talk titled "8 ways radiology can win turf battles."<sup>31</sup>

Future studies can include a gender-based response to an additionally structured questionnaire, which could help to analyze the views of male and female radiologists on the same situation. Also, a larger sample size would help get more clarity on the preferred topics and modalities of subspecialization. The open-ended questionnaire could include a mode of validation.

In conclusion, the present study helps to analyze the views of the final-year radiology postgraduate residents regarding the next step they wish to take for the betterment of their careers. The majority were observed to choose higher academic affiliations in diagnostic radiology via fellowship subspecialization either in India or abroad. A relative conundrum was observed in the decision to take up senior residency or private practice, as well as in having the wish to go for DM but had to pursue fellowship due to limited choice in topics and seats of subspecialization available in the country. The senior residency program has to be made attractive to pursue, rather than just being taken up to fulfil the eligibility for a faculty post. The options of subspecialization (such as musculoskeletal radiology, fetal medicine, cardiac radiology, thoracic radiology, pediatric radiology, neuroradiology, and interventional radiology) have to be made available in most centers so that the residents can consciously decide the topic they would take up for fellowship in their senior residency tenure. The wide variety of options will also ensure the availability of specialist radiologists in adequate numbers for the future.

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#### Conflict of Interest

None declared.

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#### References

- 1 Jankharia B. The business of radiology. *Indian J Radiol Imaging* 2010;20(04):239

- 2 Arora R. The training and practice of radiology in India: current trends. *Quant Imaging Med Surg* 2014;4(06):449–450
- 3 Krishnamurthy R. The subspecialty conundrum. *Indian J Radiol Imaging* 2010;20(03):237–238
- 4 Sohoni CA. Do most radiologists in India really have a choice? *Indian J Radiol Imaging* 2015;25(02):207–208
- 5 Your Chanakya. MD RADIOLOGY / MD RADIODIAGNOSIS [Internet]. Accessed January 10, 2023 at: <https://yourchanakya.com/md-radiodiagnosis-md-radiology>
- 6 Akhter S There is a surfeit of Indian doctors globally, but we have a shortage of doctors: Dr. Sunita Maheshwari [Internet]. *ETHealthworld.com*. 2019 [cited 2019 Sep 1]. Accessed January 10, 2023 at: <https://health.economicstimes.indiatimes.com/news/industry/there-is-a-surfeit-of-indian-doctors-globally-but-we-have-a-shortage-of-doctors-within-india-dr-sunita-maheshwari/>
- 7 Sreekar H, Nithya R, Nikhitha R, Sreeharsha H. Career intentions of medical students trained in India. *Educ Health (Abingdon)* 2014; 27(01):64–65
- 8 Mohan C. Redefining radiology senior residency - can we provide an alternative to "The Consultant Job". *Indian J Radiol Imaging* 2017;27(04):367–368
- 9 Atlas SW. Embracing subspecialization: the key to the survival of radiology. *J Am Coll Radiol* 2007;4(11):752–753
- 10 Marks JE. Subspecialization in radiation oncology. *Int J Radiat Oncol Biol Phys* 1992;24(05):987–988
- 11 Mohan C. Subspecialization in radiology - is it time to hatch out of the cocoon? *Indian J Radiol Imaging* 2017;27(03):261–262
- 12 Williams CR. Re: Embracing subspecialization: the key to the survival of radiology. *J Am Coll Radiol* 2008;5(03):229–230
- 13 Brigadier Chander Mohan S. Guest editorial: interventional radiology in India - the road ahead. *Indian J Radiol Imaging* 2008;18(02):148–149
- 14 Mohan C. Is next-generation radiologist ready for the challenges? *Indian J Radiol Imaging* 2019;29(01):2–3
- 15 Mohan C. Subspecialty training opportunities in radiology in India - the way forward. *Indian J Radiol Imaging* 2016;26(01):1
- 16 Therakathu J, Yadav VK, Keshava SN, Gibikote S, Chavan GB, Shroff M. The current status of pediatric radiology in India: a conference-based survey. *Indian J Radiol Imaging* 2017;27(01):73–77
- 17 Nidugala Keshava S, Kalva S. Interventional radiology training in India. *J Clin Intervent Radiol ISVIR* 2017;1:67–67
- 18 Madhusudhan KS, Srivastava DN, Sharma S, Sharma S. Interventional radiology in India. *Am J Roentgenol* 2018;211(04):730–735
- 19 Crewson PE, Sunshine JH. Diagnostic radiologists' subspecialization and fields of practice. *Am J Roentgenol* 2000;174(05):1203–1209
- 20 Reddy KN, Grewal HS. Comment on: Subspecialization in radiology - is it time to hatch out of the cocoon? *Indian J Radiol Imaging* 2019;29(01):106–107
- 21 Rosenkrantz AB, Wang W, Hughes DR, Duszak R Jr. Generalist versus subspecialist characteristics of the U.S. radiologist workforce. *Radiology* 2018;286(03):929–937
- 22 Smith GG, Thrall JH, Pentecost MJ, et al. Subspecialization in radiology and radiation oncology. *J Am Coll Radiol* 2009;6(03):147–159.e4
- 23 Therakathu J, Keshava SN, Thippeswamy PB, Chandramohan A. Overseas exams - perception of audience in a conference symposium: a survey. *Indian J Radiol Imaging* 2015;25(02):206–207
- 24 Thaker S, Botchu R, Gupta H. Insights into obtaining FRCR and beyond: Obstacles, opportunities and post-relocation dilemma - an Indian perspective. *Indian J Radiol Imaging* 2020;30(01):70–76
- 25 Alderson PO. A balanced subspecialization strategy for radiology in the new millennium. *AJR Am J Roentgenol* 2000;175(01):7–8
- 26 Jain SN. Pursuing a radiology career: private practice or academic? *Indian J Radiol Imaging* 2014;24(03):207–208
- 27 Notification F-ICRI. Indian Radiological And Imaging Association. Accessed January 10, 2023 at: <https://iria.org.in/icri-fellowship-notification/f-icri-notification/>
- 28 CAFEROENTGEN Radiology Fellowships, DMs and Super-Specialty DNBs in India [Internet]. *Cafe Roentgen*. 2020. Accessed January 10, 2023 at: <https://caferoentgen.com/2020/02/29/radiology-fellowships-dms-and-super-specialty-dnbs-in-india/>
- 29 Online Fellowships. Accessed January 10, 2023 at: <https://academy.telemedicineclinic.com/fellowships/online/>
- 30 Online Radiology Fellowships from MRI Online MRI Online. Accessed January 10, 2023 at: <https://mrionline.com/remote-fellowships/>
- 31 Yee KM. 8 ways radiology can win turf battles. *AuntMinnie.com*. Accessed January 10, 2023 at: <https://www.auntminnie.com/index.aspx?sec=ser&sub=def&pag=dis&ItemID=116797>