

**ADDIS ABABA UNIVERSITY
COLLEGE OF HEALTH SCIENCES
SCHOOL OF GRADUATE STUDIES
DEPARTMENT OF RADIOLOGY**



Attitude, practice, and barriers in Academic research among Radiology residents in Ethiopia, a cross sectional survey

Principal investigator: Dr. Abdi Dandena, Radiology resident (R3)

Advisors: Dr. Tesfaye Kebede, Body imaging subspecialist

A research for preparation of senior paper to be submitted to the radiology department, college of health science, Addis Ababa university in preparation for partial fulfillment of the requirements for the post graduate study in radiology.

ABBREVIATIONS

AAU- Addis Ababa University

ERMP – Ethiopian residency matching Program

CBTP – Community based training program

TTP – Team Training Program

Abstract

Background: Radiology has become one of the most sought out residency program in the country attracting highly talented qualified candidates from all over the country. the objective of the study was to determine the attitude, practice and barriers of radiology residents towards academic research

Method: A descriptive cross sectional survey was conducted across all five institutions currently giving radiology residency programs in the country the survey was carried out from 12/16/2020 to 12/12/2021. Using a questionnaires' that were distributed to the residents online using google docs.

Results: There were a total of 120 radiology residents participated in the study. 93(77.5%) of the participants were male while the rest 27 (22.5%) were female. With the mean age of the participants was 30 years of age. Out of the 120 residents only 6 (5%) of them have published a research paper and from the residents with previous publication only three had more than one publication. 92.6% of the respondents were found to have a positive attitude towards academic research. Some of the major barrier to research identified by the study were the lack of time due to heavy workload which was an issue for 99(85.3%) of the residents, followed by lack of Training course 78(67.2%), inadequate Mentor Support 63(54.3%), inadequate financial support 60(51.7%).

Conclusions: The study has showed that the overall attitude of radiology residents across the country towards academic research was positive but the practice of the residents in various academic research activities was found to be low. The authors recommend that all the stakeholders in radiology post graduate education to encourage residents in their academic pursuits by providing the necessary time and resources needed to perform quality research

INTRODUCTION

Medical research is a systematic process implemented to get new knowledge on disease causation, diagnosis and treatment and it's an important component in the development of medical science and health care and is critical for keeping up with the rapidly evolving field of medicine. For these reasons many believe that research should be integrated in the curriculum of medical education.(1)

However, health research has been a low priority area in the developing world, mostly due to lack of the necessary infrastructure needed to cultivate research minded competent health professionals. And it being not fiscally rewarding venture for most health professionals.(2)

Radiology is currently one of the most competitive residency programs in Ethiopia attracting highly talented and accomplished candidates from across the country. Since the initiation of the Ethiopian residency matching program (ERMP) back in 2017, out of the 20 different residency programs offered across the country radiology has constantly been the number one sought out residency program in the country with the number of applicants exceeding the number of available spots by many folds. (Fig 1)

Consequently the pool of radiology residents currently enrolled in the different programs across the country are more talented and academically minded than ever before. With many of the high scorers in medical school ending up in one of the radiology residency programs across the country.

And usually when highly educated and motivated residents are engaged in clinical practice they will be quick to recognize that there are gaps that are apparent in their day to day practice be it a knowledge gap or lack of facilities which prevents the delivery of the much needed care to the patients. This is more so in residents practicing in areas with limited setups like low income countries.(3)

Although this observation holds a great promise for the field of radiology in the country, the presence of highly talented and highly qualified doctors in a residency program doesn't necessarily correlate with great academics with the abilities to innovate and conduct practice changing research that can better elevate the care provided to patients.

One of the obstacles that residents face is the lack of a protected time for research away from the rituals of the day to day clinical activities which can be very demanding in the field of radiology. Due to vastness of the field of radiology and due to the limited time of 3 years for completion of a radiology residency program residents tend to be focused on sharpening their clinical skills rather than engage in research activities.

Additionally, to conduct a quality research project residents should be equipped with the skill and knowledge about research methodology which is unfortunately a neglected part of both the undergraduate and the post graduate medical education which needs much attention so that the graduating residents can reach their full potential in their academic careers.

Almost all the universities that are currently providing radiology residency programs require a solo research project as a requirement to fulfill the post graduate study but the infrastructure to support high impact researches are usually unavailable to most residents and most residents resort to retrospective studies during their residency. Although retrospective studies have an important role for teaching residents on how to conduct a research, write up a paper and in some cases serve as a guide to develop a hypothesis for future prospective studies. However in most cases these studies fail to stimulate the interest

of the trainees into pursuing more studies in the future and their impact in furthering the service provided by the department and to the overall science of radiology is very limited.

Methods

Study Design, Study area and Study period

A descriptive cross sectional survey was conducted across all five institutions currently giving radiology residency programs in the country which included Addis Ababa University, university Gondar, Mekelle University, St Paul Hospital Millennium medical College, and Bahir Dar University starting from the oldest medical school to start giving a radiology residency program in the country to the newest institution to begin the program. The survey was carried out from 12/16/2020 to 12/12/2021.

Study Population and Sampling method

All willing Residents which were enrolled at one of the Radiology Residency programs across the country during the study period were considered as the study population. And during the study period there were a total of 175 Radiology Residents studying across the country hence, using a standard error of 0.05 and a confidence interval of 95% a sample size of 120 was reached.

Data collection

A pretested structured questionnaires' was used to collect the data. The questionnaires' was adopted from a validated questionnaire by Vodopivec, et al and was modified to be relevant to radiology residents. The questionnaire had been adopted by similar studies in the country as well as other developing nations. The questionnaire was pre tested on 5 radiology residents studying at Addis Ababa University and had undergone slight modification following feedbacks received from the residents. The questions in the questionnaires' were then converted to digital form using Google Docs website and the website links were sent to all the residents across the country using shared social media platforms including personal emails and telegram accounts.

The questionnaire consisted of three parts: residents profile which include sociodemographic data, educational background and research backgrounds. The second part consists of attitude regarding research and consists of 9 questions that are answerable using the 5 point Likert scale. The questions were randomized to combat any bias that will be introduced by order and reverse coded questions were placed to detect any inconsistent response during the survey. And respondents which had inconsistencies in their response were excluded during the Data analysis (4)(5)

The third part consists of research practice and barriers experienced among residents which included both yes and no questions as well as multiple choice questions which assessed the residents prior engagement in various academic research activities and some of the barriers which are faced by residents in their academic pursuits.

Operational definitions

Attitude: The feeling of the participants towards the scientific inquiry process, statistics, literature review and critical appraisal of evidence.(6)

Practice: previous engagement in any research endeavors such as prior publications, presentations, case reports and participation in activities like workshops for research methodology.(7)

Attitude score: from the nine Likert score questions which assessed attitude a mean score was calculated and a score of 0.01- 1.0 was regarded as having a strong disagreement, from 1.01 to 2.0 was regarded as disagreement and from 2.01-3.0 was regarded as neutral, from 3.01-4.0 was regarded as agreement and from 4.01-5.0 as strong agreement. And residents with a mean attitude score above 3.0 were considered as having a positive Attitude towards academic research during residency and residents which had a score of less than 3.0 were considered to have a negative attitude towards academic research during residency. (8)

Data Analysis

Data was downloaded from the google doc's website into an Excel spreadsheet and was converted into a Spss dataset where it was proof read manually to maintain the quality of the data. The data was then analyzed using an IBM Spss v24 software. And the data was presented using graphs and tables.

Socio-demographic data were analyzed by frequency, proportions, mean, median and standard deviation Likert scale items were calculated using a mean score from the five Likert- type items.

Ethical consideration

The study was approved by the college of health sciences institutional review board. And only willing residents opted in to participate in the study and the names and other unique identifiers of the participants were not taken for the sake of confidentiality.

Results

There were a total of 120 radiology residents participated in the study. 93(77.5%) of the participants were male while the rest 27 (22.5%) were female. With the mean age of the participants was 30 years of age. And 35(29.2%) of the participants were married. The majority of the study participants were final year residents. 68 (56.3%) of the residents were sponsored from Academic institutions while the other 52(43.3%) residents were sponsored from regional hospitals (Table 1)

Out of the 120 residents only 6 (5%) of them have published a research paper and from the residents with previous publication only three had more than one publication. And 14(11.7%) of the residents have participated in research activities in addition to mandatory dissertation. 12(10%) of the residents have participated in the writing of a case report during their residency program. Only one resident has presented his research paper on a conference, which was at a regional level. 54(45%) of the residents read academic journals at a regular basis. And 18(15%) of Residents have participated in a research methodology workshop in the past. (Table 2)

On the questions regarding attitude of radiology residents regarding academic research from the 120 residents 16 of the respondents were omitted due to inconsistent answers. And from the 104 valid responses most of the residents 102(96.2%) were shown to have a positive attitude towards academic research with a mean attitude score of 3.78. (Table 3)

And regarding the topic of research training the residents would like to learn on training on proposal writing was the number one issue with 93(80.9%) of the residents requiring further training followed by research methodology design with 89(77.7%), how to publish in journals 88(76.5%), grant writing 68(59.1%) and research ethics(51.3 %) (Fig 2)

Some of the major barrier and difficulties that were faced by the residents that were identified by the study were the lack of time due to heavy workload which was an issue for 99(85.3%) of the residents, followed by lack of Training course 78(67.2%), inadequate Mentor Support 63(54.3%), inadequate financial support 60(51.7%) as well as lack of access to equipment's or research materials, complicated paper work, lack of eligible patients for their research and lack of acknowledgment for their work. (Fig 3)

There was a statistically significant association found between being Educated at jimma university in undergraduate studies and publishing a research paper in a journal. Practice of publishing was not found to have an association with gender, marital status, mode of learning and type of sponsoring institution. (Table 4)

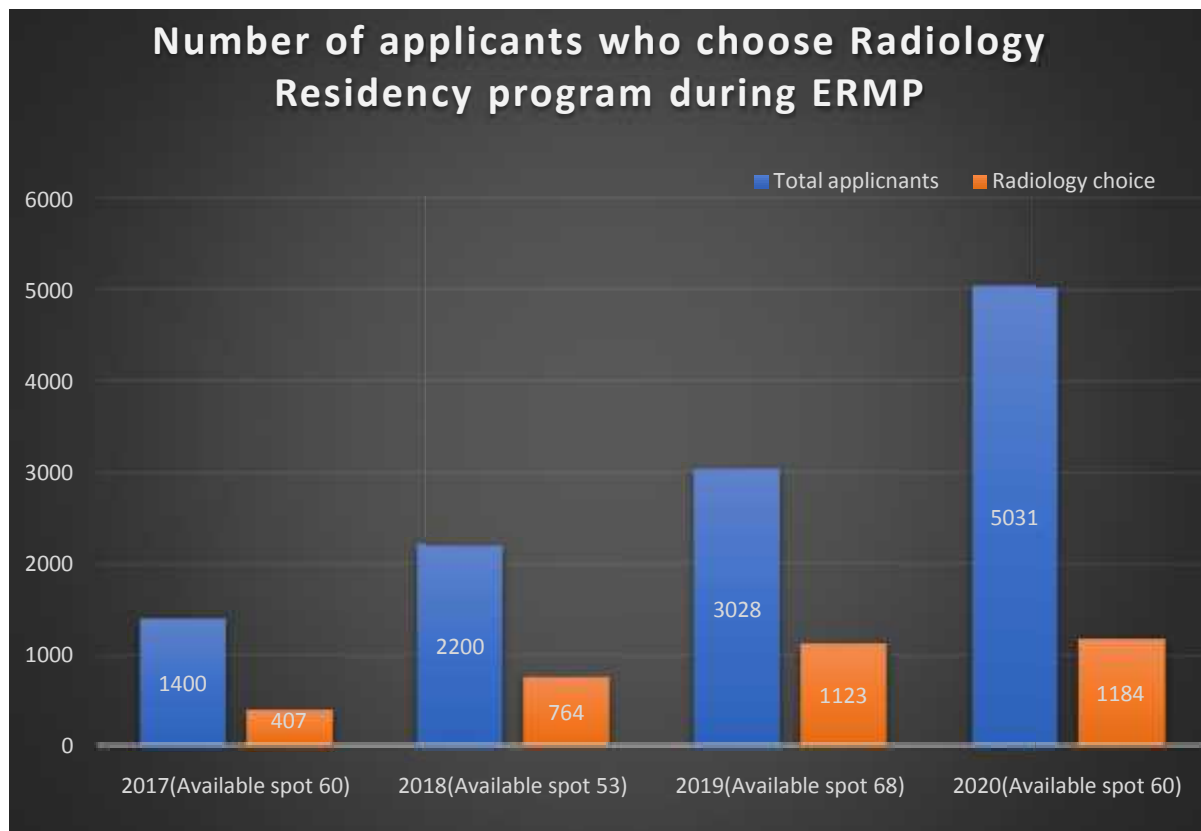


Figure 1: The number of total applicants versus Radiology residency applicants over the past four Ethiopian Residency matching Exams (ERMP) from 2017-2020

Table 1: background information of Radiology Residents who participated in the study

Age	Number	percentage
< 25 years	3	2.5%
25-29 years	62	51.7%
30-34 years	53	33.3%
>35 years	2	1.7%
Sex		
Male	93	77.5%
Female	27	22.5%
Marital Status		
Married	35	29.2%
Single	85	70.8%
Year of Residency		
R1	21	17.5%
R2	33	27.5%
R3	66	55%
Sponsoring institutions		
Academic institutions	68	56.7%

Regional Hospitals	52	43.3%
Mode of Undergraduate Learning		
Problem based learning	16	13.3%
Lecture based learning	103	85.8%
Previous exposure to research in undergraduate studies		
Performed a group research	85	70.8%
Performed a solo research	35	29.2%

Table 2: Research practice among Radiology residents who participated in the study

Questions	Yes N (%)	No N (%)
Have you published a research paper before?	6(5%)	114(95%)
Have you presented your research in a conference?	1(0.8%)	119(99.2%)
Have you worked on a case report during your residency?	12(10%)	108(90%)
Have you worked on a research project other than the mandatory dissertation during your residency?	14(11.7%)	106(88.3%)
Do you read scientific journals regularly?	54(45%)	66(55%)
Have you participated in a critical appraisal of research paper?	12(10%)	108(90%)
Have you ever participated in a research methodology workshop?	18(15%)	101(85%)
Have you ever written a grant proposal for a research project?	55(45.8%)	65(54.2)

Table 3: Attitude of residents regarding academic research practice in radiology residency (N = 104)

Questions	Strongly Disagree N (%)	Disagree N (%)	Neutral N (%)	Agree N (%)	Strongly agree N (%)		
Training in medical research methodology should be included in radiology residency program	2(1.9%)	0	6(5.7%)	40(37.7%)	58(54.7%)	Attitude score	
Engaging in medical research can improve patients outcome	1(1%)	0	4(3.8%)	36(34.6%)	63(60.6%)	< 3.00 N (%)	>3.00 N (%)
Engaging in research increase the burden on radiology Residents	3(2.8%)	19(17.9%)	19(17.9%)	41(38.7%)	24(22.6%)	4 (3.8)	102 (96.2)
Research should be mandatory for appearing in final exams in post graduate studies	10(9.4%)	29(27.4%)	22(20.8%)	33(31.1%)	12(11.3%)	Mean attitude score 3.78	
Research time should be allotted separately during radiology residency training	0	2(1.9)	8(7.5%)	46(43.4%)	50(47.2%)		
Radiology resident's should not engage in Research Activities	38(35.8%)	52(49.1%)	12(11.3%)	2(1.9%)	2(1.9%)		
Radiology residents are given adequate training on Research methodology	26(24.5%)	30(28.3%)	44(41.5%)	5(4.7%)	1(0.9%)		
I am confident in my abilities to carrying out research in the field of radiology	4(3.8%)	15(14.3%)	30(28.6%)	42(40%)	14(13.2%)		
I want to carry out Medical research In the field of radiology in the Future.	0	3(2.8%)	15(1.2%)	50(7.2%)	38(35.8%)		

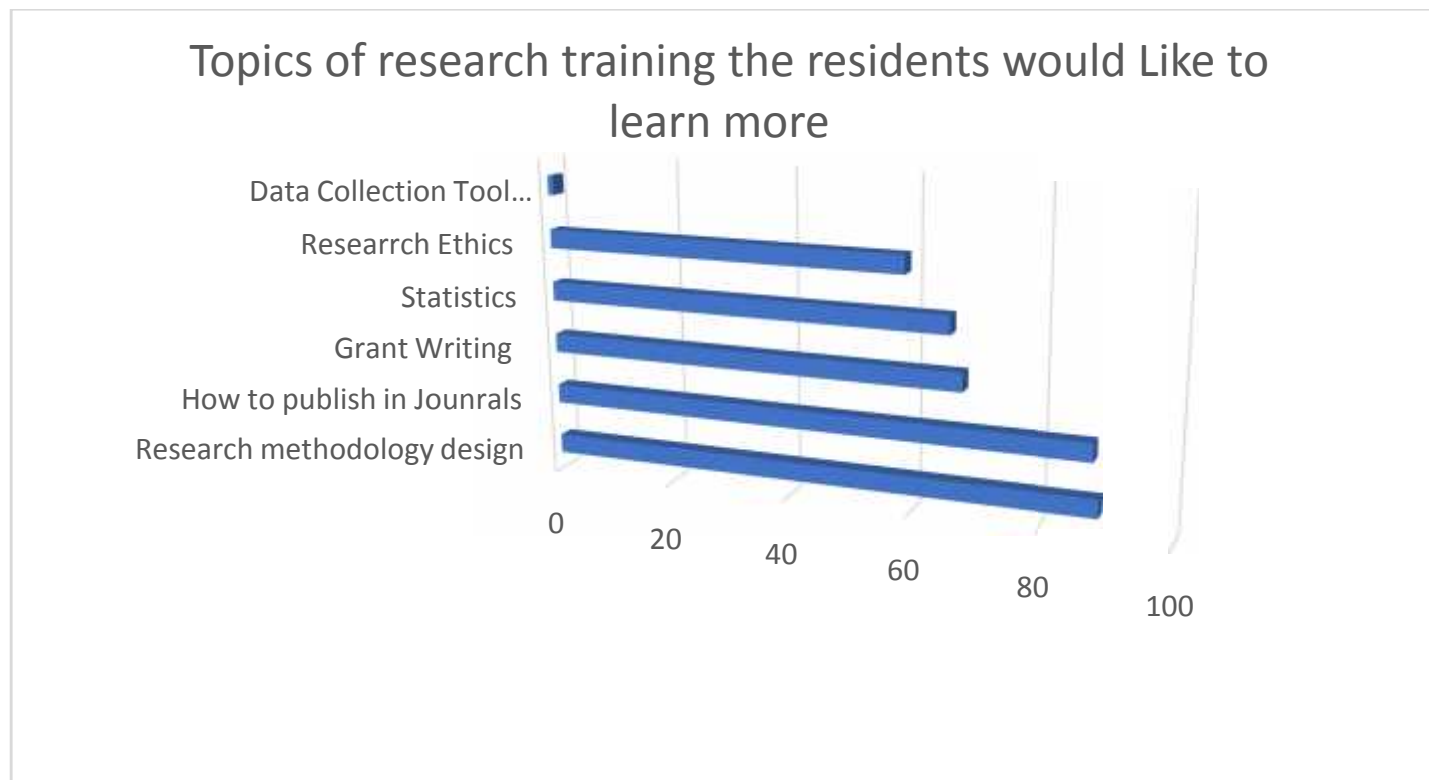


Fig 2 : Topic of research training that radiology residents would like to learn more

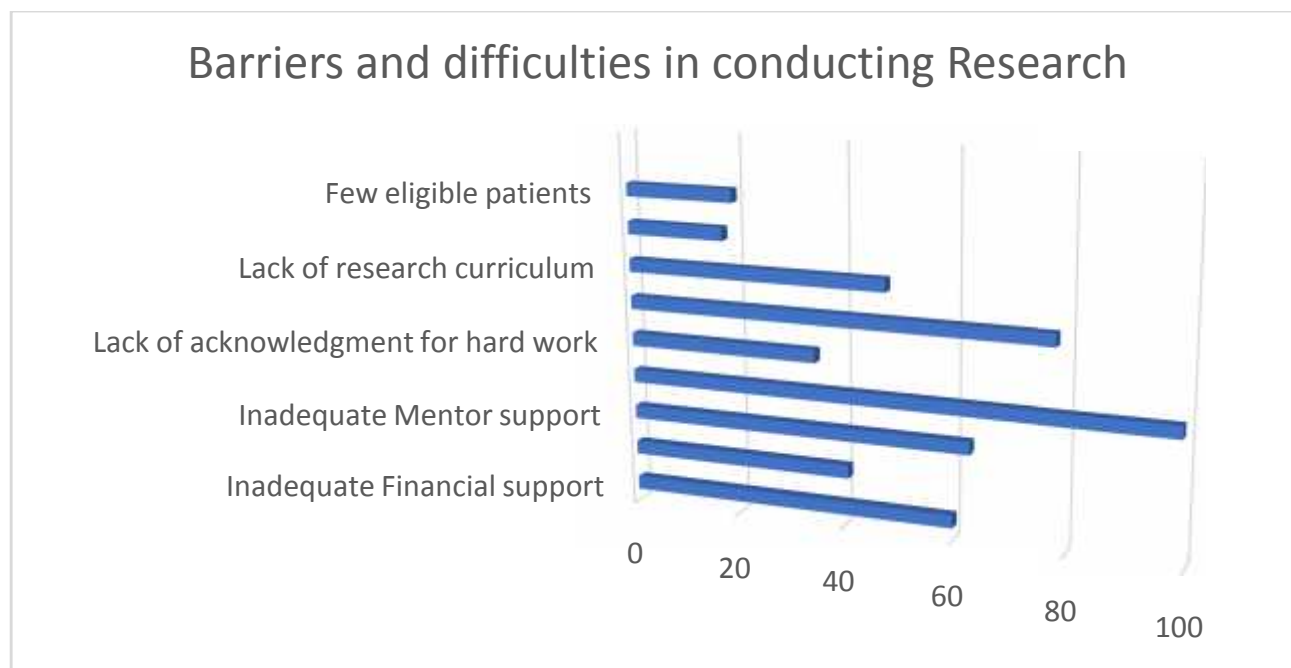


Fig 3: Barriers and Difficulties faced by Radiology residents in conducting Research.

Table 4 factors affecting publication outcomes in Radiology residents

Factors assessed	Publication outcomes		P- Value
	Residents that published	Residents that didn't publish	
Gender			0.812
Male	5	88	
Female	1	26	
Marital status			0.249
Single	3	82	
Married	3	32	
Mode of learning			0.594
Lecture based learning	6	97	
Problem based learning	0	16	
Sponsoring institution			0.612
Academic institution	64	4	
Regional hospitals	50	2	
Undergraduate studies			0.008
Jimma University	4	23	
Other university	2	91	

Discussion

The study has showed that the overall attitude of radiology residents across the country towards academic research was positive but the practice of the residents in various academic research activities was found to be low. These findings were similar to other studies conducted in the country, in a study conducted at Black lion hospital, Addis Ababa university 344 residents from all the different departments in the hospital were evaluated and the study showed an overall positive attitude towards an academic research.(1) Some of the possible reasons that could explain the disparity between the attitude and practice could be the medical educational curriculum in Ethiopia is oriented very heavily in theoretical aspects and research is not given due attention in both undergraduate and post graduate studies.

The study didn't find any gender and other socio demographic finding which affected the residents Attitude and practice of academic research but has found that there were more than three times male residents compared to female residents, this gender gap is also seen in studies in other countries as well other medical specialties in Ethiopia were women tend to make up a significant minority.(9)(10) This disparity can be explained by the fewer female medical doctors in the country secondary to various cultural and social factors.(11)

The study has shown that only few residents have published a research paper in the past and fewer were able to present their paper In conference and this finding is seen in many studies globally where disparity has been shown between positive attitude towards research and actual participation in research among health care professionals.(12) This disparities can be addressed by integrating research initiatives and competitions into the residency programs to promote the residents engage in research activities. And all stakeholder including the universities and the professional organizations including the Radiology society of Ethiopia should provide platforms for residents to present their research papers. And it's been shown that residency programs that adopt active research programs significantly enrich the residents education.(3)

Our study has found the only factor shown to be statistically significant pertaining to resident's publication outcomes was having an undergraduate training at Jimma University. This May be due to the policy and philosophy of Jimma university which requires every undergraduate medical student to engage in community based training programs (CBTP) during their stay at medical school and a Team training

program (TTP) in their internship year. These programs help students understand the practice of academic research with each student having to actively participate in the collection, analysis and interpretation of data starting from freshman year finally culminating into a mandatory solo research project for the fulfillment of undergraduate degree in medicine.(13,14)

One of the main difficulties faced by residents in conducting research was the lack of time due to a heavy workload from their day to day work and many studies have shown that giving residents a protected time to critically read and understand the published literature and attend methodology lectures can positively correlate with a resident's research productivity.(15,16)(17)

Other important barriers identified in the study were inadequate mentor support, lack of training, inadequate financial support and lack of recognition for their hard work. These factors were also noted in a study conducted with dermatology residents and has been shown to cause residents to lose interest in pursuing academic careers.(18) Similarly, limited time, poor research training, inadequate source of funding and inadequate mentor support were also found to be major hurdles for academic research in studies conducted in India, Pakistan and Saudi Arabia. (19–21)

Although it may not be possible to fully address all the barriers that affect resident's research productivity studies have found simple research enhancing strategies including a regular journal club, allotting a dedicated protected time for research, hiring of research faculty, initiating research awards, recognitions, grant competitions and organizing platforms where residents can present their findings in annual conferences and meetings has been shown to increase the research production of residents in radiology departments. (Pakistan paper)

The study also highlighted that most of the residents have not presented their researches in academic conference's. Although opportunities to perform high impact researches are not always easy to come by institutions should support residents pursue such projects by creating grants and having dedicated faculty mentors from the radiology department as well as other ancillary departments like public health and epidemiology to give the residents all the necessary tools to conduct their grand research projects that can shape the practice of radiology in the future.

Conclusion

Radiology has become one of the most sought out residency program in the country attracting highly talented qualified candidates from all over the country and the study has highlighted that there is a positive attitude among current radiology resident for academic research but the practice and engagement in any academic research activities is very low. And several barriers faced by radiology residents were identified in the study including lack of time, lack of training, inadequate financial and mentor support.

Recommendations

The authors recommend that all the stakeholders in radiology post graduate education to encourage residents in their academic pursuits by providing the necessary time and resources needed to perform quality research. Additionally, programs which incentivize residents to pursue more difficult and high impact reseraches should be implemented such as organizing annual prizes for best research and providing the necessary platforms for residents to present their finding to their colleagues.

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