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### **Clinical Radiology research in Pakistan: From evidence to practice**

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#### **Abstract**

**Objective:** To assess the clinical radiology research productivity in Pakistan by type of publication, sources of funding and name of journals.

**Methods:** A systematic search strategy using key words related to techniques and type of clinical radiology was carried out to identify various studies published in Indexed (Medline) and non-indexed (Pakmedinet) medical journals.

**Results:** Total of 397 studies were identified out of which 173(43%) from Medline (indexed database) and 220 (57%) from pakmedinet (Indexed and non-indexed database of Pakistan Medical journals). Original articles were 294 (74%) but most of them (68%) were published in non-indexed journals and significantly different from other articles types (case reports, short reports, review articles and letter to editors) (p-value <0.001). No Randomized Controlled Trial was identified. No research was funded by any formal financial agency. As high as 78% of indexed studies were published by radiology centers of Sind province. Private hospitals having radiology department contributed significantly in indexed journals compared to government hospitals (p-value <0.001). Majority (74%) of the studies were done by radiologists as compared to other non-radiology clinical colleagues (p-value <0.001). The most preferred journal for publication was the Journal of Pakistan Medical Association (JPMA; N=43) followed by Annals of King Edward medical college (Ann KEMC; N=20). Australasian journal of radiology was the most preferred international journal for publication (Australas Radiol N=3). No significant difference was found in radiology research production in terms of number of publication from and before the year 2000 (p-value 0.51).

**Conclusion:** Clinical radiology research production from Pakistan is low in terms of quality and number. Only few studies reach the standard of publication in international medical journals. There is an urgent need of building the foundation of research programmes in radiology and strengthen research capacity building at facility and health policy level (JPMA 59:544; 2009).

#### **Introduction**

Radiology is a rapidly growing discipline of medicine and it has tremendous impact over the diagnosis and management of disease especially after advent of interventional radiology. Over the past decade advances in medicine are mainly centered on radiology and it has a key role in decision making towards patient care. The new costly advanced radiologic technology is mostly tested in developed countries and cannot be adopted blindly in developing countries where disease pattern, genetic make-up, socio-cultural status and health seeking behaviour is different from developed nations. One of the major issues of adopting new radiologic technology is rising cost of equipment in developing countries.<sup>1,2</sup> Nowadays evidence-based medicine is becoming the standard for medical practice<sup>3,4</sup> and this also applies to clinical radiology<sup>5</sup> as it directly deals with patient care. Major source of evidence is medical literature and practice should be based on scientific evidence of literature rather than individual personal experiences.<sup>3,6</sup> For example a particular disease is

identified with CT scan it does not mean that CT scan is the gold standard for diagnosis of that disease, other alternative imaging modalities should be searched that can be cost effective, safe and tested in a particular population and this information mainly comes through published research. In the last ten years rapid growth of radiology has been observed in Pakistan with adaptation of newer state of the art technology without being tested in local context, that change should be reflected in medical literature. Understanding patterns of research produced by radiology department of different private and Government institutes is important for educators and policy makers in order to understand the progression in research work in the field of clinical radiology in Pakistan. Not much work has been done in developing countries evaluating and analyzing medical research work production in radiology. The objective of this research was to analyze the research papers produced in the field of radiology by different medical institutes in Pakistan. It has implication over individual, imaging facility and policy making levels.

## Methods

From 1993 to August 2008, a systematic organized search, using Boolean key words of radiology or imaging modalities like CT, MRI, Fluoro, and U/S etc was undertaken to identify studies, published in Indexed data base (Medline) and Non-Indexed articles were searched through local data base (PakMedinet.com). These files were then cleaned for eligible articles. Inclusion Criteria were any work related to clinical radiology or its subspecialty (x-ray, CT, MRI, Anglo etc) done by a radiologist as a first or second author, conducted in public or private radiology centers of Pakistan. This comprised of original articles, editorials, congress abstracts, case reports and review articles etc. Exclusion Criteria were non radiology or non clinical radiology studies in which research was not focused on radiology. Data was entered in MS excel and analyzed in SPSS version 16. All data was segregated into indexed and non indexed research for analysis. Comparison was done between original and other types of articles on research done in private or public hospitals, conducted by radiologist or non-radiologists and publications before and after the year 2000. Number of publications (in percentages) originated from the radiology centers located in different administrative territories of Pakistan were also calculated for geographical representation. Pearson chi-square test for qualitative variable and student "t" test was applied for quantitative variables. P-value less than 0.05 were considered as significant.

## Results

Total of 397 studies were identified out of which 173 (43%) were from Medline (indexed database) and 220 (57%) from pakmedinet (selected non-indexed articles). A total of 294 (74%) were original articles while 101 (26%)

**Table: Number of radiology research publications from Pakistan.**

Factors	Indexed		Non-indexed		P-value
	n	%	n	%	
<b>Article Type</b>					<0.001*
original	93	31.6	201	68.4	
other	80	79.2	21	20.8	
<b>Province Location</b>					NA
Punjab	17	10.3	148	89.7	
Sindh	132	77.6	38	22.4	
NWFP	17	43.6	22	56.4	
Baluchistan	1	33.3	2	66.7	
capital&AJK	6	33.3	12	66.7	
<b>Hospital type</b>					<0.001*
public	59	23.1	196	76.9	
private	114	81.4	26	18.6	
<b>Department</b>					<0.001*
radiology	93	49.3	201	50.7	
non-radiology	80	28.2	21	71.8	
<b>Year of publication</b>					
≤ 2000	36	44.4	45	55.6	NS
> 2000	137	43.6	177	56.4	

\*: Chi square test is statistically significant; NA: Not Applicable; NS: Not Significant.

were other types of publications including case reports, review articles, editorial or pictorial essay (Data summarized in Table). In all, 68% of original articles were published in non-indexed journals and were significantly different from other types of publications ( $p < 0.001$ ). No Randomized Controlled Trial was identified and there was not a single research conducted with formal financial support. Majority of indexed studies (78%) were published from radiology centers located in Sind province while only one indexed publication was identified from Baluchistan. Major (90%) non-indexed publications were from radiology centers located in Punjab. Private hospitals having radiology department contributed significantly in indexed journals compared to government hospitals ( $p < 0.001$ ). Majority (74%) of the studies were done by radiologists as compared to other non-radiology clinical colleagues ( $p < 0.001$ ). The most preferred journal for publication was the Journal of Pakistan Medical Association (JPMA; N=43) followed by Annals of King Edward Medical College (Ann KEMC; N=20). Australasian journal of radiology was the most preferred international journal for publication (Australas Radiol N=3). No significant difference was found in radiology research production in terms of number of publications from and before 2001 ( $p < 0.51$ ).

## Discussion

There is a worldwide growing trend on the importance of research and publication and evidence based practice<sup>7</sup> in medicine and Pakistan needs to flow within this stream. The findings of this study suggest that research productivity of radiologists in Pakistan is low as evident by less number of publications and low quantity of original articles in indexed journals. This not only reflects the small radiology research production but also lack of quality work in Pakistan. This might be partly because of lack of financial support, basic epidemiological skills and non-availability of advanced technology and archiving facility within radiology departments. This finding is consistent with international published data<sup>8,9</sup> and the problem can be overcome in promoting academic research teaching and activities. One study from Sweden showed drastic improvement in research work production by starting a part time research teaching activity by the institutes.<sup>10</sup> Another reason might be a shortage of trained radiologists within the country which leads to more burdens of routine clinical work rather than academic productivity but this needs to be justified in teaching hospitals. In this study only 5% of the studies were published in international journals. This is an interesting finding and could be because of researchers' choice of contribution for local journals or less attention given by international journals to evidence from this part of world<sup>11,12</sup> where mostly imaging technology adopted after

approval from higher authorities of developed world and new innovative technology can only be afforded by wealthy countries.<sup>13</sup> Other reasons may include poor quality of submitted work, including poor research design and methodology, lack of inferential statistics and writing or language difficulties.

One of the interesting findings is that radiology departments in private hospitals contributed more in indexed journals compared to public sector hospitals. This might be due to availability of research support within these departments as it has been seen those students and postgraduates who learn in research oriented environment produce greater research work in their academic career.<sup>14,15</sup> The radiology research productivity from Baluchistan province was significantly low as compared to rest of the country highlighting the lack of infrastructure within this region. No significant difference was found in research production in specialty of Radiology before and after 2000 in spite of the rising inclination towards research globally, and emphasis given by higher education commission of Pakistan (HEC). In short, there is an urgent need for developing a research capacity in radiology departments of Pakistan by supporting and encouraging young radiologists for participating in basic epidemiology and biostatistics courses, development of research friendly environment, hiring and retention of research oriented faculty, incentives and rewards system and making a national resource group of research mentoring in radiology.

This observational study has few limitations as only Medline and pakmedinet were searched for publication. Other data bases were not taken into account. Research production in terms of conference presentations, news articles and book or dissertation writing was not assessed. Factors associated with low radiology research production in Pakistan were not analyzed. Hence further studies are needed to explore this, particular avenue.

## Conclusion

Our study suggests that clinical radiology research is lacking in Pakistan. Most of the quality work is coming from small proportion of cities and institutes. There is an urgent need for research capacity building in radiology departments for promoting evidence based medicine in our part of world and this is only possible in the presence of strong research support through academic departments and funding agencies.

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