

## Assessment of research output at higher level of education in Pakistan

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### Abstract

**Objective:** To evaluate the contribution towards research of medical universities and universities with affiliated medical colleges in Pakistan.

**Methods:** List of Pakistani medical universities and their published research annually from 2007 to 2010 was retrieved in April 2011 from the Higher Education Commission database with due permission. As per the Commission's criteria, only those publications were included that were indexed in Journal Citation Reports published by Thomson-Reuters. Publications were analysed for their year-wise, city-wise and university-wise distributions. Descriptive statistical analyses were performed by generating Box and Whisker plots. All illustrations were generated by using MS Office 2008 and/or Minitab for Macintosh.

**Results:** From 2007-2010, the total number of publications from all medical universities or universities with affiliated medical colleges in Pakistan was 5886. Of the total 26 such universities in Pakistan, only 20 had publications in 2007, 21 in 2008, 23 in 2009 and 24 in 2010. The total number of publications from all such universities in 2007, 2008, 2009 and 2010 was 875, 1504, 1563 and 1944 respectively. The highest number of publications (n=1447, 24.58%) was produced by the University of Karachi. With respect to city-wise distribution of publications, Karachi produced the highest number of papers, (n=3108, 52.86%).

**Conclusion:** The number of research publications by Pakistani institutions imparting medical education is way below the international standards. The present study is the first of its kind, highlighting the significance of published medical research.

**Keywords:** Medical research, University ranking, Pakistan (JPMA 62: 628; 2012).

### Introduction

Research in itself is a response to man's unending quest for knowledge. On similar grounds, therefore, the analysis of the research output of a country, indeed, determines its progress in various fields. Research is crucial to the development of the field of medicine in any country. Unfortunately, however, despite its significance, it is not given the due attention in Pakistan and also in some other developing countries though the condition has improved over the last few years. As compared to the 4526 researchers per million citizens in the United States of America, the combined sum of researchers per million citizens in the subcontinent in all fields of science and technology is merely 208.<sup>1</sup> The dismal scenario inevitably hints at the poor economic conditions of these countries with researchers facing financial difficulties and consequently being unable to spend on research activity for their projects.<sup>2</sup>

Studies reveal that the rates of publication of Asian countries in the five highest ranked medical journals of the world from years 1997-2001 were generally low, whereas the highest rates were from the Scandinavian countries of

Denmark and Sweden, followed by other European countries like the Netherlands and Switzerland.<sup>3</sup> Comparing the research outputs of some of the developing South Asian countries in the year 2007, statistics show that the total number of publications in scientific research in Bangladesh that year were about 800, in Sri Lanka about 400, in India about 36,000 and in Pakistan about 2,400.<sup>4</sup>

Since research is a performance indicator of higher education institutions, there is a need to continuously assess performance and standing in the scientific community so that appropriate corrective actions may be taken in the right direction. Our study aimed at determining the change in the research culture at Pakistani medical institutions from 2007 to 2010, and to assess and compare the status of research activity in different medical institutions of the country.

### Material and Methods

This descriptive cross-sectional study was conducted in April, 2011. Names of HEC-recognised Pakistani universities were retrieved from the HEC official website ([www.hec.gov.pk](http://www.hec.gov.pk)). At the time of study, a total of 129

Pakistani universities were recognised by the HEC. Navigation through the webpages of all these universities revealed that only 26 of them offered the MBBS programme. In order to investigate the research output by these medical institutions - both medical universities and medical colleges affiliated with some general university - HEC's report of scientific output by all universities of Pakistan<sup>5</sup> was retrieved from the website with due permission. The report included 97 Pakistani universities with their respective number of publications in impact-factor (IF) journals (journals listed by the Journal Citation Reports published by Thomson-Reuters) during 2007 and 2010. Of the 97 universities, only 24 were identified as medical universities and/or universities with which some medical college was affiliated. Two medical universities that did not have any publication record, according to HEC published report, were excluded from this study. Taken together, 24 Pakistani educational institutions met our inclusion criteria because they were HEC-recognised and had produced publications in at least one of the four years of the study period in IF journals. These 24 institutions were analysed for total numbers, year-wise and city-wise trends of their published research. In order to apply descriptive statistics, Box and Whisker plots were employed by calculating upper and lower quartiles, median, maximum and minimum values of each data set. All graphs and tables were generated by using MS Office 2008 and/or Minitab for Macintosh.

## Results

Out of the initial 26 short-listed institutions recognized by the HEC, two universities (Mohiud-Din Islamic University, AJK, and the Pakistan Naval Academy, Karachi) did not have any publication record during the study period, and were, therefore, excluded. The total number of publications by Pakistani medical institutions in IF journals during 2007-2010 was 5886. These publications were analysed for their year-wise and city-wise distributions as well as their distribution within each Pakistani institution. In order to investigate yearly trends for total number of publications, an aggregated bar and line graph for total number of publications and their percentage rise each year was generated (Figure-1A). The highest percent rise in publications was noted during the year 2007-2008, and since then it never went back to the same level (3.9% rise during 2008-09 and 24.3% rise during 2009-10). During 2007, 20 (76.92%) institutions were contributing towards international research, while in 2008, 2009 and 2010 the subsequent three years, the numbers of publications progressively increased to 80.7%, 88.46% and 92.3% respectively (Figure-1B).

In order to statistically describe the data distribution within each Pakistani institution in the study, Box and Whisker plots were generated (Figure-2A). Total number of publications from 2007 to 2010 is shown at the top of box plots for each university. Upper and lower limits of the

**Table: Total number of publications by Pakistani medical universities from 2007 to 2010.**

University	City	No. of publications					Total
		2007	2008	2009	2010		
University of Karachi (UoK)	Karachi	276	419	365	387	1,447	
Aga Khan University (AKU)	Karachi	186	311	345	416	1,258	
University of the Punjab (UoP)	Lahore	162	278	269	352	1,061	
National University of Science and Technology (NUST)	Islamabad	48	92	114	150	404	
Bahauddin Zakariya University (BZU)	Multan	50	92	123	133	398	
University of Sindh (UoS)	Jamshoro	59	105	96	86	346	
Dow University of Health Sciences (DUHS)	Karachi	11	49	55	94	209	
Gomal University (Gomal)	D.I Khan	12	24	32	38	106	
Ziauddin Medical University (ZU)	Karachi	7	24	21	37	89	
Liaquat University of Medical and Health Sciences (LUMHS)	Jamshoro	6	9	17	48	80	
University of Health Sciences (UHS)	Lahore	5	14	12	49	80	
King Edward Medical University (KEMU)	Lahore	12	23	16	24	75	
Baqai Medical University (BMU)	Karachi	11	12	14	24	61	
Hamdard University (HU)	Karachi	5	9	18	12	44	
Khyber Medical University (KMU)	Peshawar	4	11	10	16	41	
Isra University (Isra)	Hyderabad	5	11	8	8	32	
Foundation University (FUMC)	Islamabad	4	11	0	13	28	
University of Lahore (UoL)	Lahore	4	3	10	11	28	
University of Gujrat (UoG)	Gujrat	0	0	11	17	28	
Riphah International University (RI)	Islamabad	4	3	9	7	23	
University of Faisalabad (UoF)	Faisalabad	0	0	6	9	15	
Bolan University of Medical and Health Sciences (BMC)	Quetta	4	2	7	2	15	
Shaheed Mohtarma Benazir Bhutto Medical University (SMBBMU)	Larkana	0	0	4	9	13	
Gandhara University (Gandhara)	Peshawar	0	2	1	2	5	
Total	All cities	875	1504	1563	1944	5886	



researchers accounted for only 1.2% of all papers within the Institute for Scientific Information database from 1992-2001.<sup>1</sup> Some of the reasons, among others of lagging behind our Western counterparts are the absence of research in the medical curriculum,<sup>6</sup> lack of trained scientists,<sup>6</sup> its being an underpaid and underappreciated profession,<sup>6</sup> lack of guidance to students to run their projects, meagre funding,<sup>8</sup> improper mentorship,<sup>1</sup> inaccessible free full texts on the internet, unequipped outdated libraries,<sup>9</sup> bias of journals,<sup>8</sup> ethical issues like running clinical trials,<sup>10</sup> and the lack of interaction between clinicians and basic scientists.<sup>6</sup>

The highest output was from Karachi, which may be due to relatively more awareness and opportunities in the city as compared to the rest of the country. The lowest output, i.e. virtually no publications at all, was mostly from relatively underdeveloped cities which makes these institutions technical colleges,<sup>11</sup> with no intellectual contribution.

A key factor in the development of research activity is the availability of grants for carrying out research projects. Fox et al. reported that a 10% increase in the number of grants held per year may raise research output per year by as much as 15 per cent.<sup>12</sup> A significant relationship between funding and research output was also shown by Gulbrandsen.<sup>13</sup> Funding, unfortunately, has been relatively less in Pakistan. The importance of research training is highlighted in a study which revealed that after a 9-day research training workshop was conducted in Pakistan, the participants had a better understanding with regards to the do's and don'ts of research work.<sup>14</sup>

A study also suggested that there was an increased contribution towards publications of those nations who were proficient with the English language, with certain Northern European countries leading the list with the highest number of publications in the top-five-ranked medical journals of the world.<sup>3</sup> Even though English is used as the official language in Pakistan, Urdu monopolises as the national language, and this may be one of the contributing factors towards decreased English proficiency and, consequently, decreased research output.<sup>8</sup>

Among group of postgraduate medical trainees, most admitted the importance of research work, whereas a very few of them actually took practical steps towards contributing to it, such as reading journals or writing articles.<sup>15</sup> A survey conducted in India reported that two-thirds of the postgraduate students read a scientific article not more than once in six months<sup>1</sup> while keeping up-to-date knowledge of basic science requires reading 33 clinical articles daily.<sup>11</sup> This evident lack of interest in reading journals could be due to their lack of training in research when at the undergraduate level. A study reported that students who did research projects at the undergraduate level were more likely to be involved in

research at the postgraduate level.<sup>1</sup> A study in South Africa revealed that 7 out of 8 medical universities surveyed gave research training along with the usual medical curriculum<sup>16</sup> which might be responsible for their better standing in the scientific community as compared to Pakistan.<sup>17</sup>

Research publications are indeed a dominant factor influencing clinical practice, and a study has revealed that the clinical practice of a number of developing countries such as China and India was most likely to be influenced by local publications.<sup>18</sup> Therefore, there is an urgent need to increase local publications to increase the efficiency of clinical practice in Pakistan.

The number of male physicians at the postgraduate level working in Pakistani institutions observed in a study turned out to be more than the females and there was also a relatively decreased rate of participation by the observed females.<sup>19</sup> A reason contributing to this situation could be the consequence of the social setup in Pakistan, with relatively lesser opportunities for females to flourish in their careers, with the primary concerns of most of them being their household. There may, therefore, be a time deficit on their parts, eventually rendering them unable to contribute substantially towards research work.

Going for international comparison, research capacity in developing countries is weak.<sup>20</sup> Although the highest burden of disease is centered in low- and middle-income countries, a report from the Institute for Scientific Information showed large gaps in scientific production between industrialised and developing settings.<sup>9</sup>

The most cited Indian publication containing only Indian addresses during the period of 1998-2008 was cited 610 times, whereas the most cited purely Pakistani publication during that period was cited only 72 times.<sup>4</sup> This drastic difference strongly suggests the need for Pakistan to improve the quality and quantity of its research publications. According to a study in 2007, the number of publications by Pakistan was very low as compared to that of India, but was more than that of Bangladesh by 1,600 publications, and of Sri Lanka by 2,000 publications.<sup>4</sup> In a paper,<sup>17</sup> Pakistan is not included in the list of top 31 nations based on their share of top 1% of highly cited publications during 1997-2001. There are, however, other developing countries, like China on the 19th, Poland on the 21st, India on the 22nd, South Africa on the 29th and Iran on the 30th rank on the list. As could be expected, the USA and the UK occupy the two top positions.<sup>17</sup>

Considering the current status of medical research activity in Pakistan, steps need to be taken to improve the quality and quantity of research output. Firstly, as has been reported by Jawaid et al, hands-on workshops are helpful in improving participants' skills.<sup>21</sup> Conferences, seminars and workshops must be held focusing on training individuals in

the field of research. Secondly, individuals should be oriented regarding research work in their respective institutions at the undergraduate level. Finally, English-proficiency is an important factor to improve on as it is of crucial importance in expressing oneself when writing a research paper. Also, Open Access Journals should be promoted to facilitate access to full-texts of all articles through the internet to ensure that budding researchers don't have to bear additional expenses. "The goal of the millennium generation is the production of a capable doctor with the cardinal ability of being able to unlearn what has been learned before and relearn."<sup>19</sup>

### Conclusion

There has been an increase in the overall medical research output of Pakistan from years 2007 to 2010. However, keeping in mind the rate of development of our global village in general and the scientific community in particular, this increase needs to be amplified manifold to bring Pakistan's medical research activity on par with international standards.

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