Table 6: Comparison of the publications characteristics in two different decades

Publication characteristics	1983-1992		2003-2012	
	N (total=135)	Percentage	*N* (total=1289)	Percentage
Impact factor				
No impact factor	58	43.0	241	18.7
<1	8	5.9	174	13.5
1-<2	17	12.6	396	30.7
2-<3	20	14.8	285	22.1
3-<4	26	19.3	133	10.3
4-<5	2	1.5	27	2.1
5-<6	0	0.0	8	0.6
6-<7	1	0.7	8	0.6
7-<8	2	1.5	3	0.2
8-<9	1	0.7	10	0.8
9-<10	0	0.0	2	0.2
≥10	0	0.0	2	0.2
Number of authors				
1	9	6.7	89	6.9
2	10	7.4	159	12.3
3	23	17.0	215	16.7
4	39	28.9	229	17.8
5-10	54	40.0	569	44.1
>10	0	0.0	28	2.2
Research type				
Intervention/ clinical trial	62	45.9	481	37.3
Descriptive/ cross section	54	40.0	475	36.9
Analytic/case control	9	6.7	156	12.1
Narrative review	1	0.7	80	6.2
Descriptive/ case report and series	6	4.4	55	4.3
Analytic/ cohort	0	0.0	22	1.7
Others	3	2.2	20	1.6
Research setting*				
Hospital	131	97.8	1169	96.7
Community	3	2.2	40	3.3
Total	134	100	1209	100

*Their *n* after exclusion of review and others

period 2000-2010.[24] Furthermore, the trend of publication with time for the college of medicine in King Saud University showed an exponential increase in the number of publications within the time period 2005-2010; and a linear increase trend was found for colleges of medicine in Assiut (Egypt) and Khartoum (Sudan) universities.[17] However the percentage of increment showed a fluctuating pattern. It showed an accelerated pattern during the period 1983-1992 followed by a sharp decline during the period 1993-1997, then it showed gradual rising pattern during the period 1998-2007 and finally it dropped again from 2008 till the time of the search. Furthermore in Libya, the number of publications was highest during 1988-1992 ($n = 117$; 34% of total). Thereafter, the publication rate declined continuously: 85 papers (24%) were published in 1993-1997, 84 papers (24%) in 1998-2002, and 62 papers (18%) in 2003-2007 and the overall trend in publication volume for Libya as a whole was estimated by regression analysis as a decline of 3% annually (95% confidence interval: 3.9-1.4%) ($r^2 = 0.51$, $P < 0.001$).[10] Oman had a significant increase in the number of publications in the period 1990-2005; however, the trend has plateaued in the last five years. A similar observation was noted in both Saudi Arabia and the United Arab Emirates for the last 10 years. In Kuwait, there was a negative trend in the early and mid-1990s, probably due to the second Gulf war.[24]

In our research work, the main high-producing department was Urology and Nephrology (35.9%) followed by pediatrics and parasitology (7% each). The high publication productivity rate of Urology and Nephrology Center (UNC) is due to the fact that UNC is a WHO collaboration center with excellent research infrastructure and international research cooperation. In Sri Lanka, the major medical specialties investigated during 2000-2009 were microbiology ($n = 201$), gynecology and obstetrics ($n = 189$), parasitology ($n = 150$), psychology ($n = 150$) and surgery ($n = 139$).[20] In Lebanon, the highest publication productivity was that of the departments of internal medicine (10.0%) and anesthesiology (5.9%), whereas in UAE was that of the Departments of Pediatrics (7.0%) and obstetrics and gynecology (4.6%).[22] In Libya, there are about 144 departments in the nine medical schools. Only nine departments produced 10 or more papers in the 20-year study period; seven of these departments are affiliated to the Benghazi medical school (Departments of Pharmacology, Pediatrics, Biochemistry, Pediatric Surgery, Laboratory Medicine, Pathology, and Neurology). The other two high-producing departments are the Department of Microbiology in Al-Fateh Medical University, Tripoli and the Department of Radiology of the Misurata Teaching Hospital. These nine departments together produced 173 papers, accounting for almost half (49%) of all papers affiliated to medical schools and hospitals. Sixty-nine (52%) departments produced no papers. They concluded that the differences observed between the departments did not and do not lie in the departments *per se*, but in individuals. In other words, the principal factor driving publication rates for a given department is likely whether it has one or more highly motivated individuals. Beyond motivation, another factor might be involved, namely differences in the research atmosphere scientists and doctors were exposed to during their years of specialization.[23]

In our study, most of the publication was original research mainly in the form of intervention/clinical trials (38.4%) followed by descriptive/cross sectional study (38.3%). In Lebanon, many biomedical articles appeared as case reports (30.9%) followed by review articles (16.1%),

comparative studies (11.1%), and clinical trials (7.2%). In the UAE, most of the articles appeared as case reports (14.9%) and comparative studies (12.9%) followed by review articles (7.1%) and clinical trials (4.8%).[22] Afifi[11] have reported that, Egypt produced 6423 PubMed-indexed articles during the period (1996-2005), of them review articles and clinical trial articles constituted 3.4% and 6.9%, respectively. For KSA during the same period, 6305 articles were produced. However, the percentage of review articles was higher and clinical trials articles were lower (7.6%, 5% respectively). Review articles and clinical trials constituted 12% and 5% respectively of the overall PubMed publications for the whole world during the same period.[11] He reported that, producing less review articles in Egypt could be explained by the poor access to the full articles for most of the researchers. In Sri Lanka, majority of the medical research articles published in the journals during 2000-2009 were descriptive studies (n = 611, 35.1%), letters (n - 345, 19.8%) and case reports (n = 311, 17.9%). There were only 37 randomized controlled trials (2.1%) and 35 preclinical trials (animal studies) (2.0%), whereas 115 articles were systematic reviews (6.6%).[20]

In our study, we found that the journal IF ranged from 0.27 to 53.3 with a median of 1.99. Nearly one quarter of the publications has no IF (22.1%) but higher percent reported by Benamer *et al*.[23] in Libya where over two fifths of the papers (141; 41%) were published in journals with no IF, also about 40% of the publications were published in journals with IF <2.0 and this was in agreement with Benamer *et al*.[23] Only about 2% of publications were published in journals with IFs >6 in contrast to what reported by Benamer *et al*.[23] who found that only two papers were published in journals with IFs >5.0, from this he concluded that the rule is publication in journals without a calculated IF or with a low IF, and that publication in high impact-factor journals is almost nonexistent.[23] The same was found in Lebanon and UAE, where a very minute proportion of biomedical papers appeared in high IF journals. They explained that by the limitation of scientific research in the region to case reports with minimal evidence-based analysis and they could be published only in very specialized international journals of relatively low IFs. Furthermore, regional journals, mostly not indexed in major databases, offer a very safe refuge for a majority of authors who do not want to be restricted with paper size or to be subject to the expensive economies of international publications.[22] Benamer and Bakoush[10] compared the biomedical research performance in the Arab world with that in nonArab Middle Eastern countries. They showed that Arab countries are lagging behind in the number of original biomedical research publications, publications in top medical journals, citation frequencies (6-year IF and h-index), and also when the number of publications is normalized to population, GDP, and GDP/capita. Tadmouri and Bissar-Tadmouri[25] suggested that the regional conflicts have been a major reason for the stagnation of medical publications in Arab countries. However, the other Middle Eastern countries have also been exposed to considerable instability and regional conflicts. Lack of freedom, democracy and funding, as well as brain drain and the difficulty of publishing research of local interest in high impact journals, all contribute to the low performance of biomedical research in the Arab world.[26,27] All these factors have to be taken into consideration if the governments of the Arab countries wish to improve the status of their biomedical research.[10] Tijssen[28] stated that the main reason for the decline of Africa's contribution to global knowledge production is the lack of the resources in many African countries, and willingness to invest in infrastructure and modern equipment to retain workers at Universities, research laboratories and health institutions.[29]

We found that the median number of authors participated in the publications was four ranging from 1 to 23. This is similar to what was reported by Afifi[11] in the research for the Egyptian biomedical publications in PubMed during the period 1996-2005 where the number of authors ranged between 1 and 20 authors. However those who had one author represented by 7.5% only contrary to 20.5% in Afifi[11] (2007) study. The mean (SD) of authors for the overall publications was 4.55 (2.5) and 4.84 (2.4) for publications with more than one author. Lower means reported by Afifi[11] 3.41 (2.1), and was 4.03 (1.9) respectively. The average number of authors differed significantly according to the type of the study, the mean in our study was nearly equal for cross-sectional study (4.97 ± 2.6), case control (4.8 ± 2.3) and clinical trial (4.40 ± 2.3), however review articles achieved the lowest mean (2.92 ± 2.9), this go with what reported by Afifi[11] where it was 1.96 in review articles and 4.12 in clinical trials. The increasing number of authors per article in these study types may be due to the increasing complexity of research, the multidisciplinary nature of research especially in clinical trials.

Study strengths

- PubMed is not only a simple search engine for biomedical citations, but also a powerful tool to conduct certain statistical analyses[30]
- To the best of our knowledge, this is the first report analyzing the research productivity of Mansoura faculty of medicine from the end of the calendar year 2012 and earlier
- With an overwhelming and rapidly increasing amount of biomedical publications in PubMed, there is a need for effective and efficient literature mining and knowledge discovery that can help health professionals to gather and make use of the knowledge encoded in text documents[31] to determine the progress in number of publications and its relevance to the increasing number of health publications worldwide.

Study limitations

- Our study did not discuss the qualitative aspect of the publications nor their impact on medical practice and benefits to the community

- We did not discuss co-authorship collaboration between our faculty and other Arab countries and the international collaborations
- Some studies have indicated that raw counts of publications can be misleading and that counts should be normalized.[8] We should allow for weighted comparison among the countries of origin through the following; calculate the ratio of the number of publications from a certain country to the number of inhabitants in that country and the ratio between number of publications and GDP
- We searched only Medline database and this database suffer many limitations
  - This database consists largely of English-language journals therefore possibly contributing to selection bias due to language barriers
  - PubMed does not represent all scientific and biomedical journals published. Journals of local nature may not be indexed but their value should not be neglected, also PubMed only indexes the address of the first author. Gaillard[32] argues that some 65% of African research papers are published in local journals that are not listed in the inter-national citation databases
  - Many research publications by African researchers, especially those focused on domestic or regional African issues and problems, are not assessable through modern technology facilities
  - We have focused in this report on the number of publications and IFs as measures of research output. However, there are other variables that also describe research productivity such as citation index, h-index, conference presentations, grants, the number of publications in the top medical journals, etc., that should be studied in the future.

Conclusion

The scientific publication activity of our faculty is considered useful data to determine our current ranking and to perform more efforts to achieve a higher ranking among Arab and international universities.

Policy implications

Results of this study have several policies implications:

- Consideration should be given to providing resources or allocating funds in the faculty budget to promote the expertise of authors, reviewers, and editors
- Developing computerized knowledge management systems to more accurately track research output by faculty staff members
- Our research would encourage local and global collaboration and partnership with other faculties and research institutions from around the world through providing full picture of our research efforts and their role in community development.

Recommendations

- Promotion of community-based studies
- Development of an electronic system to include research published in local journals, which will give a full picture of research productivity
- Further research on barriers for conduction and publication of high quality research is necessary
- Nation-wide journal evaluation of research productivity of all Faculties of Medicine could promote competition in research publication.

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