

CORRESPONDENCE

Medical research in India

This has reference to the paper 'How relevant is medical research done in India?—A study based on *Medline*' by Subbiah Arunachalam (*Curr. Sci.*, 1997, 72, 912–922).

The information about the poor performance of Indian medical researchers so far as the publication count is concerned is distressing, but the matter of more concern to the public at large is that no relevant research is being done by our medical scientists on diseases which severely affect people of our country. In Table 3, Arunachalam has highlighted the diseases which contribute to high fatality in our country as per the mortality and morbidity rates and naturally research should be spearheaded in this direction to combat the diseases. Arunachalam, justifiably becomes concerned about the underfunding of health sector and indeed it reflects in poor quality of research done and published.

I am working in the National Institute of Cholera and Enteric Diseases, one of the permanent research institutes of the Indian Council of Medical Research (ICMR). The research mandate of our Institute is on diarrhoeal diseases, an area which deserves priority research attention. Naturally, Arunachalam's paper caught my attention particularly because I am a library professional. I have gone through the database of Niced publications for 1987–1994 to check our publication pattern and to verify if it falls into the pattern described by Arunachalam.

I should mention here at the outset that we do not have access to *Medline* or *SCI* databases so far nor do we have the hard copy version of *Index Medicus*. Consequently, I have consulted the *Publishing Journal Directory of ICMR Institutes* compiled by the Scientometrics Unit of ICMR which contains a list of 638 journals and their coverage in various international databases including *Index*

Medicus and *SCI*. The impact factors assigned to the journals are based on 1994 *JCR* of *SCI*. Since the Directory was not exhaustive, data for a few journals were supplied upon request by the Scientist-in-Charge, INSDOC Regional Centre, Indian Institute of Chemical Biology Campus, Calcutta. For one journal however, impact factor (IF) was collected from another source.

I have studied and analysed our publication database and found that it deviates from Arunachalam's observations to a considerable extent and furthermore, the methodology adopted by Arunachalam may under-represent the actual publication output of any organization. Only journal articles were taken into account by Arunachalam in his study. Apart from the journal publications, scientists also contribute in Books/Monographs and many important publications regularly appear in conference proceedings as well but Arunachalam has restricted his study to publications in journals only. As in the case of our Institute, 267 papers were published during the period 1987–1994, of which 33 or 12.35% of the papers appeared as non-journal publications. These publications were not reflected in Arunachalam's study and the number of our publication output came down to 234. Next comes the matter of database coverage. Our Institute has several preclinical and paraclinical departments and the publications generated from such departments appear in some journals which are covered by *SCI* and other databases but not *Index Medicus* database and many medical journals also are not covered by *Index Medicus* database. For example, *Current Science* and *Journal of Biosciences* are two such Indian journals which were covered by *SCI* (as per *JCR* 1994) but not by *Index Medicus*. *Microbial Ecology* (IF: 1.814) and *Journal of Microbiological Methods* (IF: 1.208) are two among

such journals not covered by *Index Medicus*. Research publications on diarrhoeal diseases from our Institute, published in such journals were not taken into account during this study. To format our publications as per Arunachalam's study design, the number of publications of our Institute further came down to 185 only, which is 69.28% of the actual output. That means about one third of the total publications were left out. It is probable that many Institutes might face an experience similar to ours. It is quite obvious that such factors affect the exhaustiveness of the study.

In his paper, Arunachalam has provided a list of 40 publishing medical institutes (Table 6) where All India Institute of Medical Sciences, New Delhi was at the top with 1630 papers and the Indian Council of Medical Research, New Delhi was at the bottom with 125 papers though in Table 5 Arunachalam mentioned that Indian Council of Medical Research contributed 1007 papers during the period. This adds confusion as to which data is correct. Ironically, our Institute with 185 papers covered by *Index Medicus*, did not appear in the list!

According to Arunachalam's observation, papers from India are mostly published in low-impact journals. As for example, 74.28% (14,822 out of 19,952) were published in journals with impact factor less than 1 or in journals which were not indexed in *SCI* and only 0.29% of papers (58 out of 19,952) are published in high impact journals with IF above 8. If this is the scenario, then publications from Niced are above this average as the rate is 51.98% for our Institute (for publications in journals with IF 0 or <1) and this elevation standard is comparatively more pronounced towards top having 25.94% papers with IF between 1 and 2, 17.29% papers with IF ranging within 3 and 6, 4.86% papers with IF

between 8 and 18 including 4.32% of papers having IF above 17. And unlike Arunachalam's experience, such high impact journals are exclusively on well-known mainstream medical journals like *Journal of Clinical Investigation* (IF: 8.467) and *Lancet* (IF: 17.332). The rate at the base line would have been relatively better if all the *SCI*-indexed journals (not covered by *Index Medicus*, hence excluded) were included in the study.

In this context, it is worth mentioning that IF of a journal can be broadly explained as an estimation of average 'expected rate of citations' of articles published in that particular journal for a certain period of time. The IF of *Journal of Eukaryotic Microbiology* as per *JCR* 1994 was 2 which means that in average, each article published in that journal was expected to receive 2 citations. However this factor may vary as individual articles may obviously receive more or less citations according to the merit of the paper and several other factors. This is why the concept of 'Relative Citation Ratio' (RCR) came into being which is a ratio of 'Observed Citation Rate' (OCR) that is, the actual number of citations the article has received over a specific period of time and the 'Expected Citation Rate' (ECR) which is the IF of the journal in which the article has been published.

Likewise, the average quality of papers generated from a particular organization can also be broadly determined by estimating the 'Average Rate of Probable Citations' (ARPC) per paper. If the cumulative total of the product of the number of papers published in a particular journal and its IF is divided by total number of publications for a specific period then: $ARPC = \sum NF/T$, where N is the number of papers published in a journal; F is its IF and T is total number of papers. ($\sum NF = N_1F_1 + N_2F_2 + N_3F_3 + \dots + N_nF_n$.)

I have made such an estimate for our Institute for the 185 articles published during 1987–1994. Here the cumulative impact factor for 185 papers was 360.11. Dividing this number by 185, we get the value 1.946 (ARPC) of an article published from NICODE during the period. In a field where three-fourth of total publication output appear in journals having IF less than 1, the value 1.946 appears to be quite acceptable. I do not have any idea whether this indicator has already been conceived, evolved or worked out

and tested earlier by any information professional. However, I feel, this may be an useful tool of organizational assessment scientometrically.

To conclude, I should mention that the above analysis reveals that the publication output of NICODE is better than what was observed by Arunachalam and that his assessment has some obvious limitations as it under-represents the actual panorama of Indian medical research publication. In this context one question comes out naturally is 'how relevant is *Medline*-based study to assess medical research done in India'?

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Note: Incidentally, it was identified that the OCR for a fairly good number of publications from NICODE was much better than the ECR. As for example, according to *SCI* 1995, the paper by Bhattacharya, S. K. *et al.* published in *Journal of Infection* (1993, 27, 11–15) received 12 citations in 1995 (IF of *J. Infect* = 1.356). Another paper by Nair, G. B. *et al.* published in *Journal of Infectious Diseases* (1994, 169, 1029–1034) received 14 citations in 1995 (IF of *JID* = 4.781). We could not include the non-journal publications, but it appears that they also received citations; for example, the paper published by Nair, G. B. *et al.* in the 29th US–Japan Cholera Conference, 1993 (pp. 9–11) received a citation in 1995. These data were collected when I attended a workshop on Bibliometrics at INSDOC in February 1997.

NICODE Publications 1987–1994: Fact Sheet

Publication coverage:

Total no. of publications: 267.
Non-journal publications: 33 (12.35%).
Journal publications: 234 (74.64%).
Indian: 90 (33.7%).
Foreign: 144 (53.93%).

Document coverage:

Total no. of documents: 89.
Non-journal documents: 10 (11.23%).

Journals: 79 (88.76%).
Indian: 21 (23.59%).
Foreign: 58 (65.17%).

Publication (journal) coverage in databases

Index Medicus coverage:

Total no. of publications: 185.
Indian publications: 66 (35.67%).
Foreign publications: 119 (64.32%).

SCI coverage (out of above 185 publications):

Total no. of publications: 123.
Indian publications: 20.
Foreign publications: 103.

Impact Factor:

Nil: 62 (33.51%).
< 1: 34 (18.37%).
1–2: 48 (25.94%).
3–9: 33 (17.83%).
> 17: 8 (4.32%).

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Response:

I thank Ray for reading my paper carefully and raising some interesting questions.

There are a few points on which Ray has got me wrong. (1) I did not say that 'no relevant research is being done by our medical scientists'. For example, in Table 8, you will see paediatrics is close to the top in my analysis of *Medline* data, and infancy diseases are a major health concern in India. (2) Has ICMR published 1007 papers or 185 papers, Ray wonders. Simple. All institutions under ICMR (including the headquarters in New Delhi) together have published 1007 papers. According to *Medline*, there were 185 papers with an address 'Indian Council of Medical Research'. Most of these papers are written by researchers working at ICMR headquarters. Some may be from other ICMR institutions, where the address line includes ICMR and not the name of the particular institution or the city.

Ray has raised a few questions on the methodology used. Should we include journal articles only or should we include conference papers, books, book chapters, internal reports, mimeographed lecture