Review Article

Research orientation in Ayurveda educational institutions: Challenges and the way forward

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A B S T R A C T

This paper examines the scenario of research orientation in Ayurveda educational institutions of India. We demonstrate through the data obtained by searching the SCOPUS that the actual research output by these institutions is not very significant in terms of number of publications. While a lack of research expertise and infrastructure is one contributing factor to this status, a lack of questioning attitude is more crucial one. Mushrooming of new colleges, laxity in regulations, corruption, lack of atmosphere for ethical and quality research make the problem more complex. We show, with the help of SCOPUS Data, that the recent trend of establishing stand-alone institutions of Ayurveda may not help in invigorating research activities since the research contributions from such institutions have always been very poor. Instead, we suggest that existing stand-alone institutions of Ayurveda be merged with other established Central/State universities or other Medical colleges. The data demonstrates that the research output has been always significant when an institution has many experts working in different streams of science within, than when the institutions have only Ayurveda experts. We also take up the question of designing the clinical trials that are suitable for Ayurveda and propose an algorithm that may be considered for research in educational institutions, at least at doctoral level. We further enlist a set of recommendations that could potentially change the scenario. Evidence-informed policy making, inducting clinicians into the education system, making the curricula more attractive by including recent advances, introducing efficient faculty training programs, and rigorous implementation of the existing regulations - are some of the key recommendations we have made.

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1. Background

There has been a mushroom growth in the number of Ayurveda colleges in the last two to three decades which has led to a generalized dilution in the standards of education and research [1,2]. Pursuing post-graduation is increasingly becoming a necessity among the students though the program mostly does not provide them with the required exposure to the basics of research. In 2016, the Central Council of Indian Medicine (CCIM) introduced a paper on Research Methods and Biostatistics at the graduate level of Ayurveda curriculum, which was already a part of postgraduate curriculum [3]. However, the ground reality is that a required level of expertise to teach these subjects is not available among most of the Ayurveda educational institutions. Therefore, the research is still at a stage of infancy in most of these institutions, though research forms an 'essential' (hence compulsory) part of the degrees these institutions award. In the following paragraphs, we have tried summarizing the major facets of this problem while also suggesting some implementable action plans to change the scenario.

2. Compulsion-driven research

Currently, in most of the Ayurveda colleges, research is performed as a ritual for acquiring the degrees. The teachers get involved with research activities out of compulsion to guide the students and not out of curiosity. This leads to monotonous and
template-based research that thwarts innovative ideas. Often the PG/PhD theses in such cases contain meaningless data that are not worthy of being published. The part-time PhDs offered by many universities are practically awarded through ‘distance mode’ which further adds to the problem by diluting the rigor in research. It may be noted that the database of the Ayurveda theses and dissertations (PG and PhD) maintained by Girish KJ and Baghel MS though contains more than 20,000 titles, the entire PubMed and SCOPUS database have only about 5200 and 5700 records respectively containing the term ‘Ayurveda’ within their titles/abstracts [4]. Further, when the PubMed is searched for “medicine, ayurvedic” [MeSH Terms], only 2119 articles are retrieved (based on a search carried out in November 2018). Articles containing at least one author from Ayurveda colleges or universities amount to less than 750 on SCOPUS. This explains how scarce is the number of publications that emerge out of these educational institutions when compared to the number of theses/dissertations they produce. A detailed analysis of relevance and outcomes of such papers is not in the purview of this paper.

3. Lack of research atmosphere for ethical research

The research atmosphere in Ayurveda colleges and Universities is dampering. The ethical aspects of conducting and reporting the research are often overlooked in these institutions. Plagiarism and publishing with predatory journals are well-known problems in the sector [5]. Unfortunately, many teachers from these institutions are themselves associated with many of the sub-standard journals, and hence educating them is a challenge. The most striking problem, as already has been stated, is that there are no well-informed expert teachers and students, and only then, good research questions will emerge [5,8].

5. New stand-alone Ayurveda institutions: good or bad for research?

Of late, we have been witnessing a trend of establishing stand-alone Ayurveda universities and institutions/colleges both by Central and State governments. We feel that this strategy won’t serve the purpose of setting the right trend in education and research. We believe that this inclination stems out of a subconscious sense of diffidence that prevails among Ayurveda professionals. They often feel more secure when in isolation. In fact, we often forget that a conducive atmosphere for research cannot be created at an isolated campus, rather, students need enough exposure to multiple inter-related disciplines to be able to produce meaningful research output. Even Ayurveda has emphasized the need for studying multiple streams of sciences!

The Table-1 illustrates the representative data obtained through a SCOPUS search and depicts the differences in research output in different types of Ayurveda educational institutions. These institutions have been chosen purposively and all of them are well-recognised for their contributions in terms of patient-care. They are established at least 40 years ago (before 1978) and represent North, South, East and West zones of India in a balanced way. The year of establishment of each of these institutions and the year in which the first published work (as per SCOPUS) was produced have also been provided in Table-1 so that a reasonable comparison can be drawn. The latency period also has been shown against every institution so as to understand the time they took after establishment to produce a publishable work. Table-2 summarises the types of articles published by these selected institutions.

The trend that becomes very clear from these tables is that, the smaller and more isolated an institution is, the smaller and insignificant is its research output. The tables also show how diverse research happens in bigger institutions with the presence of multidisciplinary experts around. A university such as Banaras Hindu University (BHU) stands out differently because of the multiple disciplines it hosts in the campus apart from Ayurveda that range from engineering, physics, botany, chemistry, zoology, medical sciences, dental sciences, pharmaceutics to molecular biology. Gujarat Ayurved University at Jamnagar has been able to produce

| Institution                                           | Total Articles | Total Citations | H-index | Year of First Publication | Year of Establishment | Latency Period (Years) |
|-------------------------------------------------------|----------------|-----------------|---------|--------------------------|----------------------|-----------------------|
| Banaras Hindu University (Data on Ayurveda only)       | 338            | 5140            | 39      | 1965                     | 1916                 | 49                    |
| Gujarat Ayurveda University                           | 180            | 775             | 15      | 1990                     | 1905                 | 25                    |
| SDM College of Ayurveda Udupi                        | 56             | 128             | 5       | 2011                     | 1958                 | 53                    |
| National Institute of Ayurveda, Jaipur                | 51             | 95              | 6       | 2004                     | 1976                 | 28                    |
| State Ayurvedic College, Lucknow                      | 47             | 177             | 7       | 1973                     | 1948                 | 25                    |
| Assam Govt. Ayurveda College Guwahati                 | 15             | 78              | 4       | 1978                     | 1948                 | 30                    |
| Govt. Ayurveda Medical College and Hospital, Mysore    | 11             | 11              | 1       | 2010                     | 1908                 | 102                   |
| Govt. Ayurvedic College, Trivandrum                    | 9              | 140             | 4       | 2000                     | 1889                 | 111                   |
| Tilak Ayurveda Mahavidyalaya, Pune                     | 9              | 82              | 4       | 2001                     | 1913                 | 68                    |
| R.A Podar Ayurveda Medical College, Mumbai             | 3              | 11              | 1       | 2011                     | 1941                 | 70                    |
| Rishikul State Ayurvedic College, Haridwar             | 3              | 2               | 1       | 2013                     | 1919                 | 94                    |

Table 1 Shows the year of establishment, year in which first article was published, total number of articles published, total citations received and the h-index of the selected institutions (SCOPUS data as in November, 2018).
good research output because it hosts in-house experts from varied fields such as biochemistry, pharmacology, pharmacognosy etc.

Therefore, the future step must be not to start new Ayurveda educational institutions in isolation, but to move the existing isolated Ayurveda educational institutions into the campuses of various State Universities/Central universities/Indian Institutes of Technology/All India Institutes of Medical Sciences/other medical colleges and similar other premier institutes. Such a merger, if not immediately possible physically, at least must be administratively plausible through the involvement of agencies such as the Ministry of Human Resource Development, Health Ministry and the Ministry of AYUSH. This effort would probably be able to replicate the BHU model throughout the country and would also improve the quality of research.

However, it must be recorded here that the trend of publishing research findings in peer reviewed journals is largely a recent one in the Ayurveda sector. Earlier, researchers, especially clinicians and theoreticians used to publish their findings in the form of books and articles in a variety of periodicals, often in vernacular languages. The analysis presented in this paper does not consider these publications, which could be a potential limitation.

6. Poorly planned clinical research

Every department in Ayurveda colleges is unfortunately inclined at carrying out some or the other form of clinical trial on one or the other pretext. This has been a major setback to the basic research such as development of standard tools to assess clinical health parameters such as Agni, Ama, Koshtha, or to assess other parameters such as Rasa, Guna, Vipaka etc. Some of the areas such as research for development of Ayurveda education/pedagogy, observational studies to find out proof of concept etc. do not even need much funding or infrastructure, but only need good planning. Hence, there is a need to encourage more meaningful research in basic science disciplines of Ayurveda across these institutions.

The current clinical research in Ayurveda colleges revolves around the ‘one drug-one disease’ model (or ‘one intervention-one disease’ model), which is most of the times not suitable for Ayurveda. Practice-based research must be the ideal mode of research in most of the circumstances, however, the fossilized mindset and lack of motivation to learn new methods have made the clinical studies stagnant. To most of the teachers in Ayurveda colleges, ‘whole system trials’ is still a new phrase. They do not venture into newer domains of research not only because of lack of experience but also because of lack of orientation. Lack of exposure to and training of methodical research trials of various kinds, at institutional level are responsible for lack of research rigor in individual and institutional practices.

6.1. Need for good clinical trials in Ayurveda

Double-blind randomized and controlled trials have been long regarded as the gold standards that provide evidence regarding the efficacy of any intervention, and hence, one cannot afford to ignore this trend. When there are sufficient numbers of such double-blind trials, there will be room for meta-analyses and systematic reviews which will form the best possible evidence. However, when one considers Ayurveda interventions, it becomes obvious that there are no good meta-analyses in the literature because of a paucity of good clinical trials. On PubMed search, for instance, we get about 136 clinical trials when the search term ‘Ayurveda’ is entered (search in Nov 2018). Therefore, there cannot be an argument against the need for good clinical trials in Ayurveda.

6.2. Why conducting good clinical trials in Ayurveda is difficult?

Ayurveda is a complex system that considers multiple clinical and other parameters while deciding a specific line of treatment. These parameters include individual constitution (Prakriti), digestive strength (Agni), or digestive strength (Agni), nature of bowel evacuation (Koshtha), Saama-Niraama state (metabolically immature and mature states) and many more. Further, the diagnosis of a disease in Ayurveda too is complex one. For example, different individuals suffering from the same clinical condition, non-infective gastroenteritis, for example, may be diagnosed by different names such as Visuchika, Atisara, Grahani, Ajjirna, Adhoga Amlapitta, Shula etc. Further, there could be external factors such as season (Ritu) and Desha (place of residence) that might differ in each of these individuals. This in fact leads to many possible permutations and combinations in interventions. In a nutshell, different patients suffering from same disease may receive different interventions according to Ayurveda.

This situation poses a challenge in designing a good clinical trial because the generally accepted method of conducting clinical trial involves comparing the efficacy of one intervention against either placebo or another intervention. Mostly, a linear cause-effect relationship is assumed in such trials. For example, it may be one antibacterial agent vs another antibacterial agent in case of infective conditions, and one analgesic versus another analgesic in conditions that are associated with pain. This model may be enough to guide biomedical clinical practice because this is how biomedicine is practiced. However, this model of clinical trials is not suitable in the context of Ayurveda because Ayurveda practitioners consider multiple algorithms while decision-making. This is the reason why available literature on Ayurveda clinical trials is grossly insufficient: they are blind copies of the clinical trials involving biomedical interventions. Therefore, there is a huge gap between how Ayurveda is practiced and how it is researched [9].

Table 2

| Institution | Total Articles | Original Articles (%) | Reviews (%) | Books and Book Chapters (%) | Others (%) |
|-------------|---------------|-----------------------|-------------|-----------------------------|------------|
| Banaras Hindu University | 338 | 72.2 | 15.7 | 3.3 | 8.7 |
| Gujarat Ayurved University | 180 | 83.3 | 10.0 | 0.6 | 6.1 |
| SDM College of Ayurveda Udupi | 56 | 91 | 5.4 | 0 | 3.6 |
| National Institute of Ayurveda, Jaipur | 51 | 62.7 | 37.3 | 0 | 0 |
| State Ayurvedic College, Lucknow | 47 | 51 | 10.6 | 17.1 | 21.3 |
| Assam Govt. Ayurveda College Guwahati | 15 | 86.7 | 13.3 | 0 | 0 |
| Govt. Ayurveda Medical College and Hospital, Mysore | 11 | 63.6 | 18.2 | 0 | 18.2 |
| Govt. Ayurvedic College, Trivandrum | 9 | 77.8 | 11.1 | 0 | 11.1 |
| Tilak Ayurveda Mahavidyalaya, Pune | 9 | 88.9 | 0 | 9 | 11.1 |
| RA Podar Ayurvedic Medical College, Mumbai | 3 | 66.7 | 33.3 | 0 | 0 |
| Rishikul State Ayurvedic College, Haridwar | 3 | 66.7 | 33.3 | 0 | 0 |

*The category ‘others’ includes editorials, notes, errata, articles in press, letters, conference papers and short surveys.*
6.3. Recent attempts

It is important to note that during the past few years there have been a few sincere attempts at designing right kind of Ayurveda clinical trials in a manner that is true to the principles of Ayurveda. In one of these trials on rheumatoid arthritis, the autonomy of a physician in the form of individualizing the complex interventions was preserved [10,11]. Because this study was published in one of the leading journals of rheumatology, it was expected that many such studies would be attempted at. However, it is strange to see that researchers have not yet considered this as the right template for building up evidence in favor of Ayurveda interventions. One of the reasons for this scenario is that Ayurveda academia does not take up serious kind of research work in general. Another factor may be that most of the Ayurveda teachers are ignorant of these attempts and hence, this model has not yet probably percolated into Ayurveda colleges.

6.4. Suggested ‘whole system-personalized approach’

We suggest that the complexity involved in deciding interventions must be considered at an early stage while designing a good clinical trial. All possible permutations and combinations of parameters and diagnoses must be enumerated in the beginning itself and the individualization methods must be made clear. It is a good idea to include a panel of clinically successful Ayurveda practitioners to deliberate and finalize this. Such a trial would prove fruitful in testing the “whole system” against either standard of care or a placebo. A good protocol for Ayurveda clinical trial must at the beginning itself have clear-cut flowcharts designed and individualization methods finalized. When reporting the study, we suggest that a detailed algorithm followed while deciding the intervention may also be provided. Of course, this approach may be too complex and it may be difficult to enumerate all possible permutations and combinations beforehand. In such cases, we suggest that a study can be limited to single set of such possibilities. For example, the question could be framed like “Evaluating the effectiveness of Ayurveda intervention in the young-adult population of Pitta Prakriti with acid-peptic disease presenting as Vaidyaghatjirna in Sharad Ritu”. Though such an alternative would require excluding many cases of the same disease, still would prove to be practical.

7. Other recommendations

7.1. Make the curricula rigorous, updated with recent advances, and attractive

At present, students who score higher marks in entrance examination, mostly prefer MBBS, keep trying for MBBS, and after many failures they join Ayurveda programs. Many of them leave Ayurveda programs midway as they do not find it attractive. The basic reason for this scenario is that before joining Ayurveda programs, they do not have any idea about what Ayurveda is. To address this, we must consider including Ayurveda in the School curriculum through innovative and palatable methods [12]. There is a need to add more application-based content in the first year of BAMS studies. We need to give them good clinical exposure from the beginning. We may also consider making basic scientists teach them Physiology/Biochemistry/Genetics/Molecular Biology. This can further lead to Ayurveda graduates and postgraduates becoming eligible for pursuing masters and research programs in mainstream sciences (MSc/PhD). We also need to prepare curriculum-based standard textbooks with recent advances included in them [2].

7.2. Strengthen the implementation process of various regulations

At present there is too much of difference between good and poor institutions. While good institutions are unable to maintain patient records because of patient overload, the poor ones maintain fake patient records as there are no patients. There is a need for implementing the provisions already present in the statutes and regulations to curb these corrupt practices. The proposed bill on National Council for Indian Systems of Medicine (NCISM Bill), if implemented, can take care of some of these problems [6].

7.3. Evidence-informed policy making

The current trend in policy making is opinion based which insists upon uniformity in training. This position ignores socioeconomic differences, population density, health services penetration, poverty, illiteracy etc. that determine health seeking behaviour in different regions. We need to carry out periodic surveys (such as those conducted by NCERT) to help policy makers devise strategies in developing need-based policies [6,13].

7.4. Induct clinicians into the education system

At present, there is no provision for including good clinicians who are established clinical practitioners as teachers in the colleges. Innovative short-term programs must be planned where successful clinicians may be invited to train the students in sharpening their clinical acumen. Recognizing a few clinics and hospitals as Centres of Excellence and inviting them to teach Ayurveda students/teachers is another possibility [14].

7.5. Reforms in PG entrance tests

Postgraduate entrance tests, if revised to accommodate the questions on higher order thinking skills, can also make a difference by filtering out students who only learn the subject by rote [15]. However, the trend of lowering the cut-off marks to allow the students with lower merit to take admissions in PG courses must be stopped.

7.6. Improving the rigor of teacher’s training programs

The limitations related to infrastructure and funding may be overcome if our teachers are trained in writing good grant proposals and in planning the right kind of research protocols rooted in Ayurveda principles. The Continuing Medical Education Programs (CME) being conducted by Rashtriya Ayurveda Vidyapeeth (RAV) are the only faculty development programs formally available in the sector at present. They too suffer from redundancy and repetition of the known facts. They do not emphasise upon innovative instructional methods, examination and evaluation skills, research methods and research ethics. Good training during postgraduate programs and efficient teacher training programs can play a key role in elevating the research standards. Re-introduction of programs such as Vaidya-Scientist Fellowship program is the need of the hour [16]. Exposure to current trends in research methods, innovative teaching methods, examination and evaluation skills during such programs will certainly go a long way [17].

7.7. Other possible policy interventions

Even today postgraduate research is the main research source for Ayurveda in educational institutions. Industry-driven research does non-exist in Ayurveda sector, which has boosted modern medicine; with all its limitations. The trend of applying for external
funding agencies for research purpose has not yet percolated into this sector. Out of these colleges, a big share in post-graduate education is held by private sector. There are hardly any research facilities or financial support available to those interested scholars studying in most of these private colleges. To address this, the scope of recently introduced AYUSH-National Eligibility Test is to be widened and at least 200 eligible doctoral candidates interested to work in thrust areas are to be supported with scholarship and separate research fund every year. Regional research facility centres, either stand-alone or CCRAS units or potential colleges, are to be upgraded and made available to the colleges in that region. The standards of PhD are to be elevated by subjecting research proposals to external peer-review and to research audit. Compulsory standards of PhD are to be upgraded and made available to the colleges in that region. The standards of PhD are to be elevated by subjecting research proposals to external peer-review and to research audit. Compulsory provision for real time research data entry (non-modifiable) should be made to avoid data fabrication. A mechanism for auditing the research review committees and ethics committees is to be put in place. Identifying national pool of experts in research methodology for periodic online guidance is another possibility.

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Conflict of interest

The corresponding author of this manuscript is a member of the editorial board of the Journal of Ayurveda and Integrative Medicine. However, he was not involved in the peer-review process of this manuscript.

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