

A narrative review of research in Ayurveda

Ayurveda witnessed a shift towards rational principles in the practice of medicine, at a very early stage in its evolutionary history. The early classical Ayurveda textbooks (*samhitas*) talk about the validation of knowledge and distinguish between real and chance effects of therapy.¹ These works also contain elaborate methods to study properties of drugs, to develop new medical formulations, and protocols to study and understand the occurrence of new diseases.² Research, it appears, was therefore in some way ingrained in the tradition of Ayurveda from the very beginning. Yet, there is no evidence of organized research activities in the evolutionary history of Ayurveda, nothing of the kind that can be compared with modern medical research. For centuries, Ayurveda seems to have perpetuated itself as a tradition of practices and knowledge transmitted through apprenticeship or more formal methods of pedagogy, in some instances akin to a university education. Research in the modern sense of the word is a recent development in the field of Ayurveda, it seems.

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THE ENCOUNTER WITH WESTERN MEDICINE sparked the debate in modern times regarding the necessity of research in Ayurveda. For quite some time, staunch traditionalists swore that Ayurveda was time-tested and that there was no scope for any new research. On the other hand, the progressive-minded emphasized that Ayurveda needs to be subjected to the acid test of scientific scrutiny and only what survives can be accepted. The truth seems to lie somewhere in between these two extreme views. Just because Ayurveda has a continuity of tradition spanning many centuries, cannot be reason enough for its authenticity and its acceptance as a whole. An obvious reason is that there have been interruptions in the transmission of Ayurvedic knowledge as well as ups and downs in its evolution. There is evidence that much of the knowledge preserved by oral traditions has been lost in the passage of time. Therefore, it is necessary to revisit Ayurveda and find proper applications of it for present times.

Importantly though, the reductionist methods of modern science cannot be blindly accepted and used as a suitable yardstick to measure the worth of Ayurveda. Perhaps we need to develop methods of evaluation and validation outside the purview of modern science; or scientific methods could be tweaked to make it more appropriate for Ayurveda; or new methods of enquiry and validation could be developed and expanded on the basis of the epistemological premises of Ayurveda itself? In all honesty, the Ayurvedic community has not yet been able to develop a clear perspective of the kind of research needed to give it a push as a credible system of medicine and a knowledge system in its own right.

The beginnings of modern research

The beginnings of modern research in Ayurveda can be traced to the pre-colonial period and the first encounters of Europeans with indigenous healthcare systems in India. During this

period, many traditional medical practices like rhinoplasty³ and smallpox inoculations⁴ were documented. The Portuguese physician Garcia Da Orta was the first European to describe drugs from Ayurvedic pharmacopoeias.⁵ Hendrick Van Rheede, the Dutch Governor of Malabar, later commissioned the work on the *Hortus Malabaricus*, which documents the medicinal wealth of plants in Kerala, with stunning drawings and notes.⁶ Much of the research that followed has been from a medical historical, linguistic and philological point of view. In the span of one-and-a-half centuries scholars like Hoernle, Filliozat, Ro u, Zimmerman, Leslie, Meulenbeld, Wujastyk and others, built a body of knowledge centered around Ayurveda bringing to light many unknown facts about the Indian medical tradition. Jan Meulenbeld's *History of Indian Medical Literature* deserves special mention here because this monumental work comprehensively surveyed the history of Ayurvedic literature like never before.⁷ However, much of this research has approached Ayurveda from a historical and philological point of view. I am of the opinion that we do not have good examples of anthropological studies in Ayurveda that capture the richness and depth of India's living medical traditions that survived into modern times.

Though India's first prime minister Jawaharlal Nehru emphasized the need to initiate research in Ayurveda with inputs from modern science, and the father of the nation Mahatma Gandhi also pointed out the need to validate the practices of Ayurveda, it took a long time for independent India to establish organized and formal mechanisms for systematic research in Ayurveda. Even today, much is still unprocessed in terms of the quality and direction of the research initiatives in the field of Ayurveda.

Today's research

Today's institutional research environments for Ayurveda are broadly of three kinds. The first constitutes postgraduate

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and doctoral programs in Ayurveda educational institutes. Here Ayurveda students learn the first lessons of research. The compilation of research theses deposited in the Ayurveda schools have revealed a large number of titles ranging from literary to experimental and clinical research.⁸ Much of this research seems to be flawed in methodology and quality, and barely a handful is ever published or scrutinized by peers in the field. The apex for research is the Central Council for Research in Ayurvedic Sciences (CCRAS)⁹ run by the Government of India, with various units spread out in the length and breadth of the country, constituting the second environment for research in the government sector. The Council has many publications to its credit, conducts research in specialized areas, and also funds research done at other organizations through grants offered under an extramural scheme. The Council is, however, criticized for not generating outputs that could actually have an impact on the global scientific community at large. The third category of research institutions are in the private sector, undertakings that are mostly attached to the pharmaceutical industry and engaging in research related to quality control and standardization of commercially manufactured Ayurvedic medicines. Many such research units are recognized by the Government of India as SIROs (Scientific and Industrial Research Organizations). An example is the Dabur Research Foundation. In a limited way, modern scientific institutions provide a fourth environment for research on Ayurveda.

What is absent is systematic research on the fundamentals of Ayurveda, especially with a focus on the epistemological premises of Ayurveda. Modern positivist scientific research on Ayurveda was for a long time more or less centered on ethnobotany and ethnopharmacology. Ayurvedic pharmacopoeias were seen as a rich source of information that could provide leads for the development of new drugs with the help of modern drug discovery protocols. Ethnobotanical surveys

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The elevation of Ayurveda as Unique Selling Proposition (USP) of Kerala Tourism, has increased the number of Ayurveda massage centres in the major tourist destinations of the state. Around 58 hotels other than Ayurvedic resorts, including five-star and four-star hotels that offer Ayurveda as a luxury package, also applied for partial funding last year. The Government of Kerala endorses a number of Ayurvedic centres by labelling them as *Green Leaf* or *Olive Leaf*. These centres enjoy interim service tax exemptions and tax holidays. However, from the medical tourism literature we know that Ayurvedic treatments have too often been adapted to cater to the preferences and requirements of tourists. It is also known that these establishments sometimes charge exorbitant prices. In a market driven-economy, where cost is always equated with quality, these prices may mislead many who come to Kerala for good quality Ayurvedic treatments.

Changing focus

The Eleventh Five Year Plan (2007-12) aimed to integrate the Indian medical systems Ayurveda, Yoga, Unani, Siddha, Homeopathy and Sowa-Rigpa (AYUSH) into public healthcare and to improve their accessibility. For this purpose the money invested in AYUSH was tripled to 705 million US\$, compared to the preceding Five Year Plan in which 12.6% was allocated to industry. In addition to the core areas such as education, research, industry, and medicinal plants, the Eleventh Plan has added four target areas: mainstreaming AYUSH in public health; upgrading technology used by the AYUSH industry;

giving assistance to Centres of Excellence; and revitalizing and validating local or folk expressions of AYUSH. The complete negligence of Ayurveda in recent health policy documents, zero efforts to implement the strategy of the central Indian government (National Rural Health Mission) to co-locate Ayurvedic and biomedical facilities in Kerala, and failing to incorporate Ayurveda in public health, shows the commercial bias of the State of Kerala. Ayurveda has not been consciously included in any of the recent public health programmes, but an innovative health system approach must be more inclusive and recognize the worth of plural medicine. When indigenous medical systems are taken into account, inequality in healthcare utilization can be minimized.⁶

Interventions in Ayurveda should focus on how the local market can be supplied with affordable Ayurvedic medicines and treatments. The upgrading of Ayurveda must not completely depend upon the demands of the world market. Ayurvedic

Fig. 1: CARE KERALAM cluster.

medicine could have a large domestic market if only the industry would provide the public with better quality medicines at affordable prices. The argument promoted by the consortium CARE-KERALAM is that Ayurveda needs to first capture the world market through its health supplements and proprietary products, which will subsequently bring demand for Ayurvedic drugs. Unfortunately, the consortium's decisions are made by a select core group, and so the interests of a large number of small Ayurvedic manufacturers are not being adequately addressed.

What is really needed in Kerala's Ayurvedic sector is a favourable research environment for manufacturers and public laboratories to develop drugs for the treatment of diseases in areas where Ayurveda has shown good results, such as *chikunguniya*,⁷ dengue fever, arthritis, and respiratory ailments, among others. In addition we need to identify future potential focus areas, including palliative care and paediatrics. In conclusion, it must be said that focusing on particular





Modern research at the laboratory of an ayurvedic manufacturer in the 1990s.

listed medicinal plants used by indigenous medical traditions and attempts were made to isolate the active molecules to discover so-called new chemical entities. The discovery of *reserpine*, derived from the plant *Rauwolfia serpentina*, was hailed as the blueprint for similar breakthroughs in the future. Much of the Ayurvedic research in institutes across the country still follows similar lines, although these efforts have not led to any major achievements in drug development. The Golden Triangle Initiative under the New Millennium Indian Technology Leadership Initiative (NMITLI) is an attempt to bring traditional medicine, western biomedicine and modern positivist science together to spark new pathways in drug development, based on clues from traditional medical systems like Ayurveda. The Golden Triangle Project is being implemented through high level bodies, including the Central Council for Research in Ayurvedic Sciences (CCRAS), and has created limited possibilities for modern scientists and Ayurvedic physicians to work together, but has yet to make any major impact.

Promising research initiatives

There are some initiatives of Ayurvedic research in modern times that have attempted to look at the problem of research in Ayurveda from a different perspective. The reverse pharmacology approach propounded by the Indian pharmacologist Ashok Vaidya emphasizes that research in Ayurveda should begin at the

diseases the so-called disease specialization approach is a far better strategy than concentrating on how to capture the global market. The existing fixation on the world market can only lead to the commodification, concentration and corporatization of Ayurveda in Kerala, and will ultimately lock Ayurveda into a vicious circle of mere overproduction of alternative pharmaceuticals and nutraceuticals.

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Notes

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- 3 Madhavan, H. 2008. Home to market: responses, resurgence and transformation of Ayurveda from 1830s to 1920s, Working Paper 408, Centre for Development Studies, Thiruvananthapuram, Kerala, India.
- 4 See Pharmabiz News, available at <http://tinyurl.com/n27r14k> (accessed 6 Aug 2013).
- 5 India Brand Equity Foundation. 2005. *Medical Tourism: Providing Value for Money*. Available online: <http://tinyurl.com/kjjvydy> (accessed 6 Aug 2013).
- 6 Sato, A. 2012. Do Inequalities in Health Care Utilization in Developing Countries Change When We Take into Account Traditional Medicines?, *World Development*, 40(11):2275-2289.
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clinic and proceed to the lab, unlike the process in biomedicine where drugs are first developed in the lab and then applied to clinical practice. Ashok Vaidya also highlighted the need for pharmaco-epidemiological studies in Ayurveda, because a large number of people in past and present use Ayurvedic medications. In Ayurveda, more than often, it is a case of understanding how medicines already-in-use work, rather than developing new drugs that have never been used by humans, and therefore need testing.

It is interesting to see that modern research initiatives are also shifting from drug development to validation of the core concepts of Ayurveda. The Ayurvedic concept of physical constitution known as *prakriti* has been subjected to scientific studies with a view to establish a genomic basis, or identify biochemical markers, that can help to characterize a particular body's constitution.¹⁰ The surgeon, professor M.S. Valiathan, initiated ASIA (A Science Initiative in Ayurveda) as a novel approach to the scientific validation of Ayurveda, which shifts attention from drugs to concepts. ASIA attempts to validate key concepts that exemplify Ayurvedic thinking, including: *dehaprakriti* (physical constitution), *rasashastra* (the manufacturing and application of metallic compounds in therapy), *dravyaguna shastra* (Ayurvedic pharmacology), *pancakarma* (five-fold therapy), *shodana* (bio-cleansing of the body) and *rasayana* (anti-ageing therapies). The ASIA project has also led to a few publications in high impact journals. The Department of Science and Technology (DST) now invites research proposals for projects to be implemented under a scheme known as Ayurvedic Biology, which draws its inspiration from the idea that ancient Ayurvedic insights can open new avenues of knowledge in modern biology.

The Ayurvedic community has in fact taken some significant leaps by publishing a few journals that have found their way into international research databases, including PubMed and Scopus.¹¹ Unfortunately, many low quality journals have now also mushroomed, taking advantage of online publications platforms. In the last few years at least two research databases have been initiated to increase access to published research papers on Ayurveda; one is hosted by the Department of AYUSH, known as the AYUSH Research Portal (<http://ayushportal.ap.nic.in/>); the second was developed by AVP Research Foundation, with funding from CCRAS, and is known as DHARA - Digital Helpline for Ayurveda Research Articles (<http://www.dharaonline.org/>). The former is a repository of research papers and other official documents related to Ayurveda (or other AYUSH systems), whilst the latter deals exclusively with research papers published in indexed journals.

A careful study of the published research papers revealed that literary research and pre-clinical research dominates over other types of research. Clinical research is comparatively lagging behind and clinical case studies are surprisingly meager. There has been an exaggerated attempt to replicate the biomedical model of Randomized Controlled Trial (RCT) to evaluate Ayurvedic medicines and treatments, but study designs are often faulty and holistic Ayurvedic treatments undergo piecemeal evaluations, with the result that research on Ayurveda is far removed from real-life situations.

Last year, one clinical trial stood out and was hailed as a possible model for future studies on Complementary and Alternative Medicine (CAM). This study, which received the Excellence in Integrative Medicine Research Award from the European Society of Integrative Medicine, was conducted with a research grant from the National Institutes of Health (USA), fostering a collaboration between the University of Washington (Seattle), the University of California (Los Angeles) and The Ayurvedic Trust (Coimbatore, India). The study, led by the leading rheumatologist, Daniel Furst, challenges the conclusions of previously published systematic reviews on the efficacy of the Ayurvedic treatment of rheumatoid arthritis. Through a rigorously conducted pilot study Furst and his colleagues show that complex individualized Ayurvedic treatments for rheumatoid arthritis may be equivalent in efficacy to the biomedical arthritis drug *methotrexate*. The Ayurvedic treatments, however, have fewer adverse effects.¹³

In recent times, there is much talk about evaluating complex systems of therapy through Whole Systems Research (WSR) approaches, which offer the possibility of looking at the complex multimodal nature of Ayurvedic interventions in their totality. Are we finally reaching a point where modified and reworked western methods of research can be effectively adapted to conduct meaningful research on Ayurveda? While WSR approaches are certainly more flexible and open than RCTs, it is not clear at this moment whether these methods will serve anything more than the purpose of absorbing useful elements of systems like Ayurveda into the framework of integrative medicine. These methods have evolved out of a biomedical wish to understand, evaluate and incorporate complementary and alternative medicines within its gambit. If Ayurveda is to evolve in its own right as an independent approach to healthcare, then it will have to look for methods of research and validation from within, something that will enable Ayurveda to engage with modern medical thought and at the same time develop and evolve from the foundations of its own epistemological and ontological premises.

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Notes

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- 5 Roddis, L.H. 1931. Garcia da Orta, the first European writer on tropical medicine and a pioneer in pharmacognosy, *Annals of Medical History*, 1 (n.s.) (2):198-207
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- 9 www.ccras.nic.in
- 10 Joshi, R.R. 2004. A Biostatistical Approach to Ayurveda: Quantifying the Tridosha, *Journal of Alternative and Complementary Medicine* 10(5):879-889; Patwardhan, B., Joshi, K. & Y. Ghodke. 2008. Genetic basis to concept of prakriti, *Current Science* 90:896; Patwardhan, B. & G. Bodeker. 2008. Ayurvedic genomics: establishing a genetic base for mind-body typologies, *Journal of Alternative and Complementary Medicine* 14:571-576.
- 11 The three PubMed indexed research journals in Ayurveda are *Ancient Science of Life (ASL)*, *AYU* and *Journal of Ayurveda and Integrative Medicine (JAIM)*. Of these, JAIM is also indexed in SCOPUS.
- 12 See for example, Park, J. & E. Ernst. 2005. Ayurvedic medicine for rheumatoid arthritis: a systematic review, *Seminars in Arthritis and Rheumatism* 34(5):705-713
- 13 Furst, D.E. et al. 2011. Double-blind, randomized, controlled, pilot study comparing classical ayurvedic medicine, methotrexate, and their combination in rheumatoid arthritis, *Journal of Clinical Rheumatology* 17(4):185-192.