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## Research, biomedicine and Ayurveda: From evidence-based medicine to evidence-informed healthcare

SARIKA CHATURVEDI, NANDINI KUMAR, GIRISH TILLU, BHUSHAN PATWARDHAN

### Abstract

As the search for effective treatment for Covid-19 intensifies, traditional medicine systems are receiving increasing attention from researchers as well as the public. While scientific rigour is non-negotiable, there remain fundamental issues to be addressed when bringing evidence from traditional systems. Here we examine some of these issues pertaining to Ayurveda

and the underlying philosophical underpinnings, and suggest potential ways to move forward. We find an ability to emerge from the cage of "biomedicalism" and its foundational reductionism essential for appropriate research in Ayurveda. We caution against pursuing research in Ayurveda by just mimicking modern medicine and highlight the need for appropriate use of modern science tools and methods to understand Ayurveda and explore its potential for healthcare. We emphasise the need and potential for transdisciplinary research in Ayurveda. A balance between evidence-based medicine and evidence-informed healthcare is required.

**Keywords:** Research methods, Ayurveda, Ethics, Evidence, Covid-19

### Background

As the world adapts to the changed conditions owing to the Covid-19 pandemic, the global hunt for a medicine to cure Covid-19 intensifies. India, with its rich heritage of traditional medical systems such as Ayurveda, Siddha, Unani and Yoga, may have more to offer than the Western countries. However, basking in the glory of tradition is not enough in the present age of rapid advancements in science. In March last year, the Prime Minister in his address to the expert group of Ayurveda physicians insisted on generating scientific evidence for

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validating claims and cautioned against attempts at making any unjustified assertions (1). While scientific rigour is non-negotiable, there remain fundamental issues to be addressed about bringing evidence from traditional systems for treatment of new diseases such as Covid-19. Here, we examine the methodological challenges in conducting Ayurveda research and discuss the reductionist approach of modern medicine/biomedicine (BM) vis-à-vis the holistic approach of Ayurveda. We highlight the importance of appropriate transdisciplinary research to better utilise Ayurveda for healthcare.

### **Contemporary research in Ayurveda: methodological challenges**

Taking advantage of the desperate therapeutic crisis created by Covid-19, the market has been flooded with herbal and Ayurvedic products, especially in India, claiming to offer protection or relief (2). This is a matter of concern as it undermines the true strength of the science of the system. A profit-driven pharma industry with past reports of potentially compromised scientific standards does not even spare Ayurveda. The Ayurvedic sector is not free of malpractices, in manufacturing and in practice, like other contemporary systems. As compared to synthetic drugs for the treatment of Covid-19, the popularity, low cost and easy availability of Ayurvedic medicines over the counter make it more important to ensure that these products do not give rise to misleading declarations about the outcome. Therefore, preserving scientific integrity in research into Ayurveda is important for both the science and society.

In the current times of globalisation and industrialisation of Ayurveda, it stands at the cross roads of scientific and consumerist approaches. Developing Ayurveda-based drugs and new formulations for recent indications, rather than what is described in the authoritative books/classics, has been a major driver of research largely led by commercial interests rather than a true effort at innovation (3). However, this has reduced research in Ayurveda to merely looking for more new drugs/formulations based on Ayurvedic herbs rather than pursuing a holistic approach. Such superficial research may be commercially viable but may not be sustainable in the longer run. It may waste scarce resources which could otherwise be invested in interesting areas of research like the mechanism of action at a molecular and genetic level and to understand the science behind the principles of Ayurveda and its philosophy (4).

### **Research approaches: Reductionism of modern science and holism of Ayurveda**

The basic premise of modern medicine is the existence of an objective reality reducible to uniform measurement in contrast to the Eastern philosophy of Ayurveda that emphasises conscious experience and subjective reality (5). The ontology of Ayurveda and BM are very different in their basic assumptions about nature, ways of gaining knowledge,

and vocabulary (6). Inductive learning where truth is induced from subjective experience; a whole systems approach that emphasises holistic understanding of the person and the ecosystem, customised individually for optimised treatment by logically integrating literature with patient conditions and preferences; and local alternatives and information are distinct features of Ayurveda (6,7). Also, attending to the mind whether in a healthy or diseased state is very important in Ayurveda, where the approach to treatment considers the whole individual and not the parts. The significance of this age-old approach in Ayurveda is more understood now as research reveals that the mind influences the body's response (8). This is yet another pointer to the difference and depth of the philosophy of Ayurveda and the need for appropriate scientific exploration (9) to demonstrate the value of Ayurvedic science and its practice. Nevertheless, ignorance of the limits of science and overestimating its strengths can be problematic too.

The overemphasis on objectivity in scientific enquiry places limitations on the use of Ayurvedic medicine and its potential advantage to patients. The deviation of BM from holism and from person-centred care is based much on the ideas of scientism that objective and replicable observation, its analysis and the resulting empirical evidence is the only basis of truth informing knowledge. This view proposes that science should be considered supreme in the organisation and understanding of the entire human society (10). In trying to differentiate science from non-science, philosophers have criticised the dominance of empiricism as the "greatest of intellectual sins" (11). Scientism is demonstrated in BM with its characteristic as radical reductionism and placing of scientific method and inquiry above all others. This is more explicit with the rise of Evidence Based Medicine (EBM) through the reductionist experimental approach using technology. In contrast, Ayurveda gives more importance to actual human experience which is examined through the Ayurvedic methodology of research to inform knowledge termed as *Pramana* meaning "right perception" and "means of acquiring knowledge" (12). This philosophical diversity must be appreciated while undertaking research in Ayurveda in the current times when BM is the dominant medical system.

### **Evidence based medicine and Ayurveda**

Medicine is an applied science which is practised as an art and hence requires both, the objectivity of science and the subjectivity of art. While traditional systems of medicine are concerned with salutogenesis, BM concentrates on pathogenesis. On the one hand, there is a growing recognition of the limitations of reductionism in modern medicine; while on the other hand, we notice a growing trend to make Ayurveda evidence based. In BM, reasoning based on experience is considered as subjective, when not backed by empirical facts which can be detrimental to ethical practice (13). Evidence-based medicine (EBM) is the

accepted standard for medical education and practice (14). EBM is narrowly focused on the scientific understanding of the pathogenesis of a disease and draws conclusions based on selected outcomes while ignoring all other factors important to human illness and healing. The methodologies used may not project the actual total body response because of biological complexities and therefore, clinical practice based on such outcomes may sometimes not be that effective for all patients suffering from the same disease. In oncology, attempts have been made to get a precise targeted insight into outcome (precision care) by considering the influence of micro level indicators like biomarkers and genomics, eg umbrella trials and basket trials that tailor intervention strategies to patients' risk factors (15). Here the focus is on genetic alterations, a specific aspect of biology presumed to guide treatment, but it may not be right for all patients suffering from that disease condition. This still means ignoring the totality of the person and the culture and lifestyle which may modify that person's response.

This is in sharp contrast to the Ayurvedic understanding of a disease, a person and the interrelationship with nature and lifestyle (16). Further, evidence on specific parameters alone may not be a sufficient basis for health promotion actions, especially at population levels (17). While the prevalent approach in EBM is narrow and centred on evidence, mainly at the individual level, there remains a demand for evidence at the level of family, communities, environment, and socio economic determinants of health and culture that influence several aspects of illness. Also, the emphasis on randomised controlled designs as having a prime place in the pyramid of evidence may skew the search for evidence of effectiveness (17). Over reliance on science and ignorance of experiential evidence that Ayurveda considers important can have negative effects (5). While not rejecting the evidence hierarchy in BM, it is important to be aware of the extent to which, and the circumstances in which it is appropriate. The complexity and uncertainty of evidence in the real world need to be recognised and accommodated rather than conveniently ignored in favour of oversimplification (18). Therefore, a balance between evidence-based medicine and evidence-informed healthcare is required (19). More research is required on how to generate, weigh and use different types of evidence and supplement it with the required frameworks and tools. Considering the whole system practice of Ayurveda, a practice-based evidence (PBE) approach is more relevant for Ayurveda than EBM (20). Instead of a hierarchical model, a circular model of evidence that offers an appropriate mix of research designs is more relevant for Ayurveda (5,21). This model balances the strengths and limitations of several study designs and proposes a synthesis of relevant methods. While in the EBM model, experimental designs (focused on internal validity) are at the top of the pyramid and rank higher than observational designs (focused on external validity) at the bottom; in the case of traditional knowledge systems,

observational studies and experimental designs need to be placed in a circle as complementing each other, to balance internal and external validity. PBE should be based on this approach to maintain both scientific rigour and pragmatism.

### **Potential for transdisciplinary research in Ayurveda**

The scientific community as a whole should take on the onus of research, be it BM or Ayurvedic. Modern scientific tools can be applied to any medical system. In fact, Greek traditional medicine gradually transmuted into modern medicine with the adoption of science and technology. Not just medical doctors but several chemists, physicists, biologists, engineers, technologists and social scientist contributed to this transition. In India, vaidyas, yogis, siddhas, and hakims have done a great job in protecting knowledge and practising their respective systems. We should expect that the onus of scientific research should primarily rest on scientists working across the boundaries of their own disciplines (22). While we expect practice-based observational studies from clinicians, researchers should also proactively understand the value of PBE and expedite the transition towards EBM with the help of science and technology. Research into Indian traditional systems of medicine should not be perceived in isolation or as the sole responsibility of the Ministry of Ayurveda, Yoga, Naturopathy, Unani, Siddha, Sowa-Rigpa and Homoeopathy (AYUSH). Rather than asking AYUSH practitioners to provide scientific evidence, we should ask Indian scientists what research they have done or could do involving our traditional systems. All government-funded scientific agencies such as the Department of Health Research, Department of Science and Technology, Department of Biotechnology, Council for Scientific and Industrial Research (CSIR), and Indian Council of Medical Research (ICMR) should further encourage and support research on Indian systems of medicine as a collaborative activity as was done earlier in ICMR's studies using herbals and the tripartite Golden Triangle Partnership programme between Central Council for Research in Ayurvedic Sciences, CSIR Laboratories and ICMR. As responsible scientific institutions, all national research laboratories and institutions should get involved in scientific research on Indian systems of medicine. Working with such a spirit of transdisciplinary research, India would have better opportunities for innovation to gain global leadership in the field of biomedical research. The need to establish a collaborative culture for research which breaks the silos of medical systems is now more urgent than ever before during a major public health emergency.

### **Moving forward from EBM to evidence informed healthcare**

The ability to emerge from the cage of "biomedicalism" is essential for appropriate research in Ayurveda. Pursuing research in Ayurveda by just mimicking BM is more likely to lead to what was termed "empiricist quackery" (23). The distinctive features of Ayurveda make modern science-



based research methods such as randomised controlled trials less suitable for Ayurvedic research in certain circumstances where epistemologically sensitive approaches for Ayurvedic research are needed (21). The unsuitability of conventional RCTs for Ayurveda arises mainly from the basic concept of clinical equipoise in BM (genuine uncertainty of treatment effects before testing the intervention) which does not apply here as the action of Ayurvedic formulations are already known through documentation and clinical experience, to some extent. Classical RCTs allow researchers to determine the one best treatment for all patients by studying single/isolated therapeutic interventions. However, the treatment in Ayurveda and other traditional systems is complex with multiple modalities, and individually tailored to a specific patient. Whole system trials and the black box approach are better suited to the holistic nature of Ayurveda, its complex and subjective interventions, with patient involvement in the treatment, rather than trials designed with a BM approach, restricted to a single target intervention, and objective assessment. The appropriate use of modern scientific tools and methods to understand Ayurveda is required to enable understanding of how exactly the interventions act. Several commendable efforts have been made in this direction, such as the Ayurvedic Biology programme (Department of Science and Technology), the Ayu Genomics project, the ICMR projects and the CSIR- (New Millennium Indian Technology Leadership Initiative) projects of the recent past.

Traditional Chinese Medicine (TCM), although ancient, and based on a different epistemology from BM, has successfully employed modern methods and has thus advanced in research. The TCM trajectory offers important lessons for Ayurveda. China in its bold vision has made a strategic plan for national health through its Healthy China 2030 plan which includes the integration of TCM with modern medicine as an important strategy to reduce gaps in services (24). The plan outlines include making achievements in TCM development accessible to everyone, paying equal attention to TCM and Western medicine, and promoting their coordinated development; making TCM and Western medicine more complementary to each other by letting each play to its strengths; maintaining TCM's characteristics while actively applying modern science and technology in TCM development, and making overall plans for the integrated, coordinated, and sustainable development of TCM (19).

The potential of Ayurveda for Covid-19 treatment should certainly be explored, albeit without compromising its wisdom, true strengths and pedagogy. Both the systems – modern medicine and Ayurveda – have their strengths and limitations. Therefore, integrative research and treatment protocols weaving together the best of both systems in the interests of public health are the need of the hour. Research and practice of future medicine should progress from evidence-based medicine, presently restricted to BM, towards evidence-informed holistic healthcare. For this, integrative national health planning including areas of Ayurveda such as

clinical practices, healthcare delivery, research, education, industry, and culture would be helpful.

The Covid-19 pandemic has taught us several important lessons for the future (25). Transdisciplinary research and education is the need of the hour. Bridging the communication gap and creating opportunities for formal interactions between stakeholders of Ayurveda, modern sciences and BM will be beneficial and has to be addressed as a priority. Development of a research base and a system of coordination and innovation for the prevention and treatment of major diseases with Ayurveda could be an important action agenda. Capacity building in Ayurvedic research is urgently required for appropriate knowledge transfer and innovation.

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