**Biomedical research, Modern medicine and Ayurveda: From evidence based medicine to evidence informed health care**

**Abstract**

As the search for effective treatment or vaccine for COVID-19 intensifies, traditional medicine systems are receiving increasing attention of researchers as well as the public**.** While scientific rigour is non-negotiable, there remain fundamental issues to be addressed when bringing evidence from traditional system. Here we examine some of these issues pertaining to Ayurveda and the underlying philosophical underpinnings, and suggest potential ways to move forward. We find ability to emerge free from the cage of ‘biomedicalism’ and its foundational positivistic reductionism is essential for appropriate research in Ayurveda. We caution against pursuing research in Ayurveda by just mimicking modern medicine and highlight the need of appropriate use of modern science tools and methods to understand Ayurveda and explore its potential for health care. We highlight the need and potential for transdisciplinary research in Ayurveda. A balance between evidence-based medicine and evidence informed healthcare is required.

**Key words:** 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 cure or a vaccine against COVID-19 intensifies. India with its rich medical heritage of traditional medical systems such as Ayurveda, Siddha, Unani and Yoga may certainly have more to offer than the Western countries. However, basking in the glory of traditions is not enough in the present times of advancements in science. In March this year, the Prime Minister in his address to the expert group of Ayurveda physicians insisted on generating scientific evidence for validating the claims and cautioned against attempts at making any unjustified assertions. While scientific rigour is non-negotiable, there remain fundamental issues to be addressed about bringing evidence from traditional systems to the rescue of the world for treatment of newer diseases such as the COVID-19. Here we examine some of these issues pertaining to Ayurveda and the underlying philosophical underpinnings, and suggest potential ways to move forward.

**Contemporary research in Ayurveda: methodological challenges**

Taking advantage of the desparate therapeutic situation created by COVID-19 the market is flooded with herbal and Ayurvedic products, especially in India, claiming protection or relief. 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 spare Ayurveda too. Ayurveda sector is not free of malpractices in manufacturing and practice alike other contemporary systems. As compared to the 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 declaration about the outcome. Therefore, preserving scientific integrity in research in Ayurveda is important for both the science and society.

In current times of globalisation and industrialisation of Ayurveda, it stands at the cross roads of science in its entirety and consumerist approaches. Developing Ayurveda based drugs and newer formulations for recent indications than what is described in the authoritative books/classics has been a major driver of research, largely led by the commercial interest of the industry rather than true effort at innovation. However, this has reduced research in Ayurveda to merely looking more for new drugs/formulations based on Ayurveda 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 cause wastage of resources which otherwise could be invested in interesting areas of research like mechanism of action at molecular and genetic level and to understand the science behind principles of Ayurveda and its philosophy (1).

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

The basic premise of modern medicine is an objective reality reducible to uniform measurement in contrast to the Eastern philosophy of Ayurveda that emphasises conscious experience and subjective reality (2). The ontology of Ayurveda and modern medicine are very different in the basic assumptions about Nature, ways of gaining knowledge and vocabulary (3). Inductive learning where truth is induced from subjective experience; whole systems approach that emphasises holistic understanding of the person and the ecosystem; customised individually for optimized treatment that logically integrates literature with patient condition and preferences; and local alternatives and information are distinct features of Ayurveda. Attending to the mind in health or in the diseased state is very important in Ayurveda, where the approach to treatment considers the whole individual and not the parts. The importance of attending to mental wellbeing has come more in focus in the current COVID-19 pandemic as many are found to be suffering from depression, fear, and anxiety due to isolation in these stressful times. Recent research in psychoneuroimmunology shows the influence of the mind on the body’s response (4) and is yet another pointer to the difference and depth of the philosophy of Ayurveda and the need for appropriate scientific exploration (5), to demonstrate the value of Ayurvedic science and its practice.

Ignorance of the limits of science and overestimating its strengths can be problematic too. The overemphasis on objectivity in scientific enquiry poses limitations to use of Ayurvedic medicine and its potential advantage to the patients. The deviance of modern medicine 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 science should be considered supreme in the organisation and understanding of the entire human society (6). The dominance of empiricism has been criticised as the ‘greatest of intellectual sins’ by philosophers trying to differentiate science from non-science (7). In comparison the epistemology of Ayurveda, which is more a science of life, provides its own philosophical logic (8).

**Evidence based medicine and Ayurveda**

Medicine is an applied science which is practised as an art. On one hand there is a growing recognition of limitations of reductionism in modern medicine while on the other hand we notice a growing trend to make Ayurveda evidence based. Reasoning based on experience is considered as subjective when not backed by empirical facts which can be detrimental to virtuous practice (9). Evidence based medicine (EBM) is the accepted standard for medical education and practice (10). EBM focuses only on the scientific understanding of the disease while ignoring all other factors. 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 same disease. In oncology, attempts have been made to get a precise targeted insight in outcome – precision care - by considering influence of microlevel indicators like biomarkers and other risk factors based on genomics, e.g. umbrella trials and basket trial (11). 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 the response. This is in sharp contrast to the Ayurvedic understanding of a disease, person and the interrelationship with nature and lifestyle (12). Further, evidence on specific parameters alone may not be a sufficient basis for health promotion actions especially at population levels (13). While the prevalent approach in EBM is narrow and centred on evidence mainly at individual levels, there remains a demand for evidence at levels of family, communities, environment, socio economic determinants of health, and culture that influences several of these aspects. Also, the emphasis on randomised controlled designs as having prime place in the pyramid of evidence may skew the search for evidence of effectiveness (13). Over reliance on science and ignorance of experiential evidence that Ayurveda considers important can lead to controversial debate (2). While not rejecting the evidence hierarchy in conventional/modern medicine, it is important to be aware of the extent to and the circumstances in which it is appropriate. The complexity and uncertainty of evidence in real world needs to be recognised and accommodated rather than conveniently ignored in favour of oversimplification (14). Therefore, a balance between evidence-based medicine and evidence informed healthcare is required (15). More research is required on how to generate, weigh and use different types of evidence and potentially supplement it with required frameworks and tools. Considering whole system Ayurveda practice, practice-based evidence (PBE) approach is more relevant for Ayurveda than EBM (16). Instead of hierarchical, a circular model of evidence that balances the strengths of research designs is more relevant for Ayurveda (2,17).

**Potential for Transdisciplinary research in Ayurveda**

The scientific community as a whole should take the onus of research be it modern medicine or Ayurveda. Science should not be perceived as monopoly of modern medicine. In fact, Greek traditional medicine gradually transmuted into modern medicine with adoption of science and technology. Not just medical doctors but several chemists, physicists, biologists, engineers, technologists and social scientists from the West have contributed substantially to this transition. In India we should expect that the onus of scientific research should primarily rest on scientists of multidisciplinary and interdisciplinary nature of knowledge. Vaidyas, Yogis, Siddhars, Hakims have done a great job in protecting knowledge and practicing their respective systems. While we expect practice based observational studies from clinicians, the researchers should also proactively understand value of PBE and expedite transition towards EBM with the help of science and technology. Research on Indian traditional systems of medicine should not be perceived in isolation as a sole responsibility of Ministry of AYUSH. Rather than asking scientific evidence to AYUSH practitioners, we should ask Indian scientists what research they have done or could do involving our traditional systems. All government funded scientific agencies such as Department of Health Research (DHR), Department of Science and Technology (DST), Department of Biotechnology (DBT), 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 the Golden Triangle Partnership program. As a fiduciary responsibility, all national research laboratories and institutions should get engaged in scientific research on Indian systems of medicine. With such a spirit of transdisciplinary research, India will have better opportunities for innovations to gain global leadership in the field of biomedical research.

**Way forward: Evidence based medicine to evidence informed health care**

Ability to emerge free from the cage of ‘biomedicalism’ and its foundational positivistic reductionism is essential for appropriate research in Ayurveda. Pursuing research in Ayurveda by just mimicking modern medicine is more likely to lead to what was termed as *empiricist quackery* (18). The distinct features of Ayurveda make modern science-based research methods such as randomised controlled trials less suitable for Ayurveda research in certain circumstances where epistemologically sensitive approaches for Ayurveda research are much needed. Whole system trials and the black box approach focusing on the outcomes fit the Ayurveda approach far better than the trials designed with a modern medicine approach. The appropriate use of modern science tools and methods to understand Ayurveda is required to enable understanding of the mechanisms of actions. Several efforts in this direction are commendable such as the Ayurvedic Biology program (Department of Science and Technology), the AyuGenomics 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 different epistemology than modern medicine has successfully employed modern methods and has thus advanced research. The TCM trajectory offers important lessons for Ayurveda.

Potentials of Ayurveda for COVID-19 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 the best of both systems in the interest of public health are very much the need of the hour. Research and practice of future medicine should progress from evidence-based medicine towards evidence-informed holistic yet personalized healthcare.

**References:**

1. Patwardhan B. Bridging Ayurveda with evidence-based scientific approaches in medicine. EPMA Journal. 2014 Dec 1;5(1):19.
2. Patwardhan B, Mutalik G, Tillu G. Integrative approaches for health: Biomedical research, Ayurveda and Yoga. Academic Press; 2015 Mar 31.
3. Singh RH. Exploring issues in the development of Ayurvedic research methodology. Journal of Ayurveda and integrative medicine. 2010 Apr;1(2):91.
4. Kim, S.W., Su, K.P., 2020. Using psychoneuroimmunity against COVID-19. Brain,

Behavior Immun. (in press). doi: 10.1016/j.bbi.2020.03.025.

1. Rajkumar RP. Ayurveda and COVID-19: Where psychoneuroimmunology and the meaning response meet. Brain Behav Immun. 2020 Jul;87:8-9. doi: 10.1016/j.bbi.2020.04.056. Epub 2020 Apr 22. PMID: 32334064; PMCID: PMC7175849.
2. Sorell T. Scientism: Philosophy and the infatuation with science. Routledge; 2013 Jul 4.
3. Peterson GR. Demarcation and the scientistic fallacy. Zygon. Journal of Religion and science. 2003 Dec;38(4):751-61.
4. Charak Samhita: Acharya Y, editor. Charaka Samhita. Varanasi, India: Chaukhamba Surbharati; 1992.
5. Loughlin M, Lewith G, Falkenberg T. Science, practice and mythology: A definition and examination of the implications of scientism in medicine. Health Care Analysis. 2013 Jun 1;21(2):130-45.
6. Guyatt G, Cairns J, Churchill D, Cook D, Haynes B, Hirsh J, Irvine J, Levine M, Levine M, Nishikawa J, Sackett D. Evidence-based medicine: a new approach to teaching the practice of medicine. Jama. 1992 Nov 4;268(17):2420-5.
7. Jay J. H. Park, Grace Hsu et al. An overview of precision oncology basket and umbrella trials for clinicians. CA Cancer J Clin. 2020;70:125-137  [https://doi.org/10.3322/caac.21600](about:blank)
8. Shrikantha Murth K.R. (Editor), Vagbhata's Ashtanga Hrudayam. Chikitsasthan. 5th ed., Chaukhambha Krishna Academy Publisher, India. 2003
9. Tannahill A. Beyond evidence—to ethics: a decision-making framework for health promotion, public health and health improvement. *Health Promot Int*. 2008 Dec: 23(4):380-90. doi: 10.1093/heapro/dan032
10. Tones K. Beyond the randomized controlled trial: a case for judicial review. Health education research. 1997;12(2):161-.
11. Miles A, Loughlin M. Models in the balance: evidence‐based medicine versus evidence‐informed individualized care. Journal of Evaluation in Clinical Practice. 2011 Aug;17(4):531-6.
12. Payyappallimana U, Patwardhan K, Mangalath P, Kessler CS, Jayasundar R, Kizhakkeveettil A, Morandi A, Puthiyedath R. The COVID-19 Pandemic and the Relevance of Ayurveda's Whole Systems Approach to Health and Disease Management. J Altern Complement Med. 2020 Oct 27. doi: 10.1089/acm.2020.0370. Epub ahead of print. PMID: 33121250.
13. Walach H, Falkenberg T, Fønnebø V, Lewith G, Jonas WB. Circular instead of hierarchical: methodological principles for the evaluation of complex interventions. BMC Med Res Methodol. 2006 Jun 24;6:29. doi: 10.1186/1471-2288-6-29. PMID: 16796762; PMCID: PMC1540434.
14. Fitzpatrick, M. (2000) The Tyranny of Health: Doctors and the Regulation

of Lifestyle. London: Routledge.