

# Science, Technology, and Innovation in Indian Systems of Medicine: An Exploration in the Context of COVID-19 Pandemic

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## Introduction

Times of stress are also times of creativity and innovation. Wars have spawned many scientific innovations or hastened the completion of on-going research projects. The Manhattan Project was an example. We are now living in difficult times. Such adverse situations can also bring out the best in the innovation front of the traditional medicine systems. Science, Technology and Innovation (STI) is also the path for Indian Systems of Medicine (ISMs) to progress. What is required for this is extensive resort to intensive and large research and development (R&D). Allopathy progressed because of validated research and advanced techniques (Chauhan *et al*, 2015). The New Corona Virus Disease - 2019 (COVID-19) epidemic gives an opportunity for the ISMs to re-orient many of its existing practices and give higher stress on the use of modern science, technology and innovation in product

development and practices. The systems need to push for modernisation by making use of new advances in pharmacology and phytochemistry and also attempt to shake off the tag of traditional medicine which generally gives the impression of a not advancing medicine.

Epidemics like COVID-19 are generally boosters of medical research and innovation in modern medicine. They search for both preventive medicines like vaccines and curative medicines. Epidemiology is, therefore, very developed in Allopathy. ISMs do not have minute branches and sub-branches as in modern medicine (Samal, 2016). Traditional Medicine (TM) approach is based on development of immune system of the body. This alone may not be sufficient to tackle new epidemics, as humans also require time to develop immunity to new diseases caused by new bacteria or new virus. These micro-organisms

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might have developed new traits and adapted to changes in the environment. While fundamental principles of epidemiology in a system may remain, it will have to do research to find which practice or medicine is specifically efficient in fighting the new epidemic. That may cover both immunity boosters and curative medicines. This kind of a positive and open approach to science is required in the ISM sector.

The term 'Ayurveda', the most widely spread ISM, is derived from two terms 'Ayur' meaning life and 'Veda' meaning knowledge or science, thus denoting 'science of life'. *Encyclopaedia Britannica* describes science as "any system of knowledge that is concerned with the physical world and its phenomena and that entails unbiased observations and systematic experimentation."<sup>1</sup> It has to be a pursuit of knowledge and knowledge by nature is not static but dynamic and evolving. According to the Drugs and Cosmetics Act, 1940 (as amended upto 31 December 2016), the ISM drugs are those formulations as described in the authoritative books of Ayurveda, Siddha, or Unani Tibb systems of medicine or formulations containing only such ingredients as mentioned therein. As per the First Schedule of the Act, there are 59 such texts for Ayurveda, 31 for Siddha and 14 for Unani Tibb. But this does not deter further research or application of new technologies and development of innovations in the systems. In fact, the category "patent or proprietary medicine" as defined in Section 2 (h) itself paves way for innovation. So long as the innovations are within the broad concepts of the ISMs, they will fall under drugs of these systems. Of course, on the broad fundamental principles, the systems differ from those of modern medicine.

### **Status of Innovation in AYUSH Sector**

Indian policy approach to the AYUSH (Ayurveda, Yoga, Unani, Siddha and Homeopathy) sector has always encouraged research and innovation in the area. The Government had recognised the need for systematic research on the Indian Systems of Medicine and Homeopathy (ISM&H) quite early and established the Central Council for Research in Indian Medicine and Homeopathy (CCRIMH) in 1969 as an autonomous body under Ministry of Health and Family Welfare. For around 10 years, this composite institution was the central

apex body for all research and innovation in ISM&H, but given the diverse nature of ISMs, it was realised that separate research councils are needed to be created for different systems. In 1978, four different central councils, namely, the Central Council for Research in Ayurveda and Siddha, Central Council for Research in Unani Medicine (CCRUM), Central Council for Research in Yoga and Naturopathy (CCRYN), and Central Council for Research in Homeopathy were created. In September 2010, the Central Council



for Research in Ayurveda and Siddha was further bifurcated into Central Council for Research in Ayurvedic Science (CCRAS) and Central Council for Research in Siddha (CCRS). Apart from these, the Central Council for Indian Medicine (CCIM) was established under the Indian Medicine Central Council Act, 1970, on August 1971 for promoting and overseeing medical education in these systems. Since then, CCIM has framed uniform curriculum and syllabi for undergraduate and postgraduate courses in Ayurveda, Siddha, and Unani Tibb. In 2012, Sowa Rigpa was also included in the framework of CCIM. Since 2014, all these autonomous institutions come under the Ministry of AYUSH, Government of India.

These research councils act as apex bodies for coordinating, formulating and promoting research in AYUSH sector along scientific lines. Under these central councils, there are various institutions/centres located all over India as stand-alone units or within universities and other research bodies. Funding is also provided to research projects

outside the ambit of the Councils. An example is the FITM Fellowships granted since 2019 by RIS.

The research councils have been developing innovative drugs. Some examples are AYUSH 82 (for Type II Diabetes Mellitus) and AYUSH SG (for rheumatoid arthritis) by CCRAS, D5 *Choornam* (for Diabetes Mellitus) by CCRS, drugs for filariasis, hepatitis, ulcer, vitiligo and malaria by CCRUM.<sup>2</sup> These kinds of innovations will make the systems of contemporary relevance and the COVID-19 pandemic gives another opportunity for the systems to come up with innovative drugs.

In the devices sector also innovations have been happening, though only a few. *Electro-Trishoda-Graphy* (ETC) is a device that measures the *trishoda* (*Vadha, Pitta, and Kapha*), *Sapta dhatu*, and other fundamental elements of life as mentioned in Ayurveda text. The device is used for easy scan, evaluation, interpretation and diagnosis of diseases. The results of the computer scan are given in report form. The device has been tested and the Central Council of Research in Ayurveda Sciences (CCRAS), Ministry of AYUSH.

Another such an innovation is *Panchakarma* Machine. *Panchakarma*, which literally translates into five principles, is an important Ayurvedic procedure to cleanse the body. The IIT Delhi and CCRAS have invented a machine for the procedure.

Over time, the regulatory authorities also realised the need for adopting new technologies in the ISM sector. An example is the amendment to Rule 169 of the Drugs and Cosmetics Rules, 1954 in 2008. The amended rule permitted the use of excipients along with their standards, i.e. additives, preservatives, antioxidants, flavouring agents, chelating agents, etc. for use in Ayurveda, Siddha and Unani drugs, provided they are permissible under Indian pharmacopeia, the Prevention of Food Adulteration, Act 1954 and the Bureau of Indian Standards Act, 1986. This amendment also permitted use of artificial sweeteners like Sucralose, Aspartame, Saccharine, and Acesulfame K. These changes were made to enable the ISM pharmaceutical industry to adapt to the commercial needs of the times in accordance with the growth in science and technology. The purists in the sector may have difference of opinion

as to use of such excipients, especially if they happen to be synthetic. But the exigencies of a global market would demand such modification, apart from the fact that these are new technologies, which were neither available in ancient times, when the systems originated, nor required until recently when the practitioners were catering to local needs only. In fact, until very recently most of the Ayurvedic formulations, like *Kashaya*, were home prepared by a patient's family. Innovations can enhance the marketability of products.

## Rationale for Innovation in AYUSH

The AYUSH sector can really progress only if they ensure their "contemporary relevance, accountability and affordability to contemporary illnesses and conditions" (Srinivasan, 2004). As of now, the status of the systems is that of 'alternative' medical system, whereas, until the British colonial times, these were the primary healthcare systems in the country. In most parts of the country, particularly in the rural areas, where there is no access to modern medical care, people have no choice but to go to ISM practitioners. In urban areas also, more people use them only as wellness treatment, and not as the primary choice.

Some scholars hold the view that a large population of the rural and urban poor rely more on traditional medicine and public sector whereas the urban middle and upper-middle class



purchase allopathic medicine in the private sector (Burns. 2014). If people are to accept it as a main health care system, it will have to create confidence in their minds. This is possible only if the systems adopt modern scientific approaches and become innovative. The status of the system has to get upgraded from the current tag of 'traditional' medicine or 'home remedies' (WHO) to a formal scientific healthcare system.

Although there is no deniability that there is a vast pool of traditional medicinal knowledge and traditional medicinal practices of immeasurable value in India, one cannot overlook the advancement in technology and modern medical sciences and how it has changed our life for the better. It is imperative that traditional systems of medicine should not be looked as an alternative but rather as a complementary science to modern medicine.

With increasing levels of education and knowledge expansion in other fields, it is necessary that the ISMs keep abreast of them. The practitioners of these systems should be able to converse and dialogue with them in the jargons of science with ease and felicity. This will be possible only if the systems infuse into them science and technology in a big way. Wide-spread application of science and technology will naturally lead to great number of innovations.

## Components of an Innovation Eco-system

*Mind-set Change:* In order to create an innovation eco-system for ISMs the first requirement is of mind-set change. Such change is required among the practitioners, the industry, the educationists and academia and in the policy-makers. The attitude of unquestioned acceptance of all the practices and prescriptions in the ancient texts will have to give way to scientific scepticism. This will naturally give rise to much research to understand the basic principles of the systems, to apply them in the contemporary situations and environment and to innovate, wherever needed. This requires massive awareness generation across the country involving all stakeholders.

*Institutional linkages:* Another aspect that is required to be nurtured to create proper eco-system is creating appropriate linkages

among educational and research institutions, the practitioners and the industry. There are many disconnects among them as of now. They need to be ironed out and a harmonious relationship and forward looking approach need to be created. This would also need development of an international perspective in place of narrow local approaches. As per the 2019 report on Traditional and Complementary Medicine by WHO, Ayurveda system is reported to be practiced in 93 countries whereas Unani is being practiced in 82 WHO member countries.<sup>3</sup> Openness will have to be hallmark of the new approach.

*Professionalization of the Sector:* A third dimension of an innovation eco-system is an overhaul of the healthcare system and practitioners of ISMs. This will affect the ISM health care facilities and industry, the education and research systems and the practitioners. The sector should use modern management structures and principles. That would mean they will be accountable for the outcomes. Professional approach is likely to lead to constant upgrading. Research will have to be done as per the modern scientific protocols, wherever appropriate.

*IPRs:* Intellectual Property Rights (IPRs) always find a place in all discussions on innovation. While one need not embark here on a debate on whether IPRs are essential for innovation or not, one may have to factor in certain aspects of IPRs. Since only product and process inventions, which satisfy the triple criteria of novelty, inventiveness and industrial application [Article 27.1 of the TRIPS Agreement] are to be granted patents, existing ISM products and processes are outside the purview of patent protection. The Indian Patents Act made it doubly sure by the explicit provision in Section 3(p) that "an invention which in effect, is traditional knowledge or which is an aggregation or duplication of known properties of traditionally known component or components" is not an invention. When one looks into the background of the incorporation of this provision through an amendment in 2002 in the Patents Act, 1970, one finds that it was essentially meant to protect the traditional medical knowledge, under which the ISM knowledge will fall, even when they are available in texts. The provision, however, need not act as a bar to innovations based on such knowledge. In fact, earlier there were patents

granted for such innovations in the form of 'patent or proprietary medicines' (a term used in the Drugs & Cosmetics Act). But in the recent years, one does not find many applications for patent from the traditional medicine field in the Indian Patent Office. What is required is a more enlightened examination of patent applications in this field that would enable the grant of patents to genuine innovations in ISMs. If necessary, certain special provisions can be incorporated in the Act. That will give a boost to innovation in ISMs.

### Areas of Innovation

While the ISMs have a long history behind them, there are many areas where new innovations are required. It would be a good idea to undertake work on the scientific basis of ISM principles to make them explainable in modern scientific terms. Research on the proper mode of action, pharmacology, pharmacokinetics, and pharmacovigilance of the ISM drugs will make them more acceptable to the scientific community, the ordinary people and the health policy makers (Chauhanet *al*, 2015). Validation of ISM drugs could be done through reverse pharmacology. STI should be used for asserting the effectiveness and safety of the ISM drugs.

Modern health care systems are protocol based. This ensures accountability of practitioners and healthcare facilities. It will also create better confidence in the minds of the patients. Such protocols will not stand in the way of personal medicine, but ensures that all the required steps are taken to avoid mistakes and falls in the treatments. An area where innovation is required is the development of such protocols as appropriate for the fundamental principles of the systems. This equally applies to diagnostics.

Medicinal plants are the raw materials of the ISM drugs and formulations. As stated above, they are described in the authoritative texts, but most texts are centuries old. During the last many centuries, the soil and climatic conditions and their qualities might have changed much, mainly owing to industrialization. These changes may affect the qualities and properties of these plants (*Dravyaguna*). Research in this area can help in ensuring that the formulations and drugs have the same therapeutic effect as described in the

ancient texts. Wherever there is difference in the qualities of the medicinal plants, alternatives can also be suggested.

Contamination of heavy metals is a complaint often made against ISMs by western countries. Many a time, this contamination may happen during the process of collection or harvesting and



transportation. Innovation is needed to develop proper protocols for collection or harvesting, transportation and stocking. It is also necessary to create purifiers at the manufacturing facilities to remove any impurities that might have crept into the raw materials.

Many modern Ayurvedic firms have been using advanced technologies. However, an ethos that technology is a handmaid of ISMs also like any other system has to be created. The traditional view that drugs and other formulations have to be prepared exactly as described in the ancient texts may no longer be practical in the modern age. Almost all systems including ISMs have been commercialised. If we want to export the products and services, we will have to use enhanced technologies in manufacturing and packaging. Innovations will be required to increase the shelf life of the products.

ISMs can adopt in a big way technology relating to medical equipment and devices. Devices are mostly system-neutral. However, the ISMs may require certain adaptations in the existing ones and also modernisation of the equipment,

which they have been using for long. Innovation is the way forward.

## Innovation in Healthcare Service Delivery through Start-ups

The start-up ecosystem that has developed in the last decade has changed the way services are produced and delivered in India. From hospitality, goods delivery, to innovation in healthcare services, India has become a vibrant hub for start-ups. The NASCOMM 2019 Start-up Ecosystem report puts India as the third largest start-up hub in the world, after China and USA. The report states that the number of start-ups in India was expected to cross the 9300 mark in 2019, and has the potential to grow up to four times this number by 2025.<sup>4</sup> India's large consumers base with access to the cheapest internet in the world provides an ideal platform for the start-up businesses to take off.

In the health sector, projects like NetMeds and 1 mg, etc. have penetrated the Indian markets, ensuring availability of affordable medicine in the remotest part of the country. Most of these online pharmacies also employ doctors to cross check the prescription and provide online consultations to customers. Furthermore, there are also projects like Practo that provides easy information about nearest consulting and specialized doctors, rated and reviewed by verified patients. The app also allows for prior booking at clinics and hospitals, along with offering attractive discounts on consulting fees.

The time is right now that AYUSH sector also utilise the benefits of start-up ecosystem. For a holistic delivery of healthcare services, patients should have an option to consult with AYUSH practitioners even through virtual interactions such as the one provided by 1 mg and NetMeds. It should be noted that Practo also gives details about nearest AYUSH practitioners classified by ratings, reviews, consultation fees, etc. Provision of patient tested environment for choosing a healer gives the patient an opportunity to make informed decisions, and also helps countering the fraudulent healing claims that poses an imminent threat

to the AYUSH sector. It is important that such projects, which positively impact the health of the population, should be incentivised by the Ministry of AYUSH through soft loans, tax rebates and training programmes. A welcome step already taken is the issue of *Telemedicine Practice Guidelines for Ayurveda, Siddha and Unani Practitioners* by the Central Council of Indian Medicine on 7 April 2020.

## Conclusion

India has been encouraging application of science and technology in AYUSH systems as a policy. The development of ISM pharmacopeia is an on-going effort in this direction. However, much more is required and the challenges raised by the COVID-19 pandemic give an opportunity to modernise the systems through innovations effectively using science and technology. That will be to the benefit of the entire humanity.

## Endnotes

- <sup>1</sup> <https://www.britannica.com/science/science>
- <sup>2</sup> As per written reply by Minister of AYUSH in the Lok Sabha on 4<sup>th</sup> August, 2017.
- <sup>3</sup> WHO global report on traditional and complementary medicine 2019, Online at: <https://apps.who.int/iris/handle/10665/312342>
- <sup>4</sup> Indian Tech Start-up Ecosystem: Leading Tech in the 20s, NASSCOM, Online at: [nasscom.in/communities/product-startups/indian-tech-start-up-ecosystem-leading-tech-in-the-20s.html](http://nasscom.in/communities/product-startups/indian-tech-start-up-ecosystem-leading-tech-in-the-20s.html).

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