

Methodological Rigour in Knowledge Building – Ayurveda and the Scientific Challenge

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Abstract

This paper proposes to examine the position of Ayurveda as a knowledge system and to evaluate the rigour of the methodology it employs to build knowledge for effective application in healthcare situations. The discussion will be developed against the backdrop of specific criteria to distinguish between a belief system, a knowledge system and a science. The major point of focus will be the status of Ayurveda as a knowledge system and the convergence and divergence of its methodologies with that of “science” as it is understood today. In the process, an attempt will be made to create a coherent outline of the epistemological principles on which the body of Ayurvedic knowledge has been erected. The discourse will aim to highlight the contours and nuances of the thought process that characterizes the Ayurvedic approach to knowledge building, with supporting references from the source texts.

The preamble

Is Ayurveda an old system of thought based on ancient Hindu and Persian beliefs (Anonymous, 2005)? Does it need to borrow the methods of science to resurrect itself as a respectable system of medicine in the modern world? Such and other analogous questions daunt one’s mind as one watches the resurgence of this age-old medical tradition of India in the global scenario under the umbrella term CAM – Complementary and Alternative Medicine.

There is a need for alternatives to scientific medicine, it seems, which is increasingly being complemented with other healthcare approaches (Anonymous, 2000). The crisis in global healthcare that brings the older medical traditions back into the vanguard gives room for a subtle epistemological debate on knowledge systems. Have we reached a point from where we need to look beyond the ken of science – where we need to seek an alternative not just to medical systems, but to science itself?

Throughout the long span of its evolutionary history, religion, military onslaughts, politics and law have challenged Ayurveda. Once upon a time, Ayurvedic physicians became outcastes on religious grounds because they touched impure and diseased bodies. Centres of Ayurvedic learning and rich collections of medical manuscripts were destroyed by ruthless invaders. The British colonizers politically subjugated Ayurveda and withdrew state patronage. In modern times, international law does not recognize Ayurveda as a legitimate system of medicine outside India, save for a few exceptions.

Withstanding and overcoming these challenges, Ayurveda has survived into the new millennium and is fast gaining acceptance in various forms amongst the general public on a global level. At the same time, it is facing an intellectual confrontation – an epistemological challenge that is more profound than all the challenges that have been thrown at it and that may have far reaching implications in terms of its future growth

and development. The testimony of science is being demanded from Ayurveda to prove itself as a medical system worthy of recognition and adoption by the developed nations of the world.

The scientific validation of Ayurveda has already been initiated, with international bodies like the World Health Organization and the National Institutes for Health announcing research agendas for CAM (Anonymous, 2004; Anonymous, 2002). Only time can tell what the outcome of these projects will be and how they will influence the destiny of Ayurveda. At this critical juncture, an enquiry into the position of Ayurveda as a knowledge system assumes a significance it has never had before. For the simple reason that such an exercise will enlighten us on the innate potential that Ayurveda possesses to withstand the emerging epistemological challenge from the scientific community.

Belief, knowledge and science

The organized systems of thought that humanity has developed through the ages can be categorized as belief systems or knowledge systems. Science is a highly evolved and rigorous knowledge system that has gained such universal acceptance and popularity that it has become synonymous with knowledge itself. In this paper, an attempt is being made to distinguish between a belief system and a knowledge system as well as to characterize science as a specialized knowledge system. An attempt will be made to epistemologically position Ayurveda against the backdrop of this canvas.

Belief system and knowledge system

We can look at five characteristics on the basis of which a belief system and a knowledge system can be distinguished from each other. They are 1. origin, 2. proof, 3. acceptance, 4. revisions, 5. methodology.

A belief system advocates the idea that knowledge has supernatural origins. The concept of divine revelation is central to this system of thinking. Most of the major religions of the world exemplify this approach. On the other hand, a knowledge system professes that knowledge has natural origins and that human agency is the key component in the process of knowledge acquisition. Rational systems of thought that were nurtured in ancient India, Greece and other such parts of the world and, of course, science illustrate this approach.

In a belief system, the authority of a deified personality is the ultimate proof for the validity of knowledge. In very rigid belief systems, a single authority is worshipped as the ultimate source of knowledge. In a knowledge system, however, observation and experience become the criteria for valid knowledge. What cannot be verified experientially does not constitute knowledge.

A cardinal feature of a belief system is the tendency to accept a teaching uncritically and without investigation. Everything is a matter of belief, and nothing can be questioned. A knowledge system accepts a proposition only after a thorough investigation. Any new suggestion is subjected to critical enquiry before being accepted as knowledge.

A belief system resists change and does not allow revision of previously accumulated knowledge. What has been said once is the final truth. A knowledge

system is typically open to revisions and accumulates knowledge on the go. Old theories are modified, elaborated or abandoned, and new theories are introduced.

A belief system is not based on any well-defined or rigorous methodology to acquire and verify knowledge. It just transmits beliefs from one generation to the next. In contrast, a knowledge system thrives on rigorous methodology. Transmission of knowledge itself is a process of verification, wherein the teaching is subjected to rigorous analysis and internalized before acceptance.

The characteristics that essentially differentiate a belief system from a knowledge system can be summarized succinctly in the form of a table.

Feature	Belief system	Knowledge system
<i>Origin</i>	Supernatural origins for knowledge	Natural origins for knowledge
<i>Proof</i>	Authority is the proof	Observation is the proof
<i>Acceptance</i>	Uncritical acceptance	Acceptance after criticism
<i>Revisions</i>	Resistance to revisions	Openness to revisions
<i>Methodology</i>	Lack of well-defined methodology	Has well-defined methodology

Ayurveda as a knowledge system

With this discussion as the background, we can now attempt to explore and define the character of Ayurveda as an organized system of thought. Is Ayurveda a belief system or a knowledge system?

What position does Ayurveda take on the origin of knowledge? Interestingly enough, a careful study of the classical texts of Ayurveda yields contradicting answers. For example, the mythological account of the origin of Ayurveda states that it was first remembered[†] by Lord **brahmā**; thereafter, it was transmitted to **prajāpati** who imparted the knowledge to the **aśvini** twins from whom **indra** obtained it (A.H., Su. St. 1.3)[‡]. These are all mythological characters, and hence at first glance, it appears as though Ayurveda is promoting itself as a belief system by tracing its origins to supernatural sources. **indra** is the link between the mythological personalities and human beings, and various sages, who were essentially human beings, acquired the knowledge of Ayurveda from **indra**. In stark contrast, another section of the text talks about direct perception (**pratyakṣa**), inference (**anumāna**) and verbal testimony (**āptopadeśa**) as the true sources of knowledge (C.S., Vi. St. 4.3). A particular passage even goes to the extent of downplaying the importance of verbal testimony and stating that direct perception and inference make up the tools with which the wise acquire knowledge. Sometimes, correlative logic (**yukti**) is also considered as a valid tool of knowledge (C.S., Vi. St. 4.6). The celebrated Ayurvedic text the **caraka saṃhitā** states that the scope of knowledge is to distinguish between what is real and unreal, and this is done by employing the tools of knowledge, which are fourfold – verbal

[†] The tradition in notion is that knowledge is eternal and not created by any single agency. Thus, from time to time, it is “remembered”, i.e., recollected, propagated and used again.

[‡] References in parentheses are to the classical texts of Ayurveda. The abbreviations are expanded at the end of the article.

testimony, direct perception, inference and correlative logic (C.S., Su. St. 11.17). Unmistakably, Ayurveda projects itself as a knowledge system through such positioning. One cannot help but be intrigued by the apparent dichotomy of the thought process discernible in the Ayurvedic tradition – a blend of the elements of both belief systems and knowledge systems.

The same ambiguity is reflected in the context of proof of knowledge. There are passages in the classical texts that almost attribute absolute authority to the precepts of a particular individual or revered teacher of the past. The celebrated author *vāgbhata*, who composed the *aṣṭāṅga hṛdayam*, for instance, struggles to prove that his exposition is only a repetition of what the authorities of the bygone days have expounded and that he has not deviated even by a syllable from what they have said (A.S., Su. St. 1.20). In spite of being one of the most outspoken exponents of classical Ayurvedic learning, *vāgbhata* in one context distinguishably characterizes Ayurveda as a belief system. He states that the knowledge of Ayurveda should be used like a *mantra*, without ever being subjected to critical examination, because it has come down from authoritative persons and produces practical results (A.H., St. 40.81). In several other situations, he throws all caution to the wind and criticizes authority without mincing words and advises the aspiring physician to rely on his own intelligence and understanding without blindly relying on the teachings alone (A.S., Su. St. 7.261). In his characteristic and pithy remarks like “a statement does not become acceptable just because it comes from the mouth of a *ṛṣi*, rather it is accepted on the merit of the truth that it conveys” (A.H., Ut. St. 40.88) and “the fact that oil alleviates *vāta*, ghee *pitta* and honey *kapha* remains unchanged whether it is uttered by *brahmā* or his son” (A.H., Ut. St. 40.8), one cannot miss the sarcastic tone that scoffs at authority with unveiled contempt. To sum up, Ayurveda fluctuates across the domains of a belief system and a knowledge system when it comes to deciding what constitutes proof for knowledge.

We can notice a much more volatile situation when we try to examine and understand the position that Ayurveda has taken with regard to acceptance of propositions as valid knowledge. The Ayurvedic texts get transformed into an arena for hot debates and discussions. Technical discussions and debates are very much encouraged in the tradition and the teachings are not so easily accepted without questioning (C.S., Vi. St. 8.15). This has given rise to different schools of thought in Ayurveda and variations in theories and explanations of its basic tenets. However, much of the energy seems to have been diverted to proving and consolidating already proposed theories and establishing the supremacy of the older ideas, which ultimately overrides the importance of newer notions. In some instances, new ideas are accepted only if they conform to and do not contradict the already established conceptions, failing which, they are rejected.

One gets the impression that Ayurveda exhibits great flexibility when it comes to the critical examination of a proposition before acceptance but offers much resistance as far as the revision of older theories are concerned. Radical revisions to the basic theories of Ayurveda are literally unknown in the long span of its historical evolution though the expositions have been refined and elaborated, and new applications have been derived from them in the course of time. For example, the *tridoṣa* theory was well established at a very early period but the concept of the five types of *pitta* and *kapha* was a later development. (The fivefold divisions of *pitta* and

kepha are not mentioned in the Caraka Samhita but only in other texts dated at a later period)

Finally, when it comes to methods of knowledge acquisition, the Ayurvedic texts are quite eloquent in elaborating rigorous protocols and systems for validating knowledge. The texts distinguish between speculative thinking (*tarka*) and definite knowledge (C.S., Sa. St. 7.14). It is the existence of a sufficiently rigorous methodology for the acquisition of knowledge that helps us to characterize Ayurveda as primarily a knowledge system.

This discussion has revealed the dual character of Ayurveda, which appears to take on the features of both a belief system and a knowledge system. How do we make sense of this paradox? In order to understand this peculiarity of Ayurveda, one has to delve into the complex structure of Ayurveda as an organized body of knowledge. The texts clearly state that the knowledge of Ayurveda has been organized to address three levels of intelligence – the dull, the mediocre and the bright (C.S., Su. St. 30.18, C.S. Vi. St. 8. 3). For the dull student, the knowledge of Ayurveda has been packaged as a belief system, and for the bright student, it becomes a knowledge system opening up new frontiers of knowledge. For the mediocre student, it takes on a dual nature and is partly a belief system and partly a knowledge system. The dull witted have been advised to just follow instructions and not to attempt to understand the subtle implications of the teachings (C.S., Su. St. 4.20). On the other hand, the bright person should go beyond what has been taught and discover new knowledge (*ibid*). The ancient teachings have therefore been clothed in three layers of interpretation, and one will have to delve into the deepest levels to discover the not so obvious character of Ayurveda as a knowledge system.

Ayurvedic knowledge has been organized on a three tier structure, which corresponds to the three levels of intelligence. This constitutes the realm of application (*vyavahāra*), which is based on operational concepts or theories (*śāstra*) and which in turn stems from a direct experience of a truth principle (*tattva*). The dull witted have to just follow instructions (dos and don'ts called *vidhis* and *niṣedhas*) at the level of *vyavahara* to get expected results. The mediocre can attempt to understand the *sastra* or theory behind an application and thereby handle it more efficiently. The intelligent student, however, can have a direct experience of the truth behind a theory and improvise or modify the theory as well as invent novel applications. The ideal physician according to *suśruta* is well grounded in practical applications and delves into the *tattva* (truth content) behind the *śāstra* (theory) and becomes an innovator or inventor himself (S.S., Su. St. 34.19).

Belief based on direct perception of results (*pratyakṣaphaladarśana*) is sufficient for one who operates at the level of applications. This has to be supplemented with inference at the level of theoretical discussions. At the level of direct perception of the truth principles, altered states of consciousness have to be invoked and the world of sensory experiences transcended to obtain direct knowledge. The allusion to the origin of the knowledge of Ayurveda from the mythological personalities is an indication that the real substance of the body of Ayurvedic knowledge has emerged from higher states of consciousness. *indra*, meaning knowledge is *sahasrākṣa* (C.S., Su. St. 1. 23 *indra* is referred to by the synonym *śatakratu* here) (one who has a thousand eyes), with an ability of perception that has been increased thousandfold by rigorous discipline (*śatakratu* [C.S., Su. St. 1. 18

indra is referred to by the synonym śatakratu here] – performance of a 100 yāgas to purify and refine the cognitive apparatus). Knowledge from the level of tattva is purely a matter of verbal testimony for the dull witted and a matter of direct perception for more advanced seekers.

The level of vyavahāra is always changing as new applications have to be constantly discovered in response to varying spatio-temporal situations. The level of śāstra is relatively stable but subject to modifications, revisions and elaborations, reflecting changes in human understanding of the truth principles. The level of tattva is stable and purely experiential, reflecting the innate and unchanging nature of the fundamental truth principles and laws that govern the universe.

In the light of the above discussion, we can conclude that Ayurveda is essentially a knowledge system with an inbuilt flexibility to present itself as a belief system for aspirants with lower levels of intelligence.

Knowledge systems and science

Let us now try to position science in relation to knowledge systems. Science no doubt is a knowledge system, and the very term “knowledge system” includes science. It is, however, important to realize that science is a specialized knowledge system, which differentiates itself on the basis of some rigorously defined basic premises from other knowledge systems.

What are the characteristic features of science? Science is essentially empirical. Confronted with the limitations of the sense organs, science attempts to expand the scope of sensory perception through sophisticated instrumentation. Valid knowledge originates from observation, and though intuition is recognized as a way to know, it has to be substantiated by the actual observations of multiple observers. Thus, science is not only empirical but also objective. Constant observation being the method of science, it has a characteristic tendency for self-correction. In the light of new evidence, old theories are revised or rejected quite often and replaced by new ones. Science therefore advances in the quantity and quality of the knowledge it accumulates in the passage of time.

Science is concerned with theorizing. Science is empirical like intuition and its higher expression of mysticism. Common sense is also a kind of empirical knowledge but differs from science in that it confines itself to merely a working knowledge of the universe. Common sense accepts an idea as knowledge if it works. But science is concerned about the theory of how something works.

Another important characteristic of science is the process of experimenting wherein a hypothetical assumption is verified by planned observations under controlled conditions.

Last, but not the least, the unique characteristic of science is the criterion of falsification. It is easy to look for confirmations or verification to support the veracity of a theory. But the real test of a theory that would accord it a scientific status is the possibility of attempting to refute it or falsify it. A theory is accepted not just because it can be verified but also if one fails to falsify it (Karl Popper, *Conjectures and Refutations*, London: Routledge and Keagan Paul, 1963, pp. 33-39).

We can thus arrive at the understanding that science is a specialized kind of knowledge system with unique characteristics.

Ayurveda and science

At the very outset, it has to be emphasized that there are both points of divergence and convergence between Ayurveda as a knowledge system and as a science. Both Ayurveda and science are empirical, but science, as mentioned earlier, does not formally accept intuition and common sense as valid sources of knowledge. Ayurveda includes all these and also objective methods as sources of valid knowledge. Thus, one of the essential differences between Ayurveda and science lies in what constitutes a source of valid knowledge.

The next difference is in the operational realm. Being empirical, both Ayurveda and science rely on sensory observations. But, when confronted with the limitations of the sensory apparatuses, Ayurveda attempts to transcend the sensory realm through mystical approaches to knowledge (*alaukika pratyakṣa*), whereas science extends the scope of sensory perception with technology.

On account of the differences in the sources of knowledge as well as at the level of the reality on which they operate, there is a certain degree of incommensurability between Ayurveda and science. This incommensurability stems from paradigmatic differences and becomes more pronounced when science attempts to understand Ayurveda. This is because science adopts an exclusive approach while Ayurveda is inclusive. Problems of incommensurability can be better tackled if Ayurveda attempts to accommodate the methods of science in a proactive way. When science approaches Ayurveda, there is a danger of reductionism trimming the scope of Ayurveda within the framework of science. On the other hand, if Ayurveda approaches science, there is a better chance of preserving the totality of Ayurveda as a knowledge system.

The rest of this paper is a discussion to explore whether Ayurveda has the potential to meet the scientific challenge in terms of methodological rigour in knowledge building. For this, we need to see whether there are at least a few major points of convergence between Ayurveda and science.

The very word “Veda” is an elaboration of the process of knowledge acquisition. This word means existence, conceptualization, analysis and realization (The word *veda* is derived from the root *vid*, which has four meanings – *sattā*, *jñāna*, *vicāra* and *prāpti*. *sattāyām vidyate vetti jñāne vinte vicāraṇe, vindate vindati prāptau rūpabhedā vidh amī*). There are four stages in the knowledge cycle, which starts with the observation of existent phenomena and their conceptualization. Such conceptualized knowledge is transmitted as a teaching and subject to analysis and internalized experientially.

Knowledge seeking is an attempt to differentiate between what is real and what is unreal. This is clearly an empirical exercise, and all knowledge is experiential. But all expressions of empiricism cannot become knowledge or, in other words, knowledge is experiential but all experience is not knowledge. Validated experiences alone become knowledge, and therefore, knowledge acquisition is all about validating experience (Tarkasangraha, pp. 152, 153).

The tools used to validate experience are called as *pramāṇas*, and the number and type of *pramāṇas* vary from system to system. Ayurveda recognizes at least three such tools or *pramāṇas* – verbal testimony, direct perception and inference and also correlative logic in certain contexts, as already pointed out earlier.

The knowledge gained through verbal testimony is basically conceptual (*jñāna*). When it is verified through direct perception and inference, it becomes experiential

(vijñāna). Therefore, the real tools of validating knowledge are direct perception and inference. This exercise is technically known as *parīkṣā*, meaning investigation (C.S. Su. St. 11.26).

Thus, we can conclude that Ayurveda accepts empirical knowledge only after validation and only if it meets science eye to eye, in this regard.

The need for objectivity is also emphasized in the Ayurvedic tradition. Knowledge has to be theorized, objectified and validated by multiple observers before it is accepted as a doctrine or *siddhānta* (C.S., Vi. St. 8.37). *anumāna*, one of the tools to validate experience, is not merely inference but inference based on perception. *anumāna* proposes a rigorous methodology to establish causal relationships between events in a systematic way.

When an association between two events is observed repeatedly a number of times, a correlation is suspected. This is called *sāhacarya* or *vyāpti* (Tarkasangraha, p.160). Establishing this correlation is tantamount to discovering a law and helps us control the event. In scientific parlance, this is the study of two variables: one independent and the other dependent.

However, mere association cannot help us formulate a law of correlation between two variables. Certain other criteria will also have to be fulfilled. They are 1. the law of exclusivity (*avyabhicāritva*) – the dependent variable should not be influenced by an independent variable other than the one being studied, i.e., it should be exclusively associated with the independent variable under study; 2. the law of invariable concomitance (*avinābhāvasambandha*) – the two variables should always be seen together or, in other words, the dependent variable should be influenced by the independent variable on all occasions of observation and 3. the law of inherence (*ayutasiddhatva*) – the two variables should always coexist and should not be observed independent of each other (Tarkasangraha p. 160 - 171). In this approach, we can discern the rudiments of the experimental method to validate hypothetical assumptions.

In the biomedical context, the clinical trial design seeks to study a trial drug against a control and a placebo. For the trial drug to be acceptable, its action should be comparable to that of the control and not comparable to that of the placebo. This is very similar to what is meant by *pakṣa*, *sapakṣa* and *vipakṣa* in the process of validation through *anumāna* (Tarkasangraha, pp. 165,166).

sapakṣa is equivalent to the trial drug; in the situation in which a particular effect is doubted as existing. *pakṣa* is the control, in the situation in which the effect being studied is proved to exist. And *vipakṣa* can be compared to the placebo; i.e., the situation in which the effect being studied is established as being non-existent. Such a suggestion does not seem to be altogether improbable, and it does look like the importance of validation of clinical outcomes was recognized in ancient days. The *caraka saṃhitā* states clearly that a clinical outcome that has not been validated by proper reasoning can only be dismissed as accidental success (C.S. Si. St. 2.28).

It is beyond the scope of this paper to engage in further discussions on the parallels between Ayurveda and science. The objective of this discussion has been to demonstrate the fact that though not a science in the strict sense of the word, Ayurveda has the right ingredients ingrained in its epistemology to confront the scientific challenge that has been thrown at it in recent times.

The future of Ayurveda as a knowledge system and as a medical system in its own right will very much depend on how successfully it understands and accommodates science and, at the same time, how it operates from within the larger framework of its epistemological foundations.

Abbreviations

CS – caraka saMhitA; SS – suCruta saMhitA; AH – aSTAGga hRdayaM; AS – aSTAGga saMgraha; Su.S. – sUtrasthAnaM; Sa.S. – CArIrasthAnaM; Si.S. – siddhisthAnaM; Vi.S. – vimAnasthAnaM, Ci.S. – cikitsAsthAnaM, Ut.S. – uttara sthAnaM

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