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EDITORIAL

Integrative Health Sciences in the Post-Pandemic Era: Reimagining Immunity, Resilience and Traditional Knowledge

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The pandemic that began in late 2019 was, in the most literal sense, a stress test of the modern health enterprise. It exposed the limits of a healthcare paradigm built largely around the treatment of established disease. As intensive-care units filled, as chronic illness repeatedly emerged as a marker of vulnerability, and as the global prevalence of anxiety and depression rose by an estimated 25% in the first year alone¹, it became clear that health security cannot be purchased at the bedside alone. The pandemic also laid bare long-standing inequities in who bears the burden of disease² and it generated, alongside genuine suffering, a flood of misinformation that tested public trust in institutions. Demand for traditional and complementary healthcare rose sharply, as did the need for rehabilitation of those who survived severe illness. The question that now confronts us is not whether we were prepared, but what we should build differently. This editorial argues that the post-pandemic healthcare system must learn from Ayurveda and other traditional knowledge systems—not by declaring them validated, and not by dismissing them, but by engaging them as sources of testable hypotheses about prevention, host resilience and the maintenance of health.

The changing meaning of immunity: Popular discourse during the pandemic reduced a complex biological phenomenon to a slogan: “boosting immunity.” The phrase is scientifically misleading. Immune function is not a quantity to be maximised; it is a regulated network of recognition, response and restraint, in which excessive or misdirected activity can be as harmful as deficiency. The appropriate vocabulary is one of immune competence, host defence, immune regulation, inflammatory balance and physiological resilience. This reframing matters because it changes what we ask of any intervention, including traditional ones. The question is not whether a practice “boosts” a

vaguely conceived immunity, but whether it supports the body’s capacity to respond proportionately to a threat and to recover from it. That is a far more demanding standard, and it is the standard against which claims about host defence should be judged.

Ayurveda’s preventive perspective: Ayurveda has long placed the preservation of health at the centre of its purpose. Charaka declares that the purpose of this science is to preserve the health of the healthy and to alleviate the disorders of the afflicted.³ This is not a decorative aphorism; it is a statement of priorities that anticipates the preventive turn in modern public health. The classical frameworks of *Swasthavritta* (the regimen of health) and its components, *Dinacharya* (daily routine) and *Ritucharya* (seasonal adaptation), codify the intuition that health is cultivated through the ordinary rhythms of living: food, sleep, activity, restraint and seasonal awareness.⁴ *Charaka* identifies food, sleep and regulated conduct as the three sub-pillars of life⁵, a triad that corresponds, in broad and deliberately non-equivalent terms, to contemporary concerns with nutrition, sleep hygiene and behavioural health.

The classical construct of *Vyadhikshamatva* (the capacity to resist disease) and the related notion of *Bala* (strength) are often loosely equated with modern immunity.⁶ Such an equation is premature.

Vyadhikshamatva is a classical construct concerning resistance and susceptibility, and any correspondence with the biomedical immune system requires careful conceptual and empirical investigation rather than assumption. Similarly, *Ojas*, described by Charaka as a subtle essence situated in the heart, the destruction of which leads to death⁷, is a construct associated with vitality and systemic wellbeing. It is not, as popular writing sometimes claims, “the Ayurvedic immune system.” Attempts to correlate *Ojas* with measurable biomedical parameters are legitimate research questions,

not established facts. The same caution applies to *Rasayana*, the classical category of rejuvenative therapy aimed at attaining excellence of the body's tissues⁸ and associated with longevity, memory, intellect, freedom from disease and strength. *Rasayana* is a rich field for translational research precisely because it is not reducible to a single drug or a single mechanism.

The discipline of this editorial is therefore to hold classical concepts and biomedical constructs in their own registers and to resist the seduction of false equivalence. *Agni* is not metabolism; *Ama* is not “toxins”; *Prakriti* is not genotype. Each pairing may eventually yield defensible translational hypotheses, but only if the mapping is undertaken explicitly, empirically and with humility about what remains unknown.

What the pandemic revealed about traditional knowledge:

The pandemic produced a surge of interest in traditional and complementary healthcare, in India and globally. The Ministry of AYUSH responded with a National Clinical Management Protocol based on Ayurveda and Yoga, an interdisciplinary research task force, and public advisories on strengthening host defense.^{9,10} At the global level, WHO established a Global Traditional Medicine Centre in Jamnagar¹¹ and, in 2025, adopted the Global Traditional Medicine Strategy 2025–2034, whose objectives include strengthening evidence, ensuring safety and regulation, and integrating traditional, complementary and integrative medicine into health systems.¹² This institutional momentum is real and should not be underestimated.

But interest is not evidence. A systematic evidence map of AYUSH interventions for COVID-19 identified 304 studies in that 178 in Ayurveda, 51 in Yoga, and the remainder across Siddha, Unani and homeopathy; of which roughly half of the randomized trials were assessed at low-to-moderate risk of bias, while the remainder were limited by inadequate reporting of randomization, allocation concealment and blinding.¹³ The authors concluded that the studies vary too widely to be definitive. This is a sobering finding, and an important one. It does not mean the field has nothing to offer; it means the field has not yet produced the kind of evidence that would permit confident, generalizable conclusions. The trials of AYUSH-64 as an adjunct to standard care, which reported faster clinical recovery and shorter hospitalization in mild-to-moderate COVID-19^{14,15}, are encouraging examples of what can be achieved, but they were open-label and modest in size, and their results must be interpreted with the caution appropriate to such

designs. A multicentric trial of *Ashwagandha* (*Withania somnifera*) as chemoprophylaxis in healthcare workers showed equivalence to hydroxychloroquine rather than superiority over placebo¹⁶ it's a reminder that the choice of comparator shapes what can be claimed.

The lesson is methodological as much as clinical. The pandemic generated a large volume of research, but volume is not quality. Many studies were small, heterogeneous in intervention and outcome, and insufficiently powered. This is precisely the pattern that evidence-based medicine has learned to distrust, and it is the pattern that traditional medicine research must now deliberately transcend.

From traditional knowledge to evidence: The translation of traditional knowledge into contemporary evidence is not a mechanical process of “proving” ancient claims. It is a disciplined act of interpretation, in which classical concepts are understood in their own context, testable hypotheses are extracted, and the resulting claims are examined with the full apparatus of modern research methodology. This is the logic of reverse pharmacology — from clinical experience to laboratory and back which proposed for Ayurveda-inspired drug discovery.¹⁷ It is also the logic of appropriate reporting: trials of herbal interventions should follow the elaborated CONSORT guidance for herbal interventions¹⁸, and pragmatic questions should be reported according to the CONSORT extension for pragmatic trials.¹⁹

The research community must also confront the uncomfortable truth that a large proportion of research is avoidably wasted through poor design, non-publication and inadequate reporting.²⁰ For traditional medicine, where the stakes include public trust and patient safety, the cost of such waste is especially high. More research is not the same as better evidence. What is needed is fewer, better-designed, preregistered studies with standardized interventions, appropriate comparators, transparent reporting, patient-reported outcomes and long-term follow-up, complemented by real-world evidence, pragmatic trials, pharmacovigilance, drug–herb interaction monitoring, implementation research and health-economics evaluation.

The future of integrative health sciences:

Integration, properly understood, is not the indiscriminate combination of every available treatment. It is the disciplined matching of an appropriate intervention to an appropriate patient, supported by appropriate evidence, safety monitoring and clinical

communication. An integrative health system requires multidisciplinary care, clear referral pathways, informed patient choice, documented practitioner competency, quality assurance and clinical governance. It treats traditional and conventional medicine not as rivals but as components of a larger system, each with its own evidence base, indications and limits.

The deeper contribution of the post-pandemic moment is the concept of resilience. Resilience operates at several levels: the individual's capacity to maintain or regain physical and psychological functioning; the physiological capacity to respond to and recover from stressors; the psychological capacity to adapt to prolonged uncertainty; the community's capacity to sustain health and social functioning during crises; and the health system's capacity to prevent, absorb and recover from emergencies — the very capacity that WHO has urged member states to build.²¹ A resilience-oriented health system shifts the center of gravity from treating disease toward maintaining function, and it is here that Ayurveda's preventive and lifestyle frameworks may have their most credible contribution. This is a hypothesis to be tested, not a conclusion to be asserted.

A research agenda: The post-pandemic agenda for integrative health sciences should therefore advance on several fronts: strengthening lifestyle and health-promotion strategies in preventive health; investigating healthy ageing through validated preventive and resilience-oriented approaches; studying Ayurveda's potential contribution to the long-term management of noncommunicable diseases; examining lifestyle, yoga and meditation interventions for mental health with rigorous clinical methods; researching recovery and functional wellbeing after major illness, including post-COVID condition^{22,23}; exploring how traditional health knowledge can contribute to community resilience and pandemic preparedness while respecting evidence and public-health standards; using digital tools responsibly to document, research and deliver evidence-informed traditional healthcare; and building international research collaborations with common methodological standards.

Closing perspective: The post-pandemic era offers the opportunity to retire a tired debate. The question is no longer whether traditional medicine or modern medicine is superior — a framing that has served neither. The mature question is which interventions, from any tradition, are safe, effective, and meaningful to patients and supported by credible evidence. Ayurveda can

contribute substantially to this dialogue, particularly through its preventive orientation and its holistic understanding of health. But its future relevance will be determined not by the antiquity of its texts but by the quality of evidence generated in its name, the integrity with which its concepts are interpreted, and the responsibility with which its validated practices are integrated into care. The pandemic taught us that health is not merely the absence of disease; it is a capacity — to respond, to recover, to adapt and to endure. A healthcare system worthy of that lesson must be built on resilience, and resilience, in turn, must be built on evidence.

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