TR-02 Ayurveda: its theory, its best remedies and its documented harms

HEALING after the FALL, research library, TR-02

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1. Findings by section

1.1 The tradition on its own terms: the texts and the lineages

Ayurveda, the knowledge of long life, is not a folk practice later written down. It is a scholastic medicine with a canon, a commentarial tradition and a training curriculum, taught continuously for close to two thousand years. Its central texts are the Brihattrayi, the great three. The Charaka Samhita is the physician's book, and its own colophons describe three layers: compiled by Agnivesha of the Atreya Punarvasu lineage, edited by Charaka, completed by Dridhabala of Kashmir, who states in the text that a third of the work had been lost and that he supplied it himself (1). Meulenbeld, through the secondary literature I could reach, places the Charaka redaction at roughly 100 BCE to 200 CE over an older Agnivesha base (1). The Sushruta Samhita is the surgeon's book, attributed to the school of Divodasa Dhanvantari at Kashi, with composition beginning in the last centuries BCE and completed by a later redactor who reworked the first five sections and added the Uttaratantra (2). The third is Vagbhata's Ashtanga Hridaya, around the seventh century CE, which organised the earlier two into the form most practitioners actually learn. Later came the Madhava Nidana on diagnosis, the thirteenth-century Sharngadhara Samhita, which is the first systematic record of both pulse examination and metal preparations, and the sixteenth-century Bhavaprakasha.

Two scholarly points matter. First, none of these is a single-author treatise with a fixed date. They are composite, redacted texts, and the commentators Gayadasa and Dalhana already saw variant readings for nearly every verse of the hardest passages (3). Any sentence of the form "Sushruta in 600 BCE said" is a claim the manuscripts do not support. Second, Zysk argues, from comparing the Pali canon's medical passages with the Sanskrit treatises of Bhela, Charaka and Sushruta, that the empirical core of this medicine descended not from brahmanical orthodoxy but from wandering heterodox healers, the sramanas, whose knowledge was codified and taught inside Buddhist monastic communities, which built the first infirmaries, from around the fourth century BCE (4). If he is right, the system was built by travelling practitioners treating ordinary patients without institutional backing, which is close to the position of a village healer after the Fall.

What a vaidya was trained to be matters as much as what he knew. Sushruta sets out a surgical apprenticeship with simulation before live practice: incisions rehearsed on gourds, melons and cucumbers, excision on a water-filled bladder, venesection on the vein of a dead animal or on a lotus stalk, probing on worm-eaten wood, and bandaging practised on dummies, with the student permitted to operate only after proving himself on vegetables, corpses and soft wood and after watching real procedures (5). That is a transferable training doctrine, it costs nothing but time and vegetables, and no other tradition in this library sets it out as explicitly.

1.2 The body, the illness and the remedy, in Ayurveda's own vocabulary

The world is made of five mahabhutas: space, air, fire, water and earth. In the living body they combine into three doshas, whose balance constitutes health. Vata, from space and air, is movement: breath, circulation, nerve impulse, elimination, speech. Pitta, from fire and water, is transformation: digestion, metabolism, body heat, vision, intellect. Kapha, from water and earth, is cohesion and structure: lubrication, bulk, stability, patience. Each person is born with a ratio of the three, the prakriti, fixed for life, which determines build, appetite, sleep, temperament and vulnerability. The vikriti is what has since deviated from it.

Below the doshas are the seven dhatus, tissues in a chain of successive refinement: rasa (plasma), rakta (blood), mamsa (muscle), meda (fat), asthi (bone), majja (marrow and nerve) and shukra (reproductive tissue), each formed from the previous by its own fire, the final distillate being ojas, the subtle essence giving resistance to disease. Three malas must leave the body: faeces, urine and sweat. Thirteen agnis drive the transformation, the chief being jatharagni in the gut, and the srotas are the channels through which it all flows. When agni is weak, food is half-cooked into ama, a sticky undigested residue that blocks the channels and is the proximate substance of most chronic disease.

Illness is a sequence, not a state. The shatkriyakala names six stages: sanchaya, the quiet accumulation of a dosha in its home site, prakopa, its aggravation, prasara, its spread, sthana samshraya, its lodging in a weak tissue, which is the moment the disease becomes a particular disease rather than a general disturbance, vyakti, the full symptom picture, which is when a modern clinic would first see the patient, and bheda, chronicity and complication. The whole architecture of Ayurvedic regimen exists to intervene at stages one and two, before anything can be named. That is a coherent preventive doctrine, and it is why so much of the system is daily conduct rather than drugs.

Pharmacology follows the same logic. A substance has rasa, taste, of which there are six. It has guna, qualities, classically twenty in ten opposed pairs: heavy and light, cold and hot, oily and dry, dull and sharp. It has virya, a heating or cooling potency, vipaka, the taste it becomes after digestion, and sometimes prabhava, a specific action not predictable from any of the above, which is the tradition's own honest category for "it works and we cannot say why". The governing rule is samanya-vishesha: like increases like, opposites reduce each other, so a cold, heavy, oily disorder calls for hot, light, dry remedies. That is a complete decision procedure for an unfamiliar substance or an unfamiliar patient, which is what a system practised across a subcontinent of different flora needs.

Treatment divides into nidana parivarjana (remove the cause), shamana (pacification by diet, regimen, fasting and drugs that subdue a dosha in place) and shodhana (purification by the five actions of panchakarma), with rasayana and vajikarana over the top. Diagnosis is by eight examinations: pulse, urine, stool, tongue, voice, skin, eyes and appearance. The pulse, the signature act of the Ayurvedic physician in the popular mind, is not in Charaka at all. It enters the canon with Sharngadhara in the thirteenth century, which shows the system did change and absorb, and it turns out to be the least reliable part of the examination when tested.

1.3 The regimen, and the honest verdict on the theory

The dinacharya, the daily regimen, is set out in Charaka Sutrasthana 5 and Ashtanga Hridaya Sutrasthana 2 and 3, and Protocol 2 below gives it in full (6). It governs waking, elimination, tooth-cleaning, tongue-scraping, oil in the mouth, washing, oiling the scalp, feet and body, exercise, bathing, meals and sleep, the last by quantity and timing appropriate to age, constitution and work, because "appropriate sleep leads to happiness, nourishment, strength, fertility, knowledge and longevity" (Charaka Sutrasthana 21/30) (6). Ritucharya extends the logic across six seasons, and sadvritta (Charaka Sutrasthana 8/25) covers conduct, honesty, restraint and the avoidance of quarrels, which the text treats as a cause of disease in its own right.

Strip the dosha vocabulary and almost all of this is sound public health, much of it advice modern medicine arrived at later and by a different road: oral hygiene after meals, daily washing, graded exercise with explicit contraindications and an explicit ceiling, regular meal timing with no grazing, adequate and regular sleep, seasonal adjustment, and a social code that treats anger and dishonesty as pathogenic. It is also owned entirely by the patient, needing no

physician, no drug, no money and no supply chain. For a village of three hundred with no hospital, that is the most valuable thing Ayurveda has to offer, and it is free.

The theory itself is another matter. The tridosha scheme is a classificatory system of great internal coherence that is, at its core, unfalsifiable. Any observation can be assigned to a dosha after the fact, and failure of treatment can always be referred to a second dosha, to ama, to a channel, to the season or to the patient's conduct. Where a falsifiable claim has been carved out of it, it has not done well. Prakriti assessment, the one testable anchor of the system, is poorly reproducible between trained physicians. In one study of fifteen Ayurvedic doctors examining twenty healthy subjects, average pairwise kappa was 0.07 for pulse, 0.17 for tongue and 0.28 for prakriti, which the authors called a low level of reliability for all types of physician assessment, and Rastogi found large inter-rater and intra-rater variability with kapha least reliable (7). Questionnaires do better, but the reported figures are the developers' own and the traditional comparator against which they were validated was itself never statistically validated (7). Prasher reported whole-genome expression differences between extreme constitutional types (8), an exploratory result for which I found no independent replication.

The honest verdict: the regimen is good advice arrived at by long observation, the pharmacology is a workable heuristic for organising a materia medica, the staging of disease is a real insight, and the dosha metaphysics is a theory that cannot be wrong and therefore cannot be relied upon. Use the fourth as a mnemonic, never as a reason to act.

1.4 Sushruta's surgery: what it achieved and what a village can repeat

The Sushruta Samhita is the strongest thing in the tradition, because surgery leaves results that cannot be argued about. It is credited with 101 blunt instruments and 20 sharp ones and several hundred procedures, though those counts come from secondary summaries I could not check against the Sanskrit (5).

The forehead-flap nose. The best-documented case in the history of Indian surgery is Cowasjee, a Parsi bullock-cart driver with the English army, captured during the Mysore war of 1792 and mutilated by loss of his nose and one hand (9). He was operated on near Pune by a practitioner of a brick-maker or potter caste who had learned the art from the vaidyas, not by a physician, and two British surgeons of the Bombay Presidency, Thomas Cruso and James Findlay, witnessed it. The account ran in the Madras Gazette and was reprinted as a letter signed "B.L." in the Gentleman's Magazine of October 1794 (9). The method recorded there is the one still used. A thin plate of wax is moulded to the stump of the nose, the pattern is laid on the forehead, a flap is cut to match and left attached by a narrow pedicle between the brows, the flap is turned down and sutured to the freshened edges of the defect, and the pedicle is divided later. Joseph Carpue in London, after practising on cadavers, operated on two patients, in 1814 by most accounts, and published in 1816, after which Europe called it the Indian method, though sources disagree on that date and on whether the Samhita itself describes a cheek or a forehead flap (9). The operation works because the flap carries its own blood supply from the supratrochlear artery, a fact the surgeons who perfected it did not know. What it achieved is enormous: a face that could be shown in public, by a reliable method, centuries before anaesthesia or antisepsis, and it is the direct ancestor of the paramedian forehead flap still used today. A village can repeat it. It needs a knife, a needle, thread, a wax or leaf pattern, clean water, a steady hand and a patient who can be held still.

Cataract couching. The Uttaratantra, chapter 17, describes the treatment of linganasha, destruction of sight, with a shalaka, a probe about eight angula long with a bud-shaped tip, introduced beside the cornea and used to displace the opaque lens out of the visual axis, after which the eye is bathed with warm clarified butter and bandaged (3, 10). Whether this is couching or an early extracapsular extraction is disputed: Roy, Mehra and Deshpande argued for extraction in the British Journal of Ophthalmology in 1975 and Grzybowski and Ascaso read it similarly in 2014, while Wujastyk, the leading philologist of the text, reads it as couching (10). The outcomes of couching as practised today are known and they are bad. In the Nigerian national blindness survey, 249 of 583 operated eyes (42.7 per cent) had been couched, 73.1 per cent of couched eyes presented worse than 3/60, only 2.4 per cent reached 6/18 or better, and 42.6 per cent remained blind even with correction (11). Goyal and Hogeweg compared 28 couched with 26 operated eyes in northern Nigeria: 12 couched (43 per cent) reached 3/60 or better against 24 of 26 (92 per cent)

operated, and 6 couched eyes (21 per cent) had no perception of light at all (12). A Mali population survey published its conclusion in its title, that traditional couching is not an effective alternative to cataract surgery (13), and the one favourable series, 42 of 65 eyes from a single traditional eye centre in Yola, is wide open to selection bias (11). CH-08 holds the decision. What TR-02 contributes is the arithmetic: couching destroys about one eye in five outright and leaves most of the rest blind, while an untreated cataract blinds that eye with certainty.

Ksharasutra, the medicated seton. This is the one Ayurvedic surgical procedure with a large controlled trial behind it. A linen thread is coated in repeated layers with the latex of snuhi (Euphorbia neriifolia), the alkaline ash of apamarga (Achyranthes aspera) and turmeric, threaded through a fistula-in-ano and tied, then replaced weekly, so the track is cut through slowly while it heals behind the thread. The Indian Council of Medical Research ran a multicentre randomised trial reported in 1991 with 265 ksharasutra and 237 surgical patients. Median healing was longer with the thread, 8 weeks against 4, but recurrence, assessed in 150 patients per arm, was 4 per cent against 11 per cent (P = 0.03), and mild anal incontinence occurred in 8 ksharasutra patients against 13 surgical ones (14). A 2020 trial found healing at 43 versus 22 days with recurrence of 3.3 against 16.7 per cent (P = 0.014), while a prospective observational comparison found eighteen-month recurrence of 45 per cent for ksharasutra against 20 and 15 per cent for fistulectomy and LIFT, not significant (14). The recurrence advantage is probable but not settled. For a village the relevant fact is stronger: the thread needs no theatre, no anaesthetist and no sphincter-sparing surgical skill, and it treats a condition that otherwise suppurates for life. Grade A, with the caveat that every trial is Indian and the largest is thirty-five years old.

Wound care. Sushruta's shashti upakrama, the sixty measures for wounds, is the most detailed wound protocol in any ancient text, organised into preliminary, principal and after-care phases and aimed particularly at dushta vrana, the foul non-healing wound (15). Lekhana, scraping, is the sixteenth measure, and is debridement. The classic dressing is madhughrita, honey and ghee in roughly equal parts, and the only randomised trial I found of it compared Jatyadi, madhughrita and plain honey tulle in forty-five patients with clean wounds over ten days, finding the three comparable (16). That is a weak trial on the wrong wound type. Honey alone has better support, with a number needed to treat of 2.9 for good healing in infected postoperative wounds compared with antiseptic plus systemic antibiotics (16). The contribution here is the sixty-measure framework and the honey, not the ghee.

1.5 Panchakarma: what TR-13 settled, and the three things to add

TR-13 covers the five actions, vamana (emesis), virechana (purgation), the two bastis (enemas), nasya (nasal administration) and raktamokshana (bloodletting), with the Ayurvedic and Tibetan contraindication lists and the Shanghan lun's naming of mistaken purgation as an error with its own syndrome (THRIVING library, TR-13). I do not repeat that ground. Three additions belong here.

First, the preparatory limbs are not the purges and they are not dangerous. Snehana, oleation with ghee or oil over several days, and svedana, sudation by steam or hot fomentation, precede every shodhana procedure. On their own they are a warm oil massage and a steam bath, cheap, pleasant and almost impossible to do fatally wrong in a healthy adult.

Second, the dose problem is admitted inside the tradition. A retrospective analysis of virechana case records states that even after critical analysis of the purgative drugs in the literature, there is still difficulty in the fixation of dose (17). The classical texts list ten cardinal complications of faulty emesis or purgation, including fissure, bleeding and rectal prolapse (THRIVING library, TR-13).

Third, there is no prospective cohort anywhere giving incidence rates for dehydration or electrolyte disturbance after vamana or virechana. A 2025 Indian trial registration proposes to measure serum electrolytes across vamana and has not reported, while reviews and practitioner syllabi list dehydration, electrolyte imbalance, shock and rectal bleeding as expected complications requiring emergency management (17). The profession knows they happen and nobody has counted them. The practical statement is blunt: a therapy whose intended effect is to empty the gut from both

ends, given without any means of measuring sodium or potassium and without intravenous fluid, to a patient who may already be febrile, vomiting or scouring, is the most dangerous thing in Ayurveda apart from the metals. In a village the correct indication list for therapeutic purgation is empty.

1.6 The single plants: what the trials show

Doses here are the doses used in the trials cited, not traditional doses, and PH-07 holds the dose table for the book.

Plantago ovata (isabgol, psyllium), seed husk. A meta-analysis of sixteen randomised trials with 1,251 adults found psyllium the most effective fibre for chronic constipation, raising bowel movements by about three a week with better consistency and less straining, at above 10 g daily for at least four weeks (25). Grade A, the highest-grade and lowest-risk thing in the Ayurvedic materia medica. It needs only water, and plenty of it.

Curcuma longa (turmeric), rhizome. Kuptniratsaikul randomised 367 knee osteoarthritis patients to Curcuma extract 1,500 mg daily or ibuprofen 1,200 mg daily for four weeks and found the extract non-inferior on the main WOMAC scores with fewer episodes of abdominal pain, and Onakpoya's meta-analysis of 797 participants found significant pain reduction against placebo (21). Grade A for knee pain. The harm signal is recent: the Drug-Induced Liver Injury Network reported ten adjudicated cases of turmeric hepatotoxicity, all since 2011, median age 56, eight women, latency one to four months, five hospitalised and one death from acute liver failure, with seven of the ten carrying HLA-B*35:01 against a population frequency near 0.06, and three of seven tested products containing piperine (22). Culinary turmeric is not the exposure. Concentrated extracts, especially with black pepper, are.

Boswellia serrata (salai guggul), gum resin. Yu and colleagues pooled seven trials with 545 osteoarthritis patients, finding WOMAC pain weighted mean difference -14.22, stiffness -10.04 and function -10.75, with a minimum useful duration of four weeks, the best single trial being manufacturer-funded and giving 100 mg or 250 mg daily of an extract standardised to 30 per cent AKBA for 90 days (19). Grade A for knee osteoarthritis pain. The resin is tapped from a tree of the dry forests of central India, so elsewhere it is a trade good.

Andrographis paniculata (kalmegh), aerial parts. Hu and colleagues pooled 33 randomised trials with 7,175 patients for acute respiratory tract infection (18). Against placebo, cough improved with a standardised mean difference of -0.39 (95% CI -0.67 to -0.10, n = 596) and sore throat with -1.13 (95% CI -1.37 to -0.89, n = 314), with heterogeneity of 86 per cent, and added to usual care it improved the combined cure and markedly-effective rate (RR 1.31, 95% CI 1.16 to 1.48), with no serious adverse events. Regimens ran three times daily for three to seven days, for example 400 mg three times daily. The authors called the methodological quality overall poor (18). Grade B. The sore throat effect is the largest for any plant here.

Withania somnifera (ashwagandha), root. A 2025 meta-analysis of 15 trials with 873 adults found significant reductions in Hamilton Anxiety scores, perceived stress and cortisol at eight weeks, and a 2024 review of nine trials with 558 patients found the same (20). A dose-response analysis of 1,002 participants gave standardised mean differences of -1.55 for anxiety and -1.75 for stress, with low certainty and heterogeneity above 83 per cent (20). The effective range is 300 to 600 mg daily of root extract, and the effect appears confined to people already stressed. Grade B. Effects that large with heterogeneity that high usually shrink.

Mucuna pruriens (kapikachhu, velvet bean), seed. Katzenschlager's double-blind crossover in eight Parkinson's patients compared 15 g and 30 g of seed powder with levodopa 200 mg plus carbidopa 50 mg (23). The 30 g dose reached effect at 34.6 minutes against 68.5, gave 37 minutes (21.9 per cent) more "on" time, and raised peak plasma levodopa by 110 per cent, with no increase in dyskinesia (23). Eight patients is eight patients. But this is the one case here where a garden plant delivers a real dose of a real modern drug, and Parkinson's disease after the Fall has no other answer at all. Grade B. The pods carry itching hairs that cause intense dermatitis, and the dose carries all of levodopa's hazards.

Rauvolfia serpentina (sarpagandha), root. Rustom Jal Vakil's 1949 paper in the British Heart Journal reported a

clinical trial of the root in essential hypertension and is the hinge on which the modern antihypertensive era turns, Ciba publishing the chemistry in 1952 and launching reserpine as Serpasil (24). Modern reserpine dosing is 0.1 to 0.25 mg daily, and the depression Freis reported in 1954 at higher doses has never been cleanly established at low ones (24). I did not find two independent sources for a safe dose of the crude root powder and I do not give one. Grade B for the alkaloid. The plant is a tropical Indian understorey shrub.

Four with modest or thin support. Triphala, the three fruits Terminalia chebula, Terminalia bellirica and Phyllanthus emblica, matched chlorhexidine on plaque and gingival indices across seven trials and 1,270 patients as a 0.6 to 10 per cent mouthwash, so grade B for that use, while its laxative claim rests on mouse data (28). Terminalia arjuna bark for angina and Bacopa monnieri for memory each have one encouraging trial and a null or bias-flagged pooled result, so grade C (26, 27). Holarrhena antidysenterica stem bark, which the tradition treats as the specific for dysentery, has one uncontrolled 1986 study of 20 Entamoeba cyst passers reporting 70 per cent response, so grade D (29). Dysentery will matter enormously after the Fall and this plant has never been properly tested.

Three the book must refuse. Commiphora mukul (guggulu) oleo-gum resin is the most useful negative trial in the field, because it tested a loud traditional claim with adequate power and failed in the wrong direction: Szapary randomised 103 adults with hypercholesterolaemia to 1,000 mg or 2,000 mg three times daily or placebo for eight weeks, placebo LDL fell about 5 per cent while both guggulipid arms rose about 4 to 5 per cent, a net 9 to 10 per cent against the drug (P = 0.01 and P = 0.006), with six hypersensitivity rashes against none on placebo (30). Grade X. Tinospora cordifolia (guduchi, giloy) stem, claimed as an immunomodulator, produced six cases of acute hepatitis with an autoimmune-like picture during the Covid pandemic, one fatal, and then a 43-patient multicentre series across twelve cities with two deaths and one liver transplant, which the AYUSH ministry rejected within days as misleading (32). Grade X pending. Azadirachta indica (neem) seed oil has long safe external and dental use as leaf and twig, but by mouth or instilled in the nose it kills infants: vomiting and drowsiness within hours, then severe metabolic acidosis, seizures, coma and hepatic encephalopathy with cerebral oedema over days, with biopsy showing steatosis and mitochondrial damage indistinguishable from Reye syndrome while the liver blood tests stay normal (33). An Indian four-month-old given a second dose for cough died of cerebral oedema on day ten, and reports state that even a few drops can do this (33). Grade X by this route, and it belongs on the never list beside the metals.

Two more. Momordica charantia (karela, bitter gourd) fruit failed Ooi's Cochrane review for diabetes, with four low-quality trials and no significant difference against placebo, metformin or glibenclamide, so grade D and nothing to stake a diabetic's life on (31). AYUSH-64, a CCRAS compound of Alstonia scholaris bark, Picrorhiza kurroa rhizome, Swertia chirata and Caesalpinia crista seed, developed in 1980 for malaria and repurposed for Covid, has a meta-analysis of five trials and 420 participants giving an odds ratio of 2.35 for clinical recovery (95% CI 1.33 to 4.16, P = 0.003), the main 140-patient trial being open-label with CCRAS authors and CCRAS ownership of the formulation (34). Grade B for symptom recovery in mild illness, with no mortality data.

1.7 The systematic reviews of Ayurveda as a system

Sridharan's Cochrane review of Ayurvedic treatments for diabetes found seven trials with 354 type 2 participants, six testing proprietary herbal mixtures and only one whole-system treatment (35). Diabecon, Inolter and Cogent DB each showed lower HbA1c in one study each. No study reported complications, death from any cause or economic data, and the authors noted the interventions may not have replicated actual Ayurvedic practice, which is individualised by dosha (35).

Park and Ernst reviewed randomised trials of Ayurvedic medicine for rheumatoid arthritis, searching to about March 2003 and hand-searching Indian and Sri Lankan journals, and concluded there was no clear evidence of benefit from few poor-quality trials: one high-quality placebo-controlled trial showing no benefit, one incompletely reported trial suggesting benefit, and four difficult to interpret (36).

Furst's pilot is the most interesting trial in the field because of its design. Forty-three seropositive rheumatoid arthritis

patients were randomised to methotrexate with Ayurvedic placebo (n = 14), individualised classical Ayurveda with methotrexate placebo (n = 12), or both active (n = 17), double-blind and double-dummy over 36 weeks, with six separate placebos so that each dosage form had a match (37). ACR20 responses were 86, 100 and 82 per cent, with no significant differences and fewer adverse events in the Ayurveda arm (174, 112 and 176 events) (37). With twelve to seventeen patients per arm the trial cannot distinguish equivalence from insensitivity. What it does establish is that individualised classical Ayurveda can be blinded and tested properly.

Kessler and colleagues pooled 19 randomised and 14 non-randomised controlled trials in osteoarthritis, 2,952 patients in all, finding large effects for one compound preparation and comparability to glucosamine for another, with most others resting on single trials, and Ernst's published response agreed the evidence is scarce (38). The same group's CARAKA trial randomised 150 knee osteoarthritis patients to complex Ayurvedic treatment against conventional care and reported superiority on WOMAC at twelve weeks, acknowledging lack of blinding and unequal consultation time (38).

The pattern is consistent. Trials are small, mostly Indian, often institution-linked, rarely blinded, and almost never report mortality, complications or costs.

1.8 Rasa shastra and the metals: the documented harm

On its own terms. Rasa shastra is the alchemical branch, consolidated between roughly the eighth and thirteenth centuries and entering the mainstream canon with Sharngadhara. Parada, mercury, is theologically the seed of Shiva and gandhaka, sulphur, the essence of Parvati, and their union in kajjali, the black sulphide, founds the pharmacy. Metals and minerals undergo shodhana, purification by repeated quenching in prescribed liquids, then marana, killing, by grinding with herbal juices and incinerating through many puta cycles in sealed crucibles buried in cow-dung fires. The product is a bhasma, an ash. The tradition does not claim to be giving the patient a metal. It claims the metal has ceased to be a metal, and it has tests for this: rekhapurnatva, the powder fills the ridges of the finger-print, varitara, it floats on still water, nishchandratva, no metallic lustre remains, and apunarbhava, it does not revert to metal when re-heated with prescribed reagents. The logic is complete, the quality controls are real quality controls, and the practitioners are not being cynical. They believe the transformation is genuine.

What the measurements show. Saper and colleagues bought every unique South Asian Ayurvedic product from stores within twenty miles of Boston City Hall between April and October 2003 and analysed 70 by X-ray fluorescence (40). Fourteen (20 per cent, 95% CI 11 to 31 per cent), from eleven companies, contained lead, mercury or arsenic above published regulatory standards at the manufacturer's own recommended dose. Lead was in 13 products, median 40 micrograms per gram, range 5 to 37,000. Mercury was in 6, median 20,225, range 28 to 104,000. Arsenic was in 6, median 430, range 37 to 8,130 (40). The directions on half of the metal-containing products said children could take them. In 2008 the same group randomly selected 230 products from 673 found on 25 websites, received and analysed 193, and found detectable metals in 40 (20.7 per cent), every one exceeding at least one acceptable-daily-intake standard, with US-made products at 21.7 per cent and Indian-made at 19.5 per cent (41). This is not an import problem. Rasa shastra products were contaminated at about 41 per cent against 17 per cent for the rest (THRIVING library, TR-13, summarising the same paper), and the paper recorded more than 80 cases of lead poisoning associated with Ayurvedic medicine worldwide since 1978 (41).

What it does to people. New York City identified six pregnant women with elevated blood lead between 2011 and 2012, all through routine prenatal screening (42). Blood lead ranged from 16 to 64 micrograms per decilitre and estimated ingestion from 2 to 24 milligrams of lead a day. The products included Garbhapal Ras at 22,000 ppm lead with 19,000 ppm mercury and 410 ppm arsenic, Ovarin at 24,000 ppm lead with 70,000 ppm mercury, Garbha Dharak Yog at 100,000 ppm mercury, and Garbha Chintamani Ras at 52,000 ppm arsenic (42). Two of the six miscarried, at eleven and twelve weeks, both having taken Ayurvedic fertility preparations, and one newborn had a blood lead of 23 micrograms per decilitre at three days old. None of the nine labelled products they used was under a US import alert (42). Iowa produced the largest cluster in the American literature: the index case was a man seen

at a neurology clinic in April 2011 with a blood lead of 93.6 micrograms per decilitre, one product labelled bhasma contained 19,400 mg/kg of lead, and of 115 people then screened in his rural community, 46 (40 per cent) had blood lead of 10 micrograms per decilitre or more, with 9.6 per cent at or above 50 (43). Mercury has its own signature. Doshi reported five patients with nephrotic syndrome from membranous nephropathy attributed to mercury in Siddha and Ayurvedic preparations, all seronegative for anti-PLA2R antibodies, which marks the secondary rather than the primary form, and a British woman with rheumatoid arthritis died of end-stage renal failure from chronic mercury poisoning attributed to her medication (44).

The defence, and whether it survives the test. Mao and Desai argued in response to Saper that metals in authentic preparations are converted into mixed oxides in a way that destroys their toxicity, and Saper replied that historical use without apparent toxicity does not demonstrate safety (40). The best modern work on the defence is chemical. Dash characterised naga bhasma as lead sulphide nanoparticles of about 60 nm, arguing that progressive sulphurisation reduces aqueous solubility and therefore toxicity, and a Manipal rat study fed Nagabhasma from four stages of preparation reported a graded reduction in oxidative stress and liver and kidney markers compared with lead acetate (45). Take that seriously, then note what it does not say. It does not say the lead is gone. Lead sulphide is a lead compound, the lead content of a finished bhasma is unchanged by processing, no source reports total lead in finished commercial products at all, and solubility in distilled water is not solubility in gastric acid. The clinical series above are the test, and they were run on people given properly made preparations by practitioners who believed in them. The defence predicts those six New York women would be fine. They were not, and two lost their pregnancies.

The ministry. In February 2021, with the health minister present, Patanjali presented Coronil as the first evidence-based medicine for Covid-19 and claimed a WHO certification (46). The WHO stated it had not reviewed or certified any traditional medicine for Covid, and the Indian Medical Association called the claim a blatant lie and demanded an explanation from the minister under the code barring doctors from endorsing drugs (46). Patanjali later clarified that the certificate was a manufacturing certificate from the Indian drug controller. In July of the same year the AYUSH ministry dismissed the Tinospora hepatitis series as misleading (32). The pattern is a state advocating for a therapeutic system rather than regulating it, and it is the strongest single reason to treat Indian regulatory assurances about Ayurvedic product safety as worthless.

1.9 What a village without a laboratory can and cannot do about the metals

Nothing, and it should be stated that baldly. Every detection above required X-ray fluorescence or atomic absorption. There is no colour test, no taste, no smell, no heating test and no water test that distinguishes a bhasma containing 2 per cent lead from one containing none, and the traditional tests of a well-made bhasma, the fingerprint-ridge test and the floating test, were all passed by the products that poisoned people. Blood lead cannot be measured without a laboratory, and the clinical signs are late and unreliable: the published advice is that proper diagnosis of lead poisoning on symptoms alone may not be possible, because the symptoms overlap with common complaints and many poisoned people have none (47). Classic chronic lead features, wrist and foot drop, abdominal colic with constipation, anaemia, Burton's blue-grey line at the gum margin, and cognitive and emotional change, generally appear between 30 and 70 micrograms per decilitre (47). Chronic arsenic shows Mees' lines, transverse white nail bands taking three to six weeks to appear, raindrop pigmentation, palmar and plantar hyperkeratosis and peripheral neuropathy, and the published advice is that neuropathy with nail and skin changes and a history of indigenous medicine should immediately raise suspicion of heavy metals (47). Chronic mercury shows tremor, gingivitis, salivation, metallic taste and the irritability called erethism, with proteinuria and oedema if the kidney is hit (47). Chelation needs drugs the village will not have.

The rule for the book is therefore a prohibition, not a precaution. No metal, mineral or gem preparation, ever, under any name, at any rung up to and including the district infirmary. The village cannot verify, cannot measure, cannot diagnose and cannot treat. It can only abstain, and the cost of abstaining is whatever real benefit the bhasmas carry, which no trial has ever demonstrated.

2. Evidence grades

Remedy or procedure	Tradition says	Record shows	Grade
Dinacharya and sadvritta	Prevents disease at stages 1 and 2	Matches modern hygiene, sleep, meal-timing, exercise advice	B for components, D as a system
Forehead-flap rhinoplasty	Restores the cut nose	Cowasjee 1793, Carpue 1814, ancestor of current practice	B
Cataract couching	Restores sight	2.4% good outcome, 21% of eyes no light perception (11, 12)	X today, open after the Fall (CH-08)
Ksharasutra for fistula-in-ano	Cures without cutting the sphincter	ICMR 1991, recurrence 4% vs 11%, healing 8 wk vs 4 (14)	A
Sixty measures, honey dressing	Heals the foul wound	Honey NNT 2.9 in infected wounds (16)	B for honey, D for ghee
Vamana, virechana	Expels vitiated dosha	No incidence data, dose unfixed (17, TR-13)	D, X in the dehydrated
Andrographis paniculata, aerial	Fever, cough, liver	33 RCTs, 7,175 patients, sore throat SMD -1.13 (18)	B
Boswellia serrata, resin	Joint pain and swelling	7 RCTs, 545 patients, WOMAC pain -14.22 (19)	A
Withania somnifera, root	Strength, rejuvenation	15 RCTs, 873 adults, anxiety and cortisol down (20)	B
Curcuma longa, rhizome	Wounds, swelling, blood	Non-inferior to ibuprofen in 367 patients (21)	A
Mucuna pruriens, seed	Kampavata, tremor disease	8 patients, faster onset, 110% higher peak levodopa (23)	B
Rauvolfia serpentina, root	Insanity, high pressure	Vakil 1949, became reserpine (24)	B for the alkaloid
Plantago ovata, husk	Bowel regulation	16 RCTs, 1,251 adults, +3 stools a week (25)	A
Holarrhena antidysenterica, bark	The specific for dysentery	One uncontrolled series of 20 (29)	D
Commiphora mukul for lipids	Reduces meda	LDL rose 9-10% against placebo (30)	X
Momordica charantia for diabetes	Reduces prameha	Cochrane: no significant difference (31)	D
Tinospora cordifolia, stem	Immunity	6 cases 1 death, then 43 cases 2 deaths (32)	X pending
Neem oil by mouth or nose in a child	Worms, cough, cold	Reye-like death, few drops sufficient (33)	X

Remedy or procedure	Tradition says	Record shows	Grade
Any bhasma or rasa preparation	Metal transformed, safe	20-21% contaminated, 40% of a screened community poisoned (40-43)	X

3. Means ledger

Rung	What is available	What it changes
Hands and knowledge alone	Dinacharya, sadvritta, meal timing, sleep discipline, graded exercise, tongue scraping, chewed tooth-stick, the shatkriyakala as a way of noticing illness early, training on gourds	The whole preventive half of Ayurveda, free. The bulk of the real benefit
Hearth	Oil massage, steam fomentation, honey dressings, salt gargles, turmeric and ginger as food, psyllium if seed is available	Symptom relief, wound care, constipation. No change in mortality
Garden and still	The plants the local climate allows, decoctions, infused oils, dried powders, beeswax ointments, a scale	The graded plants become possible, but only where climate permits. Boswellia, Holarrhena, Rauvolfia and Mucuna will not grow in a temperate village
Village dispensary (300)	Trained lay healer, salvaged instruments, needle and thread, a register, ksharasutra threads, weighed doses	Fistula, abscess, wound closure, reliable dosing, a record that lets harms be noticed. First rung where rhinoplasty is realistic
District infirmary (3,000)	Nurse or doctor, sterile room, ten beds, lab bench, microscope	Rhinoplasty with after-care, fistula work at volume, and the ability to notice a cluster of liver injury before it kills several people
Hospital before the Fall	Phacoemulsification with lens implant, methotrexate, atomic absorption spectroscopy, chelation, transplant	Cataract goes from 2.4 per cent good outcome to over 90. Lead can be measured and removed

4. Harm test

The metals. They kill slowly and take the unborn with them. The harmful dose is a single daily dose of a product at a few per cent lead, which the New York women took at 2 to 24 mg of lead a day, reaching blood levels of 16 to 64 micrograms per decilitre, with two miscarriages (42). Who must never receive them: everyone. The signs are late and non-specific (1.9), and stopping the product is all a village can do.

Purgation and emesis. They kill by dehydration and potassium loss, and the people most likely to be given them after the Fall, the feverish, the dysenteric and the vomiting, are the people least able to survive them (17). Never in children, the old, the pregnant, the dehydrated, the diarrhoeal, or anyone who has not eaten and drunk normally for two days. Signs it is going wrong: more loose stools than intended, thirst, dry tongue, sunken eyes, cramp, confusion, a pulse that climbs while the patient quietens, and no urine. Stop everything, lie the patient flat, give oral rehydration solution.

Neem oil. Lethal in infants at a few drops by mouth or nose, with one to several hours to vomiting and drowsiness, then days to acidosis, seizures and cerebral oedema, and liver blood tests typically normal while the damage happens (33).

Turmeric extracts. Concentrated extracts, particularly with black pepper, caused ten adjudicated cases of liver injury with one death, latency one to four months (22). Culinary quantities are not implicated. Stop on jaundice, dark urine, pale stool, right upper abdominal pain or persistent nausea.

Mucuna. Delivers a true levodopa dose. Overdose gives nausea, vomiting, fainting on standing, confusion and involuntary movement. Never combine with any salvaged monoamine oxidase inhibitor. Handle the pods with cloth.

Rauvolfia. Lowers blood pressure and slows the heart, with the historic concern of depression at higher doses (24). Never in anyone already slow-pulsed, fainting, depressed or suicidal, and never alongside another blood-pressure drug without a means of checking the pressure.

Misidentification. Holarrhena antidysenterica is confused in trade with Wrightia tinctoria. Terminalia chebula, T. bellirica and T. arjuna are three trees in one genus with three uses, and bark, fruit and seed are not interchangeable. Plantago ovata husk is not Plantago major leaf. Bought products are also adulterated with cheaper plants and undeclared modern drugs. None of this is detectable in a village, which is the argument for growing rather than buying.

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5. Red flags

- **A woman of childbearing age taking any imported, metal-containing or unlabelled traditional preparation.** Act before anything happens. Miscarriage at eleven to twelve weeks was the outcome in two of six New York cases (42). Stop the product. There is no treatment.
- **Wrist drop or foot drop with abdominal colic and anaemia.** Chronic lead. Find and destroy the source, including anyone else in the household taking it, as in Iowa where screening found 46 of 115 poisoned (43). Nothing else can be done without chelation.
- **Nephrotic swelling with frothy urine in someone taking a traditional medicine.** Mercury membranous nephropathy (44). Stop the product. The village cannot dialyse. Comfort, salt restriction and honesty.
- **Jaundice with a herbal history.** Tinospora or concentrated turmeric are both documented. Stop everything by mouth except water and food. The village cannot transplant, and the published series carried deaths.
- **A child who has swallowed neem oil.** Seizures and coma follow within hours to days and liver tests look normal at first (33). Keep the airway clear, keep the child cool and dark, and stay with the family.
- **A patient on panchakarma who becomes thirsty, cold, confused or anuric.** Stop. Lie flat. Oral rehydration solution continuously. Never give another purgative.
- **Cataract blindness in both eyes.** Not fatal, but it ends independence. CH-08 holds the decision about couching.

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6. The case against

The strongest case against Ayurveda is made by Edzard Ernst, who with Jongbae Park found no clear evidence of benefit in rheumatoid arthritis from a small number of poor-quality studies (36), who agreed with the Kessler osteoarthritis meta-analysis that the evidence is scarce while listing several aspects of it that worried him (38), and who has argued across two decades that the field's trials are too small, too unblinded and too partisan to support its conclusions. Robert Saper and Sanjiv Kales make the harm case with numbers: one product in five contaminated, in both American and Indian manufacture, at doses exceeding every regulatory standard, with more than eighty poisonings on record since 1978 (40, 41). The New York and Iowa public-health teams supply the clinical consequence.

Their case has three parts and all three are sound. The theory is unfalsifiable, and its one testable part, prakriti assignment, is poorly reproducible even among trained physicians (7). The trial literature is dominated by small, unblinded, institutionally interested studies from one country, and Vickers showed in 1998 that trials from some countries report overwhelmingly positive results, 99 per cent of Chinese non-acupuncture trials favouring the test treatment against 75 per cent of English ones, though India was not in that comparison and no one has applied the method here (39). And the system contains a branch, rasa shastra, that has poisoned pregnant women and left an entire Iowa community with elevated blood lead, while the national ministry responded to the safety signals by attacking those who reported them (32, 46).

The counter-case is narrower than its defenders claim but it is not nothing. Furst's double-dummy trial shows that individualised classical Ayurveda can be properly blinded and tested (37), the ICMR ksharasutra trial is a large multicentre comparison in which a traditional procedure beat conventional surgery on recurrence (14), the forehead flap is in every plastic surgery textbook in the world, psyllium is in every gastroenterology guideline, and reserpine came out of a vaidya's root (24). The honest position holds four things at once: Ayurveda has produced real and lasting contributions, its preventive regimen is sound, its metaphysics cannot be used to decide anything, and its metals must be refused absolutely. Neither the romance of the herbal nor the contempt of the sceptic survives contact with all four.

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7. Ten-line summary of robust findings

1. Ayurveda is a scholastic medicine with a layered canon. The Charaka redaction is roughly 100 BCE to 200 CE, the Sushruta text was completed by a later redactor, and no precise date for either is supportable.
2. The daily regimen, dinacharya and sadvritta, is the most valuable part of the system for a village. It anticipates modern hygiene, sleep, meal-timing and graded-exercise advice, and it costs nothing.
3. The dosha theory is coherent and unfalsifiable. Prakriti assignment, its one testable anchor, has kappa around 0.28 between trained physicians (7).
4. The forehead-flap rhinoplasty is real, documented from Pune in 1793 through the Gentleman's Magazine of October 1794, and is the ancestor of current practice (9).
5. Ksharasutra beat conventional surgery for fistula-in-ano on recurrence in a 502-patient ICMR multicentre trial, 4 per cent against 11, at the cost of double the healing time (14).
6. Couching restores useful vision in a small minority and destroys about one eye in five outright (11, 12).
7. Four plants carry grade A or strong B evidence: Plantago ovata husk for constipation, Boswellia serrata and Curcuma longa for joint pain, Andrographis paniculata for respiratory symptoms.
8. Guggulu raised LDL by 9 to 10 per cent against placebo in a properly powered trial, and bitter gourd failed Cochrane review for diabetes (30, 31).
9. About one in five Ayurvedic products sold in Boston shops and on the internet contained lead, mercury or arsenic, lead up to 37,000 micrograms per gram and mercury up to 104,000 (40, 41).
10. Six pregnant women in New York reached blood lead of 16 to 64 micrograms per decilitre on classical rasa preparations, two miscarried, and 46 of 115 screened in one Iowa community were poisoned (42, 43).

8. Open questions

- Nobody has measured the incidence of dehydration, electrolyte disturbance or death after vamana and virechana in a prospective cohort, and the field admits the purgative dose has never been fixed (17).
- Whether the Sushruta Uttaratantra describes couching or an early extracapsular extraction is unsettled between Roy 1975, Grzybowski 2014 and Wujastyk (10).
- No one has applied the Vickers country-of-origin method to Indian Ayurvedic trials, so the suspicion of positive-result bias remains undemonstrated (39).
- Whether sulphurisation genuinely reduces the bioavailability of lead in naga bhasma under human gastric conditions, as opposed to in water, is untested, and no study reports total lead in finished commercial bhasmas (45).
- Whether Tinospora cordifolia causes drug-induced autoimmune hepatitis or unmasks pre-existing autoimmune liver disease is disputed (32).
- No trial has tested whether the dinacharya as a whole, rather than its components, changes any outcome.
- Holarrhena antidysenterica, the tradition's specific for dysentery, has never been tested alone in a controlled trial (29).

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At the bedside after the Fall

A household. Keep the regimen and nothing else. Rise early, empty the bowel, clean the teeth with a chewed stick after waking and after meals, scrape the tongue, wash, oil the body and scalp, work to half of your strength and no further, eat twice a day when hungry, sleep enough and at the same hours, settle quarrels. Keep honey for wounds and turmeric and ginger in the food. That is most of the value. What it needs to start: nothing. The first failure to expect: the regimen is abandoned within a fortnight because nobody is ill, which is the point at which it was working.

A village of 300. Add a garden of whichever graded plants will grow locally, weighed doses, a needle and thread, ksharasutra threads if Euphorbia and Achyranthes grow nearby, and a register in which every preparation, dose and outcome is written down with a date. Add one person who has practised incisions on gourds and suturing on cloth before touching a patient, as Sushruta required. What it needs to start: seed, a scale, a knife, a needle, boiled water,

honey and someone who can write. The first failure to expect: the healer keeps giving a preparation that is not working because the theory explains the failure, which is exactly what the register is for.

A district of 3,000. Add the forehead flap for the mutilated, ksharasutra at volume, and the thing only this scale provides, the ability to notice that three people who took the same preparation have gone yellow. What it needs to start: a nurse or trained healer, a sterile room, ten beds and a common record. The first failure to expect: someone arrives with a salvaged tin of bhasma, a reputation and a good story, and the district has no way to test it. The answer is the prohibition, written down in advance and applied to the respected visitor exactly as to the stranger.

Protocols

Protocol 1. The standing prohibition (every rung, from day one)

1. No metal, mineral, gem, ash or bhasma preparation is ever given by mouth. No exceptions for authenticity, lineage, reputation or urgency.
2. Refuse any preparation whose contents you cannot name plant by plant, and any salvaged product whose label mentions bhasma, ras, rasa, sindoor, kajjali, parada, naga, swarna, abhrak or makaradhwaja.
3. No neem oil internally or nasally, to anyone, ever, and especially not to a child.
4. No therapeutic purgation or emesis. The indication list is empty.
5. Post this list where the drugs are kept and read it aloud to every new helper.

Protocol 2. The daily regimen (household, about 40 minutes a day)

1. Wake 45 to 60 minutes before sunrise. Pass urine and stool before anything else.
2. Clean the teeth with a freshly chewed green twig about 20 cm long and the thickness of a little finger, crushed at one end into a brush, after waking, after each meal and before sleep. Do not make the gums bleed.
3. Scrape the tongue back to front, five to seven strokes, with a smooth bent strip of metal, wood or folded leaf with no cutting edge. Rinse the mouth, and hold a mouthful of oil for 2 to 5 minutes before spitting it out if oil can be spared.
4. Wash the eyes with cool clean water. Oil the scalp, the soles of the feet and the whole body with any clean warmed fat, 5 to 10 minutes, then wash, warm water on the body and cool on the head.
5. Exercise to half of your strength, judged as the point where you begin to breathe through the mouth and sweat on the forehead. Stop there. Do not exercise a sick person, a child under about seven, or the frail old.
6. Eat twice, when hungry, and never before the previous meal has gone. Sleep the same hours each night, and not by day except in the hot season, in illness, or in the very young and very old.

Protocol 3. Honey dressing for a dirty wound (hearth and above)

1. Wash your hands. Boil water and let it cool covered.
2. Irrigate the wound until nothing more washes out. Remove dead tissue and foreign matter with a clean blade.
3. Apply raw honey 3 to 5 mm thick over the whole wound surface and 1 cm beyond its edge.
4. Cover with clean dry cloth. Change daily, or twice daily while discharge soaks through. Expect stinging for the first 10 to 20 minutes.
5. Stop and reassess if redness spreads more than 2 cm beyond the edge, if there is fever, if red streaks track up a limb, or if there is no improvement after 5 days.
6. Never use honey in an infant under 12 months. That exclusion is absolute.

Protocol 4. Psyllium for constipation (garden and above)

1. One level tablespoon, about 5 to 10 g, of Plantago ovata seed husk.

2. Stir into at least 250 ml of water and drink immediately before it thickens. Follow with a second glass of water.
3. Once or twice daily, building to above 10 g daily, and continue for at least four weeks before judging it (25). Expect wind in the first week.
4. Never give it to anyone who cannot drink freely, who is vomiting, who has abdominal pain with no passage of wind at all, or who has a swollen tender abdomen. A bulking agent above an obstruction makes the obstruction worse.

Protocol 5. The drug register (village dispensary, 10 minutes a day)

1. One line per patient per preparation: date, name, age, what was given, from what plant and which part, how much, how often, and what for.
2. Review every line at 7 days and at 30 days and write the outcome, including no change and worse.
3. Once a month, read the month's lines for any preparation followed by two or more of: yellow eyes, dark urine, new weakness of hand or foot, swelling of face or legs, new confusion, or a miscarriage. Stop that preparation at once for everyone and do not restart it.
4. Keep the register even when nothing goes wrong. It is the only harm-detection instrument the village has.

Protocol 6. Before any Ayurvedic preparation is given at all

1. Can you name the plant, the part and where it grew? If not, stop.
2. Is the patient pregnant, breastfeeding, under five, over seventy, feverish, dehydrated, vomiting, scouring or jaundiced? If yes, give nothing but water, salt, sugar and food.
3. Is there a cheaper, safer thing that would do, such as rest, water, food, warmth or a dressing? If yes, do that first.
4. Write it in the register before you give it, not after.

Numbers to carry

1. **One in five.** The proportion of Ayurvedic products found to contain lead, mercury or arsenic, 20 per cent in Boston shops and 20.7 per cent bought online, in both American and Indian manufacture (40, 41).
2. **40 per cent.** The proportion of an Iowan community found to be lead-poisoned once one index case was found and 115 people were screened (43).
3. **2 to 24 milligrams of lead a day.** What six pregnant New Yorkers were swallowing in classical rasa preparations, reaching blood lead of 16 to 64 micrograms per decilitre, with two miscarriages (42).
4. **4 per cent against 11 per cent.** Recurrence of fistula-in-ano with ksharasutra against conventional surgery, at the cost of 8 weeks' healing against 4 (14).
5. **2.4 per cent.** The proportion of couched eyes reaching 6/18 or better in the Nigerian national survey, with 21 per cent of couched eyes in a clinic series left with no perception of light (11, 12).
6. **Half of your strength.** The classical ceiling on exercise, the point of mouth-breathing and forehead sweat, with children, the old and the sick excluded entirely (6).
7. **10 grams a day for four weeks.** The psyllium husk dose and duration that works, with water (25).
8. **One to four months.** The latency from starting a concentrated turmeric extract to liver injury, in the series that included one death (22).
9. **A few drops.** The quantity of neem oil that has caused fatal encephalopathy in an infant (33).
10. **9 to 10 per cent the wrong way.** The LDL difference against guggulipid in the only properly powered trial, which is the number to recite whenever someone says the tradition would not have kept a remedy that did not work (30).

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