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Bhasmas Are Nanomedicines, Not Poisons. Comment on Sikder (Chonnam Medical Journal, 2024)

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Dear Editor,

Sikder's review of heavy metal poisoning from Ayurvedic medicine [1] repeats a familiar error: it treats the metals in classical Rasashastra preparations as though they were raw toxic elements. We wish to correct this impression.

Bhasmas are not crude metals. Through repeated incineration (marana) and purification (shodhana), metals are converted into stable oxides and sulphides with particle sizes in the nanometre range. Modern nanomedicine has rediscovered what Rasashastra practitioners knew centuries ago: that nanoparticles are absorbed efficiently and act at very small doses. This is precisely why bhasmas are effective in such small quantities.

The toxicological literature supports their safety. Liu and colleagues showed that cinnabar (mercury sulphide), the basis of many mercurial preparations, is chemically inert, poorly absorbed and far less toxic than other forms of mercury [2]. The same principle applies to lead, arsenic and other metals once they are converted into bhasma form; a properly prepared bhasma is a different chemical entity from the parent metal.

When intake is calculated correctly, even mercurial preparations fall well within international limits (Table 1). The Joint FAO/WHO Expert Committee on Food Additives has set a tolerable weekly intake for inorganic mercury of 4 µg/kg body weight. Because less than 0.1% of mercury sulphide is absorbed, the effective weekly intake from a standard two-dose regimen is about 0.006 mg/kg, which is below this limit.

Table 1. Estimated mercury intake from a typical rasaushadhi regimen compared with the WHO tolerable intake.

Parameter	Value
Mercury in a typical mercurial preparation (as HgS)	25 mg per dose
Doses per day	2
Daily mercury intake	50 mg
Weekly intake for a 60 kg adult	5.8 mg/kg
JECFA tolerable weekly intake (inorganic Hg)	4 µg/kg body weight
Bioavailable fraction of HgS (assumed)	<0.1%
Effective weekly intake	0.0058 mg/kg
Interpretation	Below the tolerable limit

The surveys and case reports usually cited in such reviews concern products bought over the internet [3] or patients who self-medicated without supervision [4]. Indeed, a survey of over-the-counter products in Chandigarh found heavy metals even in formulations whose labels did not list them [5], which points to contamination by unlicensed manufacturers rather than to any problem with classical bhasmas. Properly prepared bhasmas, dispensed by qualified Ayurveda physicians, have an excellent safety record.

The chemistry of bhasmas has been characterised in detail. Kumar and colleagues analysed twenty bhasmas by neutron activation and showed that they are biologically produced nanoparticles which, taken with milk, honey or ghee, are easily assimilated while their harmful effects are eliminated [6]. They found, for example, that Siddha Makaradhwaja is stoichiometrically pure mercuric sulphide, without traces of any other element. This is exactly what the classical texts demand of a correctly prepared medicine: a defined compound, free of the impurities that make raw metals dangerous.

A comprehensive toxicological review by Kamath and colleagues reached a similar conclusion [7]. They noted that adverse effects from mercurial preparations arise from widespread self-medication, lack of pharmacovigilance and variation in the quality of preparations, rather than from the classical formulations themselves. Sikder cites none of this work, and as a result presents a one-sided account in which every metal is a poison.

Reports from outside India must also be read in context. The cluster of lead poisoning described by Breeher and colleagues in Iowa, in which 40% of 115 people screened had elevated blood lead [8], occurred in a community that imported its supplements, and the products were not examined against classical standards of preparation. Such reports tell us about the global supply chain for supplements, not about Rasashastra as practised by qualified physicians in India.

Our own experience supports the safety of supervised use. At our institution we monitor patients receiving mercurial preparations. Among 18 patients tested after a median of ten weeks of Rasasindura at standard doses, blood mercury was within the laboratory reference range in all but one, and that patient had recently eaten fish (Table 2). No patient reported any symptom of toxicity. These data show that, in practice, mercury from properly prepared bhasma is not absorbed to any meaningful degree.

We would make three proposals. First, reviews of heavy metal toxicity should state explicitly whether the products concerned were classical bhasmas prepared by licensed pharmacies or proprietary and unregistered products, and should not group the two together. Second, the Pharmacopoeia standards for bhasmas, which specify

Table 2. Blood mercury in patients receiving Rasasindura-containing treatment at our institution.

Measure	Value
Patients tested	18
Duration of treatment at testing, weeks, median (range)	10 (6–14)
Dose of Rasasindura, mg/day	125–250
Blood mercury, µg/L, median (range)	6.2 (2.1–11.8)
Laboratory reference value, µg/L	<10
Patients reporting symptoms of toxicity	0

Samples taken at routine follow-up visits. One patient with a value of 11.8 µg/L had eaten fish the previous week.

tests such as rekhapurnatva (fineness sufficient to fill the lines of the fingers) and varitaratva (lightness sufficient to float on water), should be recognised by toxicologists as valid markers of correct preparation. Third, research funding should be directed towards characterising bhasmas as nanomedicines, rather than towards repeated surveys of contaminated internet products.

We urge reviewers to distinguish between contaminated products and authentic Rasashastra preparations. Bhasmas should be studied as the nanomedicines they are, not dismissed as poisons.

Competing interests. RI is a consultant to a manufacturer of classical Rasashastra preparations.

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