

Contamination of herbal medicines

In the 13th article in a series on complementary medicine, **Edzard Ernst** points to several cases of contamination of herbal medicines and looks at advice to give to users



Traditional Indian remedies often contain heavy metals

Herbal medicines, particularly Asian herbal medicines, have become more and more popular. Currently, they are not regulated as medicines and can be purchased from outlets ranging from health food stores to internet sites. A critical evaluation of their safety is, therefore, important. One safety issue relates to the possibility that some Asian herbal medicines contain heavy metals or undeclared drugs.

Indian remedies

Indian medical systems (eg, Ayurveda and Unani) have a long history of herbal medicine. Heavy metals have been a regular, and often deliberate, constituent of these traditional Indian remedies. To use the term “contamination” can, therefore, be misleading.

A London-based toxicology unit published a case series of adverse events associated

with traditional medicines reported to it between 1991 and 1995.¹ Of 12 cases of poisoning with lead, arsenic or mercury, nine were associated with herbal remedies from India. The remainder were due to traditional Indian cosmetics (eg, Surma, a coloured powder used in the eye area). A recent case report from Italy² describes typical features found in such instances of poisoning:

- Non-qualified prescribers
- Lack of product standards
- Undeclared ingredients
- Non-disclosure of usage
- Delay of diagnosis of poisoning and effective therapy

Indian authors analysed 31 Ayurvedic formulations obtained in India for their mercury content.³ With the exception of one, all exceeded the legal limits of 1ppm mercury and 16 had more than double the acceptable amount. Lead poisoning through Ayurvedic medicine has also been reported in the US and Germany.⁴ A US survey suggests that 20 per cent of such remedies are contaminated with heavy metals.⁵

Chinese remedies

Numerous case reports and case series of heavy metal poisoning associated with the use of traditional Chinese medicines (TCMs) have been published. Lead has been most frequently implicated as the culprit but mercury, cadmium, arsenic, copper and thallium have also been found in TCMs. A recent case report from Canada demonstrates the typical

Panel 1: Undeclared pharmaceuticals found in traditional Chinese medicines

Aminopyrine	Caffeine
Carbamazepine	Chlorzoxazone
Clobetasol propionate	Dexamethasone
Diazepam	Diclofenac
Ethoxybenzamide	Fenfluramine
Fluocinolone acetonide	Glibenclamide
Hydrochlorothiazide	Hydrocortisone
Indometacin	Mefenamic acid
Methylsalicylate	Paracetamol
Phenacetin	Phenylbutazone
Phenytoin	Valproate

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features of poisoning by herbal remedies listed above.⁶

When officials screened for undeclared pharmaceuticals and heavy metals in imported Chinese remedies on sale in Californian herbal retail stores,⁷ they found that 7 per cent of the 251 products contained undeclared pharmaceuticals (eg, ephedrine, chlorphenamine, methyltestosterone and phenacetin). Twenty-four products contained at least 10ppm lead, 36 contained an average of 14.6ppm arsenic, 35 contained an average of 1,046ppm mercury, and 23 had more than one contaminant. When 2,080 samples of TCMs were tested in Singapore, 42 different TCMs were found to contain metals in amounts exceeding the legal limits.⁸ Mercury was detected in 28 products, lead in eight, arsenic in six, and copper in one. One product contained both mercury and lead and one contained both mercury and arsenic. Melchart *et al* analysed all 317 batches of dried Chinese medicinal herbs delivered to a German hospital. Heavy metal content beyond the legal limits was detected in 3.5 per cent of these samples which, according to their Chinese certificates, were not contaminated.⁹

Variety of contaminants

Heavy metals are not the only possible toxins in herbal remedies. Contamination with herbicides, pesticides, micro-organisms or mycotoxins, or insects also occurs. Moreover, contamination with toxic herbal constituents (eg, through misidentification of the herbal ingredients) has caused serious problems. In Belgium, the use of a TCM contaminated with plants from the *Aristolochia* species resulted in an epidemic of subacute intestinal nephropathy. Many of the affected patients required kidney transplantation. When 19 kidneys and urethras removed from 10 patients were examined histologically, neoplasms were

detected in 40 per cent.¹⁰ *Aristolochia* is now banned in the UK but it is still widely available via the internet. A Google search carried out in early April generated no fewer than 86,000 hits using the search term “aristolochia” and 60,600 for “snakeroot”, the common name. Many of these sites were offering aristolochia products for sale.

Numerous case reports from countries such as Australia, Belgium, China, Holland, New Zealand, the UK and the US demonstrate the adulteration of TCMs with synthetic drugs and associate this with health problems in users. Japanese authors saw six patients who experienced liver problems after taking Chinese herbal slimming aids adulterated with N-nitroso-fenfluramine.¹¹ Two patients developed fulminant liver failure — one needed a transplant and one died.

The adulterants cover a wide range of pharmaceutical agents (see Panel 1, p167). Agranulocytosis, Cushing’s syndrome, coma and excessive increase of international normalised ratio have all been reported as a consequence. Analyses of TCMs are available from Australia, Taiwan and the UK. The largest of these studies¹² showed that 24 per cent of all 2,609 samples contained at least one adulterant.

Other herbal medicines

A study from Brazil showed that non-Asian herbal remedies can also be contaminated. Cadmium was detected in samples of *Celastraceae*, *Cascara*, horse chestnut and *Chorella*.¹³ Case reports from South Africa demonstrated that herbal remedies available from indigenous healers in this country can be adulterated with prescription drugs, which can lead to serious consequences for patient’s health.¹⁴

Conclusion

There are several possible explanations for the presence of heavy metals in Asian herbal medicines. First, heavy metals could be included intentionally for alleged medicinal properties. Traditional Indian schools of medicine emphasise the importance of metals like lead, copper, gold, iron, mercury, silver, tin and zinc for the proper function of the human body. Ayurvedic texts acknowledge the toxicity of heavy metals and recommend special physico-chemical procedures that allegedly “detoxify” them. In TCM, mercury is part of some preparations. For example, *cinnabaris* (mercury sulphide), *calomet* (mercury chloride), or *hydrargyri oxydum rubrum* (mercury oxide).⁷ Lead is used as “*Mi Tuo Seng*” (Lithargyrum) and arsenic as “*Xiong Huang*” (Realgar) in the manufacture of several TCMs.

Second, the presence of heavy metals may be the result of contamination during manufacture. For instance, from grinding weights or the use of lead-increasing containers or other manufacturing utensils.⁷ Third, Asian herbal medicines can contain heavy metals when grown on heavily polluted soil. TCMs can also contain animal and mineral products and these, too, can be contaminated with heavy metals.

Adulteration is, by definition, fraudulent. Some manufacturers evidently include synthetic drugs in their products with the aim of rendering them more clinically effective and presumably to boost sales.

An effective strategy of minimising these risks (see Panel 2) should follow several avenues. The consumer should be informed that natural does not necessarily mean free from risk. Patients and pharmacists should be encouraged to talk openly about the use of Asian herbal medicines and the possibility of interactions of herbal medicines with prescribed drugs.

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Further reading

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Panel 2: Advice for patients regarding use of herbal medicine

- Herbal remedies should be considered medicines by all parties concerned
- Recommended dosage regimens must be followed
- Long-term therapy should be discouraged
- Discussion with conventional health care providers should be encouraged
- The possibility of herb-drug interactions should be acknowledged
- The possibility of contamination and adulteration should be considered
- Reputable suppliers should be chosen
- When experiencing adverse effects, herbal medicines must be discontinued and a health care professional consulted
- Extra caution is advised for pregnant or breast-feeding women, young children or the elderly

Adapted from Ko R. Adverse reactions to watch for in patients using herbal remedies. *Western Journal of Medicine* 1999;171:181–6.