



Complementary Medicine And Heavy Metal Toxicity In Australia

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Article ID: WMC00535

Article Type: Review articles

Submitted on: 07-Sep-2010, 12:03:10 AM GMT **Published on:** 07-Sep-2010, 03:03:53 PM GMT

Article URL: http://www.webmedcentral.com/article_view/535

Subject Categories: TOXICOLOGY

Keywords: Heavy Metals, Toxicity, Lead, Arsenic, Ayurvedic, Complementary Medicine, Alternative Medicine

How to cite the article: Denholm J . Complementary Medicine And Heavy Metal Toxicity In Australia .
WebmedCentral TOXICOLOGY 2010;1(9):WMC00535

Source(s) of Funding:

No funding source.

Competing Interests:

Nothing to declare

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Abstract

In recent years, heavy metal toxicity related to the use of traditional Chinese and Indian herbal medications has been reported in a number of countries, including Australia. Heavy metals such as lead or mercury may be introduced into herbal medications through contaminated soil or production techniques, or may be deliberately included as a therapeutic ingredient. Particularly when consumed over prolonged periods, heavy metals have been detected in some products at levels sufficient to cause significant toxicity. Currently, these medications may be imported for personal use without licence or testing, and there is continued risk that Australians may develop heavy metal toxicity through their use.

This article will review heavy metal toxicity related to herbal preparations, and argue that the current regulatory framework could be strengthened through the use of targeted public educational campaigns and the provision of free heavy metal testing for imported medications.

Introduction

Scientifically, 'heavy' metals are those which have high density or specific gravity, however, the term has come more generally to refer to those metals which are poisonous or toxic to humans. The most common heavy metals implicated in human toxicity include lead, mercury, arsenic and cadmium, although beryllium, manganese, aluminium and cobalt may also cause toxicity [1,2]. The effects of toxicity vary between metals; for instance, while lead poisoning typically may cause cognitive impairment, abdominal pain, vomiting and anaemia, mercury poisoning may cause peripheral neuropathy, desquamation and psychological disturbances. Other factors, such as the chronicity of exposure, may also affect symptoms and clinical presentation. There is, however, considerable overlap between the clinical syndromes associated with heavy metal poisoning, often involving gastrointestinal disturbances, and specific identification of metals is required for diagnosis [3].

Heavy metal toxicity has been well described in a variety of settings, including occupational and

household exposure. Exposure through imported, contaminated herbal remedies, however, has only been relatively recently recognised. In 2007, the Australian Adverse Drug Reactions Bulletin reported a case of a husband and wife who developed lead poisoning after prolonged therapy with Ayurvedic herbal medicines [4]. Both had been prescribed the treatment through a hospital in India, and developed symptoms including abdominal pain and vomiting. Serum lead levels were found to be 40-120 µg/dL, with normal levels being

Larger scale attempts to determine the extent of heavy metal contamination in herbal medications have been carried out. A systematic sampling of Ayurvedic preparations sold in the Boston area found that 14/70 (20%) contained heavy metal levels above regulatory standards [6]. On a more global scale, another study examined heavy metal content in traditional Asian herbal remedies purchased in the United States, Vietnam and China [7]. The majority of products were found to have detectable levels of heavy metals, with nearly three-quarters (74%) containing amounts greater than recommended by existing public health guidelines. Finally, a Californian screening program for imported Asian herbal preparations found that 32% contained either undeclared pharmaceutical products or heavy metal concentrations exceeding acceptable limits [8]. The extent of the issue, then, appears to be substantial and the risk of heavy metal toxicity significant.

Herbal remedies, then, have been identified as causative factors in a number of cases of heavy metal toxicity worldwide. Typically, these cases have involved medications prepared in China or India and subsequently exported or ingested overseas. A public health response to this issue requires an understanding of the cultivation and preparation of these products, particularly how these processes may lead to contamination with heavy metals. Considering that products implicated in human toxicity in Australia have been prepared overseas, an adequate public health response will also require consideration of appropriate legislation and guidelines for importation of medicinal products and plants.

Discussion

Heavy metal contamination of herbal products

There are three main mechanisms that have been proposed to account for heavy metal contamination in medical herbal products; contamination during cultivation, accidental cross-contamination occurring during processing and/or the deliberate introduction of heavy metals as a therapeutic ingredient.

Cultivation in soils containing high concentrations of heavy metals is one mechanism by which heavy metal contamination of herbal products have been documented [9]. Alongside the increasing industrialisation of countries such as China and India has come reduction in available arable land free from contact with urban centres [10]. Farmland, which may have been used for generations to produce medicinal herbs, may be directly encroached upon by factories, roads and other high pollutant areas or contaminated by aerosolised particles of waste material. Fertilisers, herbicides or insecticides containing heavy metals may also be applied in some settings. Additionally, run-off and catchment areas for rivers and streams may become contaminated and lead to downstream dispersion of heavy metals [11]. Regardless of the source, plants are ultimately grown in high concentrations of heavy metals and incorporate them in subsequent products.

Concerns about contaminated soil have been investigated directly in a number of different settings. While some environmental surveys have found high levels of heavy metals in soil where herbal products are grown [12], surveys of other cultivated areas have not borne this finding out [13]. Studies such as these are of course highly variable depending on geographical location, however, they do support the possibility that heavy metal contamination could occur in this way.

Cross-contamination with heavy metals may occur during processing of previously uncontaminated herbal preparations in laboratories dealing with both substances [14]. Alternatively, different processing techniques have been shown to be variably effective in removing or concentrating heavy metals found in the plant material being prepared [15]. Processing technique is thus a further way that heavy metals may be introduced, concentrated or fail to be removed from the preparations sold as medicinal herbal medications. Finally, heavy metals in herbal preparations may not be a result of accidental contamination but may be deliberately introduced for supposed therapeutic properties. Heavy metals have long been considered to have therapeutic potential in many contexts. Even in the developed world, mercury was used to treat syphilis until the introduction of penicillin, while arsenic-derived compounds are still used for treatment

of some forms of malignancy. Lead, mercury and arsenic have all been included in various Ayurvedic and traditional products, and may still be found in some preparations. One Ayurvedic website reviewed contains the claim that lead is normally 'present in blood and lymphatic tissues', and that 'imbalance causes anaemia' [16]. The same website claims that mercury "has proved to be an effective haemopoietic drug and a good anabolic agent." Erroneous beliefs such as these may lead to deliberate addition of heavy metals for purported therapeutic effect; addition which may or may not be declared to the recipient.

It is difficult to estimate the degree to which each of these mechanisms contributes to the overall burden of heavy metals found in herbal preparations, and the mechanisms for addressing each are likely to vary considerably. The Indian government introduced regulation in 2005 requiring that products designed for export be tested for heavy metals, however these provisions do not impact locally produced or purchased medications [17]. Although these measures are important, it is anecdotally relatively common for such products to be purchased locally and then brought into Australia for personal or family use.

Current Australian regulation of herbal medications

The Therapeutic Goods Administration (TGA) regulates complementary medications, including herbal, traditional Chinese or Ayurvedic medicines, if they are manufactured in Australia. Australian-made formulations of these products are subject to a three-tiered regulatory system, which consists of manufacturer licensing, pre-market assessment of medication risk and post-market auditing [18]. These measures appear effective, and no cases of heavy metal toxicity have been reported relating to herbal medications manufactured in Australia.

Commercial importation of herbal medications also requires licensing and assessment through the TGA. Imported medications must be listed on the Australian Register of Therapeutic Goods, and manufacturers are subject to the Australian Code of Good Manufacturing Practice for Medicinal Products [19]. Once in use, medications suspected of being related to adverse effects such as heavy metal toxicity have been reported by medical practitioners or pharmacists through the Australian Adverse Drug Reaction Advisory Committee, a role which is currently being replaced with the Advisory Committee on the Safety of Medicines [20]. This committee may investigate or intervene in a variety of ways, including removal of the product.

While licensed medications, then, have both pre- and post-marketing structures for safety monitoring, medications that are imported for personal

(non-commercial) use are not restricted unless they are known to contain substances registered as pharmaceutical compounds in Australia [21]. While import/export restrictions provide some degree of regulation for commercially available products, individuals are free currently to import moderate quantities of unlicensed medications produced overseas, without assessment of risk or evidence regarding heavy metal contamination.

This situation allows the continued possibility that people living in Australia may develop heavy metal toxicity from imported herbal preparations. Effective strategies to minimise or eliminate this risk are challenging for policy makers, but critical for optimising health.

Alternative regulatory systems

An effective response to the importation of herbal products potentially containing heavy metals presents a difficult challenge on a number of levels. These medications are likely to be imported in small quantities by a variety of routes, including via the postal service and with international travellers. While prohibited substances such as illegal recreational drugs also enter Australia in these ways, the majority of herbal medications are likely to be safe and legal and an equivalent response is not warranted. Additionally, any harms that are derived from the use of herbal medications are most likely to be borne by the individual or their family rather than the broader community. Under these circumstances, the introduction of punitive measures such as fines would arguably be overly harsh and probably ineffectual. A more effective strategy would be to provide a voluntary heavy metal testing service that consumers and general practitioners could access easily, and to support its use with culturally appropriate educational campaigns about heavy metal toxicity.

Testing for heavy metals

One potential approach would be for the TGA to make heavy metal testing freely available in Australia, so that individuals importing medications for their own use have access to high-quality information regarding the substances they are ingesting. The most effective way that testing could be introduced would be by allowing general practitioners to have herbal preparations tested through existing pathology service providers as a free service. As with currently performed investigations, pathology providers would either perform the testing or refer the sample to a designated central testing site, then communicate results back through the general practitioner.

To be utilised, heavy metal testing should be provided without charge to the consumer. Results should be made available as quickly as possible, and those

bringing preparations for testing should be discouraged from consuming them until results are available.

Education of community groups and general practitioners

In many cases, people importing herbal preparations will have used or been familiar with their use before, and may not generally perceive them to be risky. Education of cultural groups who frequently use herbal preparations is essential in supporting a voluntary testing policy on imported products. Campaigns should be culturally and linguistically appropriate, and different strategies may be required for different community groups. Involvement of cultural organisations from an early stage is imperative in identifying effective communication strategies. As with all educational programs, review of effectiveness and evidence of behavioural change is valuable for continuous improvement.

Education would need to contain information related to the risk of heavy metal toxicity and awareness that heavy metals may be deliberately or accidentally included in herbal preparations. Such a campaign may not be limited to the risk of heavy metal toxicity, however, and could be directed towards encouraging people taking herbal preparations to discuss them with a general practitioner. This may have a range of associated benefits, including reducing the risk of medication interactions and providing an opportunity for treatment of co-existing medical conditions. At the time of the consultation general practitioners could send a sample of the preparation for heavy metal testing, providing an opportunity to detect heavy metal contamination and to prevent toxicity.

As well as community educations, the knowledge of such a service and the means by which it could be accessed would need to be effectively disseminated to general practitioners. Educational networks such as regional general practice colleges are already in existence, and could be employed to facilitate this process.

Conclusion(s)

In summary, heavy metal toxicity through contamination of imported herbal preparations continues to be a recognised risk in Australia. Although strategies to limit this risk present challenges, they are important for promoting and maintaining an optimal level of health. Voluntary programs to provide community education regarding the potential risks of herbal preparations should be supported by the

availability free heavy metal testing services. These testing services would most helpfully be provided through existing general practice and pathology testing services, and would contribute to health protection and promotion in a range of related ways.

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