Ayurvedic medicine- Not always a safe bet [version 1; referees: awaiting peer review]

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Abstract
Ayurvedic medicine, a traditional system of medicine practiced in the Indian subcontinent is considered to be devoid of adverse effects. We report three cases which highlight the possibility of adverse events with the use of ayurvedic products. A 35 years old woman with hepatitis took ayurvedic powders and had her liver injury worsened, possibly due to alkaloids, and developed nephrotic syndrome, possibly due to gold salt. A 57 years old hypertensive man was taking ayurvedic medicine containing reserpine which had long been withdrawn from the allopathic system of medicine due to wide range of side effects. A 47 years old woman with rheumatoid arthritis was taking an unknown tablet containing a steroid as an adulterant for 2 years and developed side effects typical of steroid excess. We like to highlight the fact that ayurvedic medicines do have propensity to cause adverse effects due to adulterations or inherent constituents like alkaloids, and hence are not completely safe.

Keywords
Ayurvedic medicine, heavy metals, alkaloids, adulteration
Background

Ayurveda is one of the most renowned traditional systems of medicine, and has been widely practiced in the Indian subcontinent, including Nepal, since the 2nd century BC. People have faith with ayurveda as it is based on the use of natural products, and is considered to be devoid of adverse effects.

Allopathic medicines on the other hand are known to have adverse effects, and are generally prescribed based on risk versus benefit for a particular disease and patient. Alternative forms of medicine like ayurveda are usually thought by patients and ayurvedic doctors alike to be harmless, and are also advertised similarly. But it has been proven that certain constituents of ayurvedic products, like heavy metals and alkaloids, can have adverse effects, and the possibility of these adverse events needs to be highlighted so that both the practitioners and consumers will become cautious in their use, as with allopathic medicines.

Sometimes, patients receive unknown powders adulterated with drugs such as steroids in the name of ayurvedic medicine, prescribed by traditional healers. People’s faith in ayurvedic medicines has been exploited by many healers who prescribe such unnamed powders to patients, especially with chronic diseases like arthritis and asthma, leading to adverse events.

Below we discuss some of the apparent pitfalls of the administration of ayurvedic medicine with common examples.

Case 1

A 35 years old Newar woman from suburban Kathmandu who was a housewife, developed jaundice, vomiting and low grade fever. Family members took her to a local ayurvedic practitioner who prescribed a combination preparation called “puriyas” in paper packets containing several powder medicines and gold salt (swornabhasma) as shown in Figure 1. Despite the treatment, she became sicker with deepening of jaundice and significant weight loss (almost half of her previous body weight) in about one week. She was then rushed to the emergency department (ED) of Patan Hospital, Lalitpur, Nepal (April, 2018). On presentation to ED, her laboratory parameters, with normal range in parantheses, were as following;

Complete blood count (CBC): white cell count 10.9 (4–10) × 10^9/L; neutrophils 70%; lymphocytes 22%; monocytes 8%; red blood cells 4.8 (4.2–5.4) × 10^12/L; haemoglobin 12.1 (12–15) g/dL; platelets 136 (150–400) × 10^9/L.

Biochemistry: random blood sugar 123 (79–160) mg/dL, urea 59 (17–45) mg/dL, creatinine 1.3 (0.8–1.3) mg/dL; sodium 138 (135–145) mmol/L and potassium 4.3 (3.5–5) mmol/L.

Hepatic panel: bilirubin total 65.73 (0.1–1.2) mg/dL and direct 43.9 (0–0.4) mg/dL; alanine transaminase (ALT) 566 (5–30) units/L; aspartate transaminase (AST) 494 (5–30) units/L; alkaline phosphatase (ALP) 155 (50–100) IU/L; albumin 3.0 (3.5–5) g/dL, International normalized ratio (INR) 2.0 (0.9–1.2).

Urine examination: albumin 3+, sugar- nil, white cell count 1–2/ high power field, red blood cells- nil, 24 hour urine protein- 3.5 gm/day

Viral hepatitis panel: Hepatitis A virus (HAV) IgM, Hepatitis E virus (HEV) IgM, HBsAg, Hepatitis C virus (HCV) IgM- all negative

She was admitted and diagnosed of fulminant hepatic failure with infective hepatitis and nephrotic range proteinuria. The ayurvedic powder was stopped, and she was managed with supportive treatment (intravenous fluids, intravenous ceftriaxone 1 gm and oral doxycycline 100 mg twice daily for 7 days, daily blood glucose and alternate day hematology, electrolytes, renal and hepatic biochemistry monitoring). She was discharged from hospital in two weeks after she started improving. She recovered, with bilirubin and transaminases falling gradually to normal after three weeks (bilirubin-total 1.0 mg/dL and direct 0.6 mg/dL, ALT 30 units/L and AST 23 units/L). Her proteinuria also decreased gradually (24 hour urine protein- 0.8 gm/day), and urine dipstick for protein was negative at one month.

Case 2

A 57 years old gentleman from Kathmandu, teacher by occupation had come for a blood pressure check-up at the medical outpatient department (OPD) of Patan Hospital, Lalitpur, Nepal in June, 2018. He told the doctors that he had been taking an ayurvedic medicine called “Tensarin” for high blood pressure control. On OPD review his blood pressure was recorded as 150/80 mm Hg. He was prescribed a combination preparation called “puriyas” in paper packets containing several powder medicines and gold salt (swornabhasma) as shown in Figure 1. The composition leaflet revealed that this drug contained several herbal preparations, one of which was “Rauwolfia serpentina” from which the active substance “Reserpine” is derived. His blood pressure during this visit was 140/80 mm Hg. Reserpine is not a recommended agent for treating hypertension due to its adverse effects such as decreased cardiac output, bradycardia, sedation, depression, diarrhea, and increased gastric acid. Fortunately, our patient had no adverse effects of reserpine. We explained to him the risks of the drug he was taking and he stopped taking the powder medicines immediately.
Figure 2. Unlabeled tablet taken by case 3.

was receiving, then switched him to amlodipine 5 mg once daily. He has been in regular follow up now and his blood pressure continues to be well controlled.

Case 3
A 47 years old Aryan woman from suburban Lalitpur who was a housewife, came to the OPD of Patan Hospital in April, 2018 with a complaint of excessive weight gain. She claimed that she was gaining excessive amount of weight despite maintaining her normal diet and physical activity. She also had sore muscles and bruises on her body. On further inquiry, she said that she had been experiencing pain over multiple joints for past 2 years, for which she was taking some unlabeled ayurvedic tablet (Figure 2) prescribed to her by an ayurvedic doctor. The tablet controlled her pain, and it also made her feel “strong” as she could perform her chores that she was unable to, prior to that medication. On further questioning as to why she chose this form of medication, she said that she believed the ayurvedic medicine were potentially harmless. The drug was sent for chemical analysis, and it revealed that the tablet consisted of prednisolone, an exogenous steroid. Soon after we stopped the unlabeled medicine, she started to have more pain and swelling in the small joints of both hands and symptoms suggestive of steroid withdrawal were noted. She was subsequently diagnosed as rheumatoid arthritis based on clinical features and laboratory parameters: C-reactive protein- 25 mg/L (normal < 5 mg/L), Rheumatoid factor- 30 IU/mL (normal < 25 IU/mL). She was then managed with disease modifying anti-rheumatic drugs (DMARDs); oral methotrexate 7.5 mg per week for 2 weeks followed by 15 mg per week thereafter and oral hydroxychloroquine 400 mg once daily. Low dose steroid (oral prednisolone 20 mg daily) was continued with gradual taper and stopped over 3 months. When last seen 3 months ago (October, 2018), her arthritis was well-controlled with DMARDs without steroid preparations or unlabeled medicines.

Discussion
In the first case, the patient with jaundice due to infective hepatitis was taken directly to an ayurvedic practitioner. Jaundice is a problem which most of the Nepalese people in general, regardless of the status of their education, consider as a disease requiring ayurvedic medicines. Even if they consult allopathic clinicians first, many take ayurvedic medicines after a period of time as it usually takes many days to weeks for jaundice to resolve; and their faith in ayurvedic medicines gets strengthened. But unfortunately, many plant products contain alkaloids such as pyrrolizidine which are toxic to the liver, and can precipitate or worsen liver injury1. It was not clear in our patient whether the worsening was caused by the disease process itself or the use of ayurvedic products containing potentially harmful alkaloids, but we can at least say that these products were not helpful in dealing with her liver problem as is generally believed. We see many patients coming to our clinic with worsened jaundice after the intake of ayurvedic products as in our patient.

Our first patient also received gold in the form of swarnabhama that has been linked with kidney injury and nephrotic syndrome2. Ayurvedic products contain certain amounts of different heavy metals like gold, lead, mercury, copper, iron, arsenic, zinc, and cadmium that are believed to have therapeutic benefits. Studies have shown that most of the ayurvedic products contain these metals in amounts exceeding WHO permissible limits, and can potentially cause harmful consequences to human health3. The possibility of the potentially toxic amount of these heavy metals should also be considered and precautions taken. So it is imperative that the amount of such constituents in each of the ayurvedic products be mentioned on the label so that patients have some idea of the substance and the quantity being taken.

Our second patient had been taking reserpine in the form of ayurvedic product, as antihypertensive agent. The present allopathic guidelines do not support the use of such adrenergic inhibitor as a first line treatment for hypertension, nor is it included among any of the indications for treating hypertension4. Reserpine causes depletion of norepinephrine, thereby producing adverse effects such as decreased cardiac output, bradycardia, sedation, depression, diarrhea, and increased gastric acid. Its wide range of side effects led to the limitation of its use in allopathic system of medicine several decades ago5, but it is still used in the ayurvedic system.

Adulteration of ayurvedic products has been another alarming issue6,7. We see many patients with arthritis and asthma like our third patient, coming to our clinic with classic Cushingoid character and many of the other adverse events of chronic steroid usage: hypertension, weight gain, hyperglycemia, osteoporosis, bone fracture, muscle weakness, ocular effects, gastrointestinal effects, and electrolyte imbalance8, following years of taking ayurvedic products. Adrenal crisis when stopping these drugs is a potential problem.

Most people in South Asia believe that ayurvedic products are safer and more effective for chronic diseases9. Patients with chronic disease are more vulnerable to mishaps related to ayurvedic products because they want to get rid of their chronic disabling condition, and tend to try alternative medicine products in the hope of safety and cure. Many of these chronic diseases (diabetes, hypertension, arthritis, cancer) may have no cure in

Figure 2. Unlabeled tablet taken by case 3.
either allopathic or alternative medicine practices, and patients should be counselled regarding this fact so that expectations are realistic.

Conclusion
Ayurvedic medicines may be beneficial to health, but are not devoid of adverse effects. Adverse events may be due to adulteration or some inherent constituents like alkaloids. Each chemical compound in any ayurvedic preparation should be listed in the manufacturer’s label along with the amount which may lead to proper dosing, and may reduce adverse events. Proper counselling by health professionals, especially regarding adverse events, will play an important role in minimizing harm.

Consent
Written informed consents for publication of clinical details and clinical images were obtained from the patients.

Data availability
All data underlying the results are available as part of the article and no additional source data are required.

Grant information
This work was supported by the Wellcome Trust [106680].

The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

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