Publications

(Papers related to thesis work are in preparation. Publications in associated works are enclosed.)
Can Homeopathic Arsenic Remedy Combat Arsenic Poisoning in Humans Exposed to Groundwater Arsenic Contamination?: A Preliminary Report on First Human Trial

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Groundwater arsenic (As) has affected millions of people globally distributed over 20 countries. In parts of West Bengal (India) and Bangladesh alone, over 100 million people are at risk of As poisoning because of drinking contaminated groundwater having concentrations of As ranging 60-560 µg l⁻¹, much exceeding the maximum permissible limits laid down by WHO (2) and US Environmental Protection Agency (3). The attempts made so far by both Governmental and Non-Governmental organizations to provide As-free drinking water to the highly affected areas remain grossly inadequate.

**Introduction**

Prolonged exposure to arsenic (As), a toxic metalloid, has caused various illnesses to millions of people globally distributed over 20 countries. In Bangladesh and its adjoining part of West Bengal (India) alone, ~100 million people are at risk (1) of As poisoning because of drinking contaminated groundwater containing As ranging 60-560 µg l⁻¹, much exceeding the maximum permissible limits laid down by both WHO (2) and US Environmental Protection Agency (3). The attempts made so far by both Governmental and Non-Governmental organizations to provide As-free drinking water to the highly affected areas remain grossly inadequate.

Furthermore, As enters the bodies of unsuspecting villagers not only through drinking water alone but also a substantial amount enters through food and vegetables grown in contaminated land around the village (1). We, therefore, feel that serious efforts should also be directed to remove As after it enters the body. However, orthodox medicines (e.g., chelating agents like Dimercaptosuccinic acid (DMSA), Diethylenetriamine-pentaacetic acid (DTPA) etc. and some antioxidants) have been most unsuccessful (1,4,5). Chronic exposure generally leads to various ailments and the dysfunction of several vital organs like the liver, kidney, lung etc. (6) more often when there is an accompanying nutritional/dietary deficiency (7). Most of the affected people in general complain of muscle and joint pains and are highly depressed with various gastric problems and general weakness. Many people look pale and anemic and seem resigned to fate. In such a scenario, our efforts are directed to find a remedy that is inexpensive, easy to administer, and has no toxic effect.

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To examine whether elevated antinuclear antibody (ANA) titers reported in random human population of arsenic contaminated villages can be reverted to the normal range by administration of a potentized homeopathic drug, *Arsenicum album*, randomly selected volunteers in two arsenic contaminated villages and one arsenic-free village in West Bengal (India) were periodically tested for their ANA titers as well as various blood parameters in two types of experiments ‘placebo-controlled double blind’ experiment for shorter duration and ‘uncontrolled verum fed experiment’ for longer duration. Positive modulation of ANA titer was observed along with changes in certain relevant hematological parameters namely total count of red blood cells and white blood cells, packed cell volume, hemoglobin content, erythrocyte sedimentation rate and blood sugar level mostly within 2 months of drug administration. Thus, *Arsenicum album* appears to have great potential for ameliorating arsenic induced elevated ANA titers and other hematological toxicities.

Keywords: antinuclear antibody (ANA) – *Arsenicum album* – arsenic toxicity – blood cells – blood sugar – ESR – human – homeopathic remedy

Introduction

Contamination of drinking groundwater with various toxic metal compounds including arsenic has become a menacing problem in many countries. It has affected millions of people globally distributed over some 20 countries including over 100 million people in West Bengal (India) and Bangladesh alone (1). Prolonged exposure to Arsenic (*As*) leads to various ailments and dysfunctions of several vital organs such as liver, kidney and lungs apart from its toxic effects manifested on skin and other epidermal tissue (2). Most of the affected people in general complain of muscle and joint pains and are highly depressed with various gastrointestinal problems and general weakness. Many people look pale and anaemic and seem resigned to fate. Various disease symptoms and diseases involving different organs have been reported in people of arsenic affected areas (3–5). However, no systematic survey on incidence of any systemic autoimmune disorder occurring in random populations of arsenic contaminated villages seems to have been carried out so far although some sporadic case studies have been reported (6–7). However, in one of our recent surveys, we observed an alarming prevalence of ANA-positive subjects in two arsenic contaminated villages of West Bengal (8). Moreover, efforts to reverse or alter ANA titers through administration of any orthodox medicine often bring adverse side-effects even though the treatment with...
Is An Elevated Antinuclear Antibody Titer In Subjects Living In Two Groundwater Arsenic Contaminated Villages Indicative Of A Time-Dependent Effect Of Arsenic Exposure

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Received 29th November, 2006
Accepted 14th December, 2006
Web Publication Date 27th December, 2006

**ABSTRACT**
The arsenic (As) contents of urine and blood and ant-nuclear antibody (ANA) titer in blood sera were determined in some 47 volunteers from Ghetugachhi and 83 from Dakshin Panchpota, two arsenic contaminated villages, and in 26 volunteers from a distant arsenic-free village, Padumbassan, in West Bengal. Hair and nail samples from some of them were also analyzed. While As content of urine, blood, hair and nail samples in control subjects from Padumbassan was in the non-detectable range and blood sera of all except one were ANA negative, many volunteers from the two arsenic contaminated villages had a high level of 'As' content in their urine, blood, hair and nail and were ANA positive. Many of the latter group had skin and digestive disorders. There was some positive correlation among arsenic content of blood, urine and hair. Although no clear-cut correlation between As content in different samples and ANA positivity could be substantiated, the high incidence of ANA could probably be due to long-term digestive disorders brought about by chronic arsenic intake. Test of ANA titers in arsenic risk zones may be useful as an additional parameter in risk assessment along with periodic monitoring of As in urine and nail samples. © 2007 Trade Science Inc.
Supportive Evidence for the Anticancerous Potential of Alternative Medicine against Hepatocarcinogenesis in Mice


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Key Words
Homeopathy CAM Lycopodium clavatum Anticancerous Toxicity biomarkers Physicochemical parameters

Summary
Introduction The present study examines Lycopodium 200 (Lyco-200) in demonstrating anti-cancer activities in mice which are chronically fed carcinogens, p-dimethylaminoazobenzene (p-DAB) and phenobarbital (PB) to induce liver cancer. Materials and Methods Mice in 5 different groups were chronically fed for varying periods of time group I normal diet, group II normal diet + alcohol 200, group III p-DAB + PB, group IV p-DAB + alcohol 200 (vehicle of Lyco-200 being ethyl alcohol), group V p-DAB + PB + Lyco-200. They were sacrificed at day 7, 15, 30, 60, 90 or 120, and the following parameters were assessed cytogenetic endpoints like chromosome aberrations, micronuclei, mitotic index and sperm head anomaly, toxicity biomarkers like acid and alkaline phosphatases, alanine and aspartate aminotransferase, glutathione reductase, succinate dehydrogenase and catalase activities, lipid peroxidation and reduced glutathione content. Additionally, scanning and transmission electron microscopic analyses of liver tissues were made at day 90 and 120, and immunodetection of p53 protein as well as gelatin zymography for matrix metalloproteinases in liver tissue were performed. Furthermore, studies were conducted on blood glucose, hemoglobin and cholesterol, estradiol, testosterone and cortisol, and lymphocyte and hepatocyte cell viabilities. Physical properties of Lyco-200 and potentized alcohol 200 were analyzed by using methods such as UV, Fourier Transform Infrared Spectroscopy (FTIR), Fluorescence Spectroscopy, 1H-NMR and 13C-NMR (Nuclear Magnetic Resonance Spectroscopy). Results Lyco-200 reduced cytogenetic damages yielding positive modulations of all biochemical, pathological and other risk factors, cell viability and expression of p53 protein and matrix metalloproteinases as compared to controls. Conclusion Studies on other mammals are recommended to further investigate the potential of Lyco-200 in liver cancer.

Schlüsselwörter
Homöopathie Komplementär- und Alternativmedizin Lycopodium clavatum Antikarzinogenese Toxizitätsmarker Physikochemische Parameter

Zusammenfassung
Homeopathic remedy for arsenic toxicity?: Evidence-based findings from a randomized placebo-controlled double blind human trial


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Received 16 February 2007, received in revised form 21 May 2007, accepted 5 June 2007

Abstract

Millions of people are at risk of groundwater arsenic contamination, but supply of arsenic-free drinking water is grossly inadequate. The present study was intended to examine if a potentized homeopathic remedy reportedly showing ameliorating potentials in people inhabiting high-risk arsenic-contaminated areas but drinking arsenic-free water, can also ameliorate arsenic toxicity in subjects living in high-risk arsenic-contaminated areas, and drinking arsenic-contaminated water. This pilot study was conducted on 20 males and 19 females of village Dasdiya (arsenic contaminated) who initially agreed to act as volunteers, but as many as 14, mostly placebo-fed subjects, later dropped out. 18 volunteers, 14 males and 4 females, from a distant village, Padumbasan (arsenic-free), served as negative controls. In a double blind placebo-controlled study, a potentized remedy of homeopathic Arsenicum Album-30 and its placebo (Succussed Alcohol-30) were given randomly to volunteers. Arsenic contents in urine and blood and several widely accepted toxicity biomarkers and pathological parameters in blood were analyzed before and after 2 months of administration of either verum or placebo. Elevated levels of ESR, creatinine and eosinophils and increased activities of AST, ALT, LPO and GOT were recorded in arsenic exposed subjects. Decreased levels of hemoglobin, PCV, neutrophil percentages, and GSH content and low G-6-PD activity were also observed in the arsenic exposed people. The administration of "verum" appeared to make positive modulations of these parameters, suggestive of its ameliorative potentials. Most of the subjects reported better appetite and improvement in general health, thereby indicating possibility of its use in remote arsenic-contaminated areas as an interim health support measure to a large population at risk.

Keywords: Arsenic toxicity, Homeopathic remedy, Human trial, Cytogenetical and biochemical biomarkers, Blood pathology

1. Introduction

The potentized homeopathic remedies Arsenicum Album 30 and Arsenicum Album 200 have been reported by us (Khuda-Bukhsh et al, 2005, Belon et al, 2006) to have beneficial effects on a random...