# Effect of Mercury and Arsenic on Population of Osmanabad District

## *Ms. Pratibha Kalidas Dandade*

Research Student, Shri. Siddheshwar College Majalgaon,Dist. Beed.India

### ABSTRACT

Mercury is a heavy metal of considerable toxicity. Scientific literature reveals various plants and plant derived natural products, i.e., photochemical, which can alleviate experimentally induced mercury toxicity in animals. The present review attempts to collate those experimental studies on medicinal plants and photochemical with ameliorative effects on mercury toxicity. A literature survey was carried out by using Google, Scholar Google, Scopus and Pub-Med. Only the scientific journal articles found in the internet for the last two decades (1998–2018) were considered. Minerals and semi-synthetic or synthetic analogs of natural products were excluded. The literature survey revealed that in pre-clinical studies 17 medicinal plants and 17 natural products exhibited significant mitigation from mercury toxicity in experimental animals. Clinical investigations were not found in the literature. Admissible research in this area could lead to development of a potentially effective agent from the plant kingdom for clinical management of mercury toxicity in humans.

Keywords: arsenic, mercury, ascorbic acid, natural products, oxidative stress etc.

## Introduction

The issue of Arsenic contamination of water across the world is very alarming and crucial in the context of health on living being. There exist wide heterogeneities among Arsenic contamination of water and its health effects of chronic Arsenic poisoning on population in terms of various kinds of illnesses / manifestations relating to various systems of the body involved i.e. Skin, Respiratory system, Cardiovascular system, Gastrointestinal & Digestive system, Nervous system, Excretory system, Reproductive system and General problems. There exists voluminous literature dealing with the health impact on exposed population and its association with selected demographic and epidemiological characteristics. Most studies have targeted this issue as unit for measuring health effect and have sought to gauge the impact of various body organs on relative effects. The findings of such studies have been used to aware about present situation of exposed areas and how to control the existing situation with the help of government agencies to frame policies and make Arsenic removal filters that could promote safe water sources. Many significant factors cause limited success to efforts of balancing the quality of water and develop adverse health effects and exclusive reliance on information relating to awareness about safe water sources. Though several drinking water samples from Arsenic contaminated sites have been analyzed to determine Arsenic contamination levels, scarce data are available on the health effects of chronic Arsenic poisoning. The main objectives of the study are to know the Status of Arsenic (As) exposure in different development Blocks, Impacts of Arsenic on Health of exposed population and its association with different demographic and epidemiological characteristics. The present researcher feel that knowing answers to the above questions would not only through light on the real dynamics of the Arsenocosis related problem in the area but at the same help in suggesting appropriate mitigation to remove the Arsenic from drinking water.

## Objectives of the Study

The primary objectives of the present work were as follows- ▯
1. To know the Arsenic concentration in water, health impact and extent of manifestations due to chronic Arsenic exposure on residing population of 2 Blocks in Osmanabad district.
2. Identify Arsenicosis cases and know the extent of manifestations among the people exposed to high Arsenic i.e. most affected block.
3. To know the Complete Blood Count of exposed subjects by analyzing by Bene Sphera 5-Part Haematology Analyzer.
4. To study regarding existence of other heavy metals by Atomic Absorption Spectrophotometer (AAS). ▯
5. Know the mitigation measures adopted in Arsenic affected area (using filter technique). Suggest recommendations for future action.

## Hypotheses of the Study

The work undertook the following hypotheses the validity of which have been tested in the work.
1. The study of the Arsenic contaminated water impact in 2 Blocks in Osmanabad district, concerned to suffering from the Arsenic contaminated water problems with the degradation of the quality of water.

2.  The present study has given an emphasis on deterioration of high Arsenic concentration in water and its impact on the residing population.
3.  The study has also included the various causes, especially the activities performed by human beings like over exploitation of ground water sources, which influence the degradation of quality of drinking water as well as the ground water in the context of prevailing scenario of water resource of the area under interest.
4.  Residing population is suffering from many Arsenic related diseases as well as social exclusion due to menace of diseases.

## Methodology and Data Analysis

The study has made an attempt to measure Arsenic concentration in drinking water sources, awareness about Arsenic contamination and its Health effect on exposed population. It has measured by taking the Interviews of exposed population and analysing the Arsenic concentration in drinking water by Wagtech Digital Arsenator and Hydride generated Atomic Absorption Spectrophotometer as well as Complete Blood Count (CBC) Test of exposed subject's blood by BeneSphera 5-Part Haematology Analyzer.

## Data Analysis

Data thus generated were analyzed with the help of Microsoft excel 2007 and SPSS version 16th software. Appropriate tables were generated and are given in this paper. Demographic characteristics were tabulated for research work. Each statement of the interview schedule was analyzed separately. Percentage of the respondents were determined for each answered. The required respective data were collected. The concerned collected data were further used to find out the results in connection with the exposure of Arsenic present in drinking water (as observed in present study) resulting in health hazards occurred in the inhabitants around study area.

## Statistical analysis

The data were based on two replicates and subjected to a two-way analysis of variance to bring out the effects of the plants location on the plants mineral content as well the effect the plant itself has on its mineral content. Variations among the locations and plant samples were evaluated by mean of least significance difference (LSD) at 5% level of probability ($P \leq 0.05$). Data analysis was conducted using SPSS statistical software.

## Results and Findings

Our study has shown that same species of medicinal plants, growing in different geographical locations, cumulates different levels of heavy metals. Concentration of heavy metals also differed for different plant species collected from the same geographical location. Amounts of heavy metals detected in plants collected from the Bobiri forest reserve were within permissible limits, whereas the levels in other geographical locations exceeded the recommended values. Thus, medicinal plants for the formulation of herbal remedies should be harvested from pollution-free natural habitat. Our findings further indicate that the medicinal plants, used for local or pharmaceutical purposes, should be collected from areas not contaminated with heavy metals. It is, therefore, advised that the metal content in medicinal plants be checked for levels of heavy metals before their use for local and pharmaceutical purposes.

## Challenges

Making people to understand the correlation between health and with the quality of water they were drinking. The maintenance of government installed Arsenic removal filters is one of the biggest challenges.

## Suggestions

Harvested rainwater can be an important resource for drinking water. Groundwater as a freshwater resource should not be out rightly rejected but "Safe water sources should be explored". Use of Arsenic removal technologies (Domestic Filter).

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