

## EFFICACY OF MICRODOSES POTENTIZED HOMEOPATHIC DRUG, ARSENICUM ALBUM INDUCED BY ARSENIC TRIOXIDE IN ZEBRAFISH (DANIO RERIO)-A FTIR STUDY IN GILLS

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### ABSTRACT

**Objective:** Arsenic, one of the major natural as well as anthropogenic pollutant produces biochemical changes in the organs of animals due to its potential toxicity. Arsenic is toxic to fish and may be taken through gills and skin. In the current work, arsenic trioxide-treated fishes were prescribed with potentized homeopathic drug, ars alb 30C, and ars alb 200C. The biochemical contents in exposed gill tissues of zebra fish (*Danio rerio*) were analysed using Fourier transform infrared spectroscopy (FTIR).

**Methods:** The acclimatised fish were treated with arsenic trioxide and LC<sub>50</sub> was calculated. Along with arsenic trioxide, the homeopathic drug ars alb 30C and ars alb 200C were given three drops per litre. After a period of 7 and 14 d, the gills of exposed fish were dissected. The samples were lyophilized and analysed in FTIR.

**Results:** In arsenic exposed fish, the amine N-H stretch was different when compared to the control and the treated different potencies of ars alb 30C and 200C respectively at 7days. Whereas at 14 d the arsenic exposed fish the amine N-H stretch was drastically reduced. Notably, in treating different potencies of ars alb 30C and 200C, the amine N-H stretch was increased.

**Conclusion:** It was found that the higher the potency that is ars alb 200C was more effective against Arsenic toxicity. It shows higher dilution may be efficacious.

**Keywords:** Arsenic trioxide, Ars alb, Gills, FTIR

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### INTRODUCTION

Arsenic one of the major contaminant in groundwater, possibly cause many sufferings in humans as well as organisms in water [1]. In West Bengal, India, the amount of arsenic, was getting discharged progressively, crumbled in water, with aquatic and soil sediment [2]. Absorption of arsenic is being controlled by a mixture of input and removal mechanisms happened in the aquatic environment. Accumulation of arsenic in the physical system leads to physiological and biochemical disorders. An aquatic ecosystem is a disparate association of organisms and biotic factors, which are interrelated, even the micro-modifications in the environment can change the nature and conduct of the organisms. Freshwater fish constitute one of the major origins of cheap nutrition for human beings. Biochemical composition of proteins, carbohydrates, free amino acids, lipids and mineral contents are the important nutritional values of fish [3]. The global yield of farmed fish more than doubled in value over the past decade. The fish developed from farming activities currently account for over one after parting of all fish directly consumed by humans. As the human population continues to rise, the reliance on farmed fish production as an important source of protein will also increase [4]. The consequence of inorganic arsenic species might result in a larger number of adverse health effects to the cosmopolitan public. Thus, it is important to evaluate the inorganic arsenic levels of farmed seafood in arsenic-polluted fields [5]. These answers indicate that the dwellers of the arsenic polluted region are being subjected to moderately elevated arsenic exposure through the use of tilapia and shrimp raised in aquaculture ponds.

The bulk of toxic stuff initiates biochemical alterations like inhibition of the enzyme system, the amendment in the level of enzyme and individual alteration in the permeability of biological membranes [6]. The rate of elimination of arsenic became more composite because of the poor people health and hygiene status and the relatively low affordability of the greater majority of the population surviving in contaminated zones. And for the lack of awareness of

the potential effects of arsenic poisoning in most of them. Mainly with such an environment, the initial object was to find out suitable antagonists of arsenic poisoning, which should be easily executable, in force in less quantity and low price.

Earlier certain studies were getting on with mice a potentized homeopathic drug, ars alb 30C and it presents a promising result [7]. The biomedical technique Fourier Transform Infrared Spectroscopy (FTIR) is unitary of the techniques that can potentially discover a wealth of qualitative and quantitative information about a given biological sample. Tissue components, including membranes, proteins, nucleic acids and polysaccharide compounds can be evaluated by FTIR spectroscopy. This indicates that this technique is valuable for analysing complicated biological materials, including tissues, body fluids or cell cultures. The transformation in the top positions, bandwidth and the saturation of the stripes, all give valuable structural and operational information which may have diagnostic value for biological systems. Thus, it seemed exciting to apply FTIR spectroscopy to monitor disease induced and arsenic toxicity induced biochemical changes occurring in any living organism and to evaluate the quantitative and semi-quantitative effects of various factors on biological structures.

### MATERIALS AND METHODS

#### Test species

Zebrafish (*D. rerio*) adults (length: 4±0.2; weight: 2±0.3) total of 100 was obtained from Muthupandi fish farm, Kadachanenthal, Madurai District, Tamil Nadu, India. It was acclimatised in laboratory conditions in glass tanks for a minimal period of 14 d. It was maintained under temperature conditions of 25±2 °C, 12 h/12 h light/dark cycle. At the time of the experiment, the fish were fed with artemia.

#### Test chemicals

Arsenic trioxide was purchased from Karnataka fine chemicals and arsenicum album was purchased from Dr Reckweg, Germany.





**DISCUSSION**

This FTIR study was based upon the toxicology effect of arsenic in fish gills. A study on biochemical changes in the kidney of *Labeo rohita* intoxicated with arsenic found that FTIR study can be applied for toxicology [12]. As well a related study of ars alb 30C and ars alb 200 was said to be more effective [13]. Further studies were carried out that the ars alb contains ultra high dilution of Arsenic trioxide was re-equilibrate upregulated genes at the time of oxidate stress by brought back expression levels [14].

Since arsenic was treat along with the water, there might be an alteration in the protein content of the fish, and there seems the intensity was decreased in amide bands [15]. Arsenic is a kind of metalloid, and it has the capability to have a strong interaction with thiol groups, thiol residues in proteins, regarding these functions it affects the structure of the molecules present in the gills [16].

Cakmak and his colleagues [17] studied the effect of nonylphenol, found the structural analysis and functional proteins based upon FTIR study. Based his way the investigation was applied to arsenic and alternative medicine on arsenic toxicity i. e Arsenicum album. Furthermore, by this examination on FTIR—a time of 14 d concentrate on it was found that the measure of protein and lipid content in the gill was radically changed in a brief time of days when contrasted with arsenic intoxicated, control and ars alb habituated.

**CONCLUSION**

Arsenicum album was unrevealed as a major homeopathic medicine against arsenic poisoning. By this investigation, it was concluded that the FTIR study on gills shows the alteration due to arsenic intoxication. In contrast, when the fish was treated with a higher dilution of arsenic that is ars alb 200C shows the most promising result, whereas ars alb 200C shows compatible results when compared to ars alb 200C. Since arsenic intoxication shows variable effects in biochemical constituents of gills, it is essential to finding a valuable resource to treat. In such condition, homeopathic treatment may be considered as an alternate means to handle.

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**CONFLICT OF INTERESTS**

Declared none

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