

EFFECTS OF LOGARITHMIC SERIAL DILUTIONS OF ARSENIC ALBUM (As_2O_3) ON THE EXCITABILITY OF THE SCIATIC NERVE OF FROG

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ABSTRACT: Effects of different dilutions (1st to 30th dilutions in the range of 10^{-4} M to 10^{-14} M) of Arsenic album were studied on the compound action potentials of sciatic nerve of frog. Results showed inhibitory changes in the amplitude of action potential after treatment with Arsenic alb. at different logarithmic serial dilutions. Mechanism of action of Arsenic alb. remains to be studied.

INTRODUCTION

Inorganic arsenic (As^{III}) is one of the several metallic elements, which is reported to be highly toxic and responsible for various pathological diseases such as arsenicalism, neurological disorders, skin, respiratory and lung cancers (Goldstein *et al.*, 1975; Ohta, 1970; Le Quesha & Mc Leed, 1977; Welch, 1982; Kathleen *et al.*, 1983; Gerber *et al.*, 1982; Takahashi *et al.*, 1983; Yamauchi & Yamamura, 1983). Homoeopaths claim to cure various diseases including mental disorders, anxiety neurosis, senile dementia etc. with lower dilutions of Arsenic alb. But their claim is questionable on the two grounds: (1) When high levels of arsenic naturally occur in ground water and biological samples and is ingested in human beings with drinking water or diet, how arsenic in ultradilutions can affect the system. (2) While preparing the logarithmic serial dilutions of homoeopathic drugs, the solute gets so diluted that the drugs do not contain theoretically even a single molecule of the solute in the dilution. But recently Jussal *et al.* (1982) have reported that physical characteristics such as pH, mV, and dielectric constant of logarithmic serial dilutions of Arsenic alb. showed oscillatory changes even in those dilutions wherein molecules of solute might not be present. Since this is an interesting phenomena, we intended to study the effects of logarithmic serial dilutions of arsenic on the excitability of the sciatic nerve of frog, a biological system. The results could be useful not only in the field of biology, medicine and neurology at large but also for providing scientific rationale for homoeopathic system of therapy.

Recent observations of physical characteristics of ultradilutions of Arsenic album (Jussal *et al.*, 1983) and other drugs (Jussal *et al.*, 1982), which showed variations at different dilutions, aroused interest in the study of the effect of logarithmic serial dilutions of Arsenic album on biological system to test their efficacy. If it is so, whether it corresponds to physical properties observed by Jussal *et al.*, (1983). In the present work, therefore, we have studied the effect of logarithmic serial dilutions (1st to 30th dilutions in the

range of 10^{-6} M to 10^{-26} M) on compound action potentials of sciatic nerve of frog.

METHODS

Mother tincture of Arsenic alb. (As_2O_3) was procured from M/S Bhandaris (New Delhi). Logarithmic serial dilutions of Arsenic alb. (1 to 30 dilutions in the range of 10^{-6} M to 10^{-26} M) were prepared according to the method of Jussal *et al* (1983).

Frogs (*Rana tigrina*) were collected from nearby fresh water ponds. Sciatic nerves were dissected out from the pithed frogs and compound action potentials were recorded by method of Sax *et al* (1981). Stimulating pulses were obtained from a Grass SD9 Stimulator, action potentials amplified by means of a Grass P511J AC preamplifier were displayed on ECIL Oscilloscope. Positive changes in amplitude of compound action potentials were observed after the treatment with drug dilutions and are shown in the graph.

RESULTS & DISCUSSIONS

Reports concerning effects of serial dilutions of Arsenic alb. on the electrical activity are, however, meagre and debatable, since the effect is not similar. Either it shows decrease or no change. Higher doses of arsenic (both, acute and chronic) have been reported to cause abnormalities in nerve conduction (slowing of velocity, decrease in amplitude)—(Goldstein *et al*, 1975; Jenkins, 1966; Murphy *et al*, 1981; Kathleen *et al*, 1983). The data derived from the present experiments also showed that logarithmic serial dilutions of Arsenic alb. (ultradilutions) influenced the excitability of sciatic nerves. Changes in amplitude of compound action potential of sciatic nerve after the treatment with different serial dilutions were oscillatory in nature as shown in the graph. Greater degree of inhibition in amplitude was observed at 3, 6, 9, 12 and so on dilutions.

Hahnemann empirically selected series of 3, 6, 12, 18, 24 and 30th dilutions and from his writings we noticed that he used 30th dilution mostly for proving and others for treatment of diseases. Our observation therefore confirmed that the 3rd, 6th, 12th, 24th, 26th and 30th dilutions are more effective than others.

Effects of logarithmic dilutions of Arsenic alb. (ultradilutions) on amplitude of action potentials are similar to the previous reports of higher dose of arsenic on amplitude as reported by Murphy *et al*, 1981; Kathleen *et al*, 1983. In view of the hypothesis, i.e. similar cures similar, this may be important reason that higher dose produces (symptoms) toxic effects and the lower dose removes or cures them when they appear in a natural disease. It is thus obvious that excitability of sciatic nerve which is an important peripheral nerve is influenced by treatment with very low dilutions of Arsenic alb. (ultradilutions).

Since in the experimental chambers, the nerves were free from the influ-

ences of central nervous system or any *in vivo* physiological factors, changes in the amplitude are largely due to imbalance in excitability which could be due to conduction block or unequal slowing of conduction in individual fibres due to the changes in the molecular organisation of the nerves themselves. The action potential generation is largely due to the changes in ionic flow and involves opening of channels and passive migrations of ions through them. Thus, the changes in excitability with regard to serial dilutions would appear to be a function of alteration in molecular arrangement of nerve membranes. Nature of molecular changes that would occur in neural membranes under the treatment of logarithmic serial dilutions of Arsenic alb. remain to be studied.

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