



Official Journal of the  
Neuroscience Society of Nigeria  
(NSN)

ORIGINAL ARTICLE

ISSN 1116-4182

## **$\beta$ -AMYLOID ACCUMULATION IMPAIRED SHORT-TERM MEMORY IN MERCURY TREATED RATS**

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**Received:** ..... **May 2018**

**Accepted:** ..... **October 2018**

### ABSTRACT

Mercury is a non-essential element that exhibits a high degree of toxicity to humans and animals. The study was designed to assess  $\beta$ -amyloid accumulation and its role on short-term memory impairment in mercury treated rats. Twenty four Wistar rats of average weight 190 g were divided into four groups of six animals per group. Group I served as control, while other groups were administered with mercury chloride orally at 12.45 mg/kg, 24.9 mg/kg and 49.8 mg/kg, i.e. low, medium and high doses respectively, for 28 days. Short-term memory test was assessed using novel object recognition test. Animals were humanely sacrificed; brain tissues were fixed in RCL<sub>2</sub> fixative. The hippocampal tissues were used for histopathological studies using routine haematoxylin and eosin techniques and Congo red stain for the presence  $\beta$ -amyloids. Acetylcholinesterase (AChE) enzyme was determined using AChE assay kit cytometric analysis for cell volume and number was performed using Digimizer v4.0. There was a significant increase ( $p < 0.01$ ) in mean time for animals exploring familiar objects among rats that received 24.9 mg/kg (low) and 49.8 mg/kg (high) of mercury chloride. Histopathological observation showed neurodegenerative changes in the hippocampus. Expression and deposits of  $\beta$ -amyloid protein was observed in animals treated with 24.9 and 49.8 mg/kg body weight of mercury chloride. AChE significantly decreased ( $p < 0.001$ ) among groups that received low, medium and high doses of mercury chloride. It is concluded that mercury impaired short-term memory, induced beta amyloid accumulation, alters AChE concentration and also causes histopathological lesion in the hippocampus.

**Key words:** *Mercury,  $\beta$ -amyloid, Hippocampus, Short-term memory, Cell volume, Cell number*

### INTRODUCTION

Mercury has been used worldwide for many centuries for commercial and medicinal purposes (Ibegbu et al. 2014). Man in his environment is exposed to much potential hazards by heavy metals via bioaccumulation and biodegradation which is transferred to man via food chain due to anthropogenic activities (Wang et al. 2007; Chen et al. 2016; Bjørklund et al. 2017). Mercury exists in

three forms: These forms include; Elemental mercury also called metallic mercury, this is the element in its pure, un-combined form; Inorganic mercury compounds or mercury salts are more commonly found in nature, which include mercuric sulphide

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