

## Research Article

# Assessment of Hair Aluminum, Lead, and Mercury in a Sample of Autistic Egyptian Children: Environmental Risk Factors of Heavy Metals in Autism

Farida El Baz Mohamed,<sup>1</sup> Eman Ahmed Zaky,<sup>1</sup> Adel Bassuoni El-Sayed,<sup>2</sup>  
Reham Mohammed Elhossieny,<sup>1</sup> Sally Soliman Zahra,<sup>1</sup> Waleed Salah Eldin,<sup>3</sup>  
Walaa Yousef Yousef,<sup>1</sup> Rania Abdelmgeed Khaled,<sup>1</sup> and Azza Mohamed Youssef<sup>1</sup>

<sup>1</sup>Pediatrics Department, Faculty of Medicine, Ain Shams University, Cairo, Egypt

<sup>2</sup>National Institute of Standards, Giza, Egypt

<sup>3</sup>Community Medicine Department, Ain Shams University, Cairo, Egypt

Correspondence should be addressed to Sally Soliman Zahra; [sallyzahra@yahoo.com](mailto:sallyzahra@yahoo.com)

Received 24 June 2015; Revised 24 August 2015; Accepted 2 September 2015

Academic Editor: Michael E. Behen

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**Background and Aims.** The etiological factors involved in the etiology of autism remain elusive and controversial, but both genetic and environmental factors have been implicated. The aim of this study was to assess the levels and possible environmental risk factors and sources of exposure to mercury, lead, and aluminum in children with autism spectrum disorder (ASD) as compared to their matched controls. **Methods.** One hundred ASD children were studied in comparison to 100 controls. All participants were subjected to clinical evaluation and measurement of mercury, lead, and aluminum through hair analysis which reflects past exposure. **Results.** The mean Levels of mercury, lead, and aluminum in hair of the autistic patients were significantly higher than controls. Mercury, lead, and aluminum levels were positively correlated with maternal fish consumptions, living nearby gasoline stations, and the usage of aluminum pans, respectively. **Conclusion.** Levels of mercury, lead, and aluminum in the hair of autistic children are higher than controls. Environmental exposure to these toxic heavy metals, at key times in development, may play a causal role in autism.

## 1. Introduction

The *autism spectrum* describes a range of conditions classified as neurodevelopmental disorders in the fifth revision of the American Psychiatric Association's *Diagnostic and Statistical Manual of Mental Disorders 5th Edition* (DSM-5). These disorders are characterized by social deficits and communication difficulties, stereotyped or repetitive behaviors and interests, sensory issues, and in some cases cognitive delays [1].

The increase of ASDs prevalence cannot be fully explained by advances in diagnostics or sudden genetic shifts. There is a growing consensus among scientists and clinicians that ASDs ensue from an interaction between biological vulnerability factors and environmental or iatrogenic insults [2].

This points to the importance of environmental factors and raises the possibility of an etiological role for toxic

exposures: either prenatal, postnatal, or in some cumulative pattern that combines the effect of maternal, gestational, and infant exposures [3].

Some possible sources of heavy metal poisoning include chemical products, fertilizers, industrial paint, building materials, fish that is high in mercury, silver dental fillings, and mercury-containing preservatives (thiomersal) in vaccines. Lead may be found in the dirt near roads and can still be found in paint from older houses. Children eating paint chips or those with pica may develop toxic lead levels [4].

Genetically, children with autism may be less able to detoxify toxic environmental agents, and this inability may predispose them to suffer neural damage consistent with autistic behavioral traits [4].

Women with chronic metal exposure (who have accumulated high tissue levels of mercury and other metals) may pass