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## International Journal of Biological & Medical Research

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### Short Report

## Reduced levels of adiponectin in Omani Autistic Children – A Brief Report

Essa MM<sup>a,b,c,\*</sup>, Al-Sharbati MM<sup>d</sup>, Al-Farsi YM<sup>d</sup>, Ali A<sup>a</sup>, Waly MI<sup>a</sup>, Al-Shaffae MA<sup>d</sup>, Guillemin GJ<sup>b</sup>

<sup>a</sup>Dept of Food Science and Nutrition, College of Agriculture and Marine Sciences, Sultan Qaboos University, Oman

<sup>b</sup>Neuroinflammation group, Department of Pharmacology, School of Medical Science, University of New South Wales, not college of medicine, UNSW, Sydney, Australia.

<sup>c</sup>Developmental Neuroscience Lab, NYSIBR, 1050 Forest Hill road, Staten Island, NY, 10314, USA

<sup>d</sup>College of Medicine and Health Sciences, Sultan Qaboos University, Oman

#### ARTICLE INFO

##### Keywords:

Adiponectin  
Adipokines  
Autistic spectrum disorders  
Oman

#### ABSTRACT

Autism is a lifelong neurodevelopmental disorder characterized by impairment in social interaction and communication, delayed and disordered language, restricted and stereotypic patterns of behavior, interests and activities, and onset before 3 years of age. The pathogenesis of autism is not completely understood and it has been hypothesized a role for environmental factors, immune dysfunctions, and alterations of neurotransmitter systems. Adiponectin, a protein produced by adipose tissue and involved in the control of energy homeostasis. It also provides insulin sensitizing, anti-inflammatory and anti-atherogenic properties. Recent studies from different countries suggest that the abnormal levels of adiponectin have been implicated in the pathophysiology of autism. There is no such biochemical data available for Omani autistic children. So, the current study was aimed to compare the plasma levels of adiponectin in normal and Omani autistic children. Significant reduction in the levels of adiponectin was found in Omani autistic children as compared with controls. Our results corroborate with the previous findings and also suggest that there might be some relationship between adiponectin and the pathophysiology of autism.

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### 1. Introduction

Autism spectrum disorder (ASD) is mysterious neurodevelopmental disorder resulting in pervasive abnormalities in social interaction and communication, repetitive behaviors, and restricted interests. ASD occurs with prior onset 1.5 to 3 years of age and several factors have been reported including genetic, environmental, autoimmune and inflammatory factors implicated in the etiology of autism. Although the precise mechanism underlying the pathophysiology of autism remains to be determined, accumulating evidence suggests that the abnormality of inflammatory events may be implicated in the pathophysiology of autism [1-7]. The prevalence of ASD is kept on increasing worldwide. Despite numerous reports suggesting a high rate of

inheritance, no specific single genes have been identified that are more than risk factors [8-9]. The identification of specific biochemical correlates of autism might increase the reliability of the behavioral diagnosis of this disorder.

Sultanate of Oman is a developing Arab country located in the South Eastern of the Arabian Peninsula and the total population is approximately 3.5 million, about half of which is below the age of 15 years [10]. 113 diagnosed cases of ASD were reported nationwide and the prevalence of ASD in Oman was reported low (1.4 cases per 10,000 children aged 0–14 years) compared to western countries, which is attributed to under-diagnosis and under-reporting. More prevalent cases were among boys (75%) and among low-income families in Oman also reported [11].

Adiponectin is a protein that is produced by adipose tissue and involved in the control of energy metabolism [12]. The plasma levels of adiponectin are inversely correlated with insulin resistance and parameters of obesity such as body mass index [13-15] were reported. Adiponectin belong to adipokines (16) and many adipokines were reported to exert pro-inflammatory / anti

\* Corresponding Author : Dr. M. Mohamed Essa

Assistant Professor  
Dept. of Food Sciences and Human Nutrition  
CAMS, Sultan Qaboos University,  
P.O No: 34, Al-Khoud,  
Muscat, Postal Code: 123, Sultanate of Oman  
Phone: 00968 2414 3604  
Email: [drmdessa@gmail.com](mailto:drmdessa@gmail.com)

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-inflammatory effects and may exert protective functions against metabolic disturbances. Involvement of some of pro-inflammatory adipokines are implicated in the pathophysiology of autism [7, 17-18] were reported. According to literature survey, there is no scientific data available related with adiponectin in the autistic children of Sultanate of Oman. So, there is a need for scientific studies which can explore the cause of autism and helps for early detection of autism in Oman and worldwide. Therefore, the present study was aimed to evaluate the levels of plasma adiponectin in Omani autistic children.

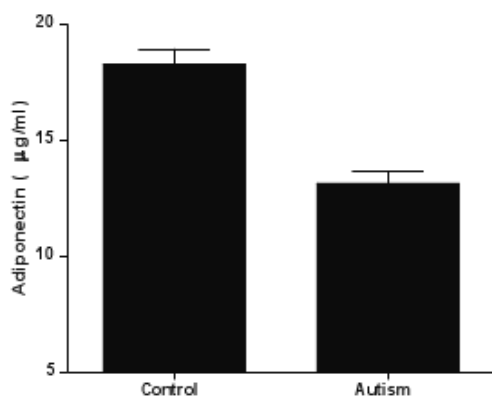
**2.Materials & Methods**

**Subjects:** A total of thirty eight Omani Children, between the age of 3 to 10 years (19 autistic, 15 males and 4 females and their age matched normal children (19, 10 males and 9 females) from 19 different families were recruited for this study. The autistic children were diagnosed according to the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (DSM-IV-TR) (19) American Psychiatric Association, 2000). Ascertainment of ASD diagnosis was further supplemented by completing a standardized and validated Arabic version of the Childhood Autism Rating Scale (CARS) questionnaire. A written consent was obtained from the parents in each individual case, according to the guidelines of the Ethical Committee of Sultan Qaboos University, Oman (EC 158/2010).

**2.1.Biochemical and Data analysis:** After an overnight fast, the blood samples from both the autistic and control children were collected at the SQU hospital and used for biochemical analysis. The levels of plasma adiponectin were assessed by using adiponectin assay kit from R & D systems, USA. Data analysis was done by using the Graph pad Prism software. All values are Mean ± SD, unpaired student's t test level of significance at P<0.05.

**3.Results**

The plasma levels of adiponectin were significantly lower in autistic children as compared to their age matched controls (n=19). All values are mean ± SD, compared by using unpaired student's t test, p ≤0.05 was considered as significant.



Control	Control	P value
18.29 ± 0.6528 (N=19)	13.17 ± 0.5364 (N=19)	0.0001 (***)

**4.Discussion:**

Adiponectin is a recently discovered protein that is produced by adipose tissue and involved in the control of energy homeostasis. It also provides insulin sensitizing, anti-inflammatory and anti-atherogenic properties. Interestingly, some of pro-inflammatory adipokines are implicated in the pathophysiology of autism [17,21, 7] were reported recently. This may be due to the serotonergic regulation of adiponectin secretion [7] and abnormal inflammation in autism[1-5].

It was recently hypothesized that the adiponectin might participate in the clinical manifestations other than weight balance and energy expenditure in Rett syndrome and autism. Reports found that ASD children are predisposed to malnutrition and recently a study from Oman suggest that the Omani ASD children at preschool age level showed a general tendency towards malnutrition [19]. Recent studies from Japan and Italy suggest that there is a link between the altered levels of adiponectin reflected the impairments in social interaction and might be implicated in the pathophysiology of autism [7, 16] and Rett syndrome [20].

The results of this study show that Omani autistic children have a significant reduction in the levels of plasma adiponectin in as compared with control subjects, which was supported by the previous studies from other countries. And also confirms the hypothesis of decreased levels of adiponectin might be implicated in pathophysiology of autism and could also be involved in the clinical manifestation of autism. This is the first study related with adiponectin in autism in Oman and furthermore, this study has the limitation in the sample size (n=19). Identification of biochemical markers related to autism will be advantageous for an early clinical diagnosis and intervention. The exact mechanism is still unclear and further extensive research needed to be done in larger samples with broader age spectrum to find the link between adiponectin and autism.

**Acknowledgments:**

Project was supported by Internal grant (IG/AGR/FOOD/11/02) from Sultan Qaboos University, Oman.

**Conflict of Interest: None**

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