



Universidade de São Paulo

Biblioteca Digital da Produção Intelectual - BDPI

Departamento de Psiquiatria - FM/MPS

Artigos e Materiais de Revistas Científicas - FM/MPS

2012

Low serum levels of 25-hydroxyvitamin D (25-OHD) in children with autism

Trends Psychiatry Psychother, Porto Alegre, v. 34, n. 3, p. 161-163, July/Sept., 2012
<http://www.producao.usp.br/handle/BDPI/40790>

Downloaded from: Biblioteca Digital da Produção Intelectual - BDPI, Universidade de São Paulo

Low serum levels of 25-hydroxyvitamin D (25-OHD) in children with autism

Baixos níveis séricos de 25-hidroxivitamina D (25-OHD) em crianças com autismo

Márcia Helena Fávero de Souza Tostes,¹ Hudson Caetano Polonini,² Wagner Farid Gattaz,³ Nádia Rezende Barbosa Raposo,¹ Edilene Bolutari Baptista²

Abstract

Objective: To confirm previous evidence suggesting an association between autism and low vitamin D serum levels.

Methods: This preliminary exploratory study assessed the circulating levels of 25-hydroxyvitamin D (25-OHD) in pediatric patients with autism and in typically developing controls from Juiz de Fora, Brazil.

Results: Serum levels of 25-OHD were lower in children with autism (26.48 ± 3.48 ng mL⁻¹) when compared to typically developing subjects (40.52 ± 3.13 ng mL⁻¹) ($p < 0.001$).

Conclusion: Our findings attest to the importance of vitamin supplementation during pregnancy and in the treatment of children with autism, who tend to present low vitamin D consumption rates.

Keywords: Autism, children, vitamin D.

Resumo

Objetivo: Confirmar evidências prévias indicando uma associação entre autismo e baixos níveis séricos de vitamina D.

Métodos: Este estudo preliminar avaliou os níveis circulantes de 25-hidroxivitamina D (25-OHD) em pacientes pediátricos com autismo e em controles apresentando desenvolvimento típico em Juiz de Fora, Brasil.

Resultados: Os níveis séricos de 25-OHD foram menores em crianças com autismo ($26,48 \pm 3,48$ ng mL⁻¹) em comparação com indivíduos com desenvolvimento típico ($40,52 \pm 3,13$ ng mL⁻¹) ($p < 0,001$).

Conclusão: Nossos resultados confirmam a importância da suplementação de vitamina durante a gravidez e no tratamento de crianças com autismo, que costumam apresentar um baixo consumo de vitamina D.

Descritores: Autismo, crianças, vitamina D.

Introduction

Autism is described as a complex neurological condition that undermines normal brain development, leading to conditions such as disturbances in social interaction and communication impairments.¹ Autism spectrum disorders (ASDs) are considered to be caused by different triggers, including nutritional ones.²

In this context, the association between autism and vitamin D levels has been investigated, pointing to possible links between deficient levels of calcitriol [$1,25(\text{OH})_2\text{D}_3$] and some clinical observations^{3,4} – although no single factor can explain why more children are being identified with ASDs. This assumption has been made because this active metabolite plays several important roles: i) inhibition of the synthesis of inducible nitric

¹ PhD. Núcleo de Pesquisa e Inovação em Ciências da Saúde, Universidade Federal de Juiz de Fora (UFJF), Juiz de Fora, MG, Brazil. ² PhD candidate, Graduate Program in Health Sciences, Núcleo de Pesquisa e Inovação em Ciências da Saúde, UFJF. ³ PhD. Departamento e Instituto de Psiquiatria, Laboratório de Neurociências (LIM 27), Universidade de São Paulo (USP), São Paulo, SP, Brazil.

This article is part of the first author's PhD dissertation, presented at the Graduate Program in Health Sciences, at the School of Medicine of Universidade Federal de Juiz de Fora (UFJF), Juiz de Fora, MG, Brazil, in 2012.

Financial support: Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) and Fundação de Amparo à Pesquisa do Estado de Minas Gerais (FAPEMIG). Submitted Mar 22 2012, accepted for publication May 14 2012. No conflicts of interest declared concerning the publication of this article.

Suggested citation: Tostes MH, Polonini HC, Gattaz WF, Raposo NR, Baptista EB. Low serum levels of 25-hydroxyvitamin D (25-OHD) in children with autism. Trends Psychiatry Psychother. 2012;34(3):161-3.

oxide synthase (iNOS), an enzyme responsible for the generation of nitric oxide (NO); ii) modulation of helper T cells, leading to a suppression of autoimmune responses⁵; iii) increase of glutathione levels; and iv) activation of the tyrosine hydroxylase gene expression, increasing the levels of neurotransmitters.⁶ Thus, calcitriol deficiency in early childhood could be in some manner associated with the neurological clinical aspects of autism, and therefore with an increased risk for developing the disorder.⁷

Another suggestion of the importance of vitamin D in the etiology of autism comes from the fact that populations born in environments exposed to reduced levels of UVB radiation, i.e., where vitamin D deficiency is more likely to occur, have higher prevalence rates of this disorder.⁷

Within this context, the present study aimed to conduct a preliminary investigation of the circulating levels of 25-hydroxyvitamin D (25-OHD) in pediatric patients with autism and in typically developing controls from Juiz de Fora, Brazil.

Methods

The study protocol followed the ethical guidelines contained in the Declaration of Helsinki and was approved by the Ethics Committee of Universidade Federal de Juiz de Fora, southeastern Brazil (protocol no. 140/2007). Written informed consent was obtained from the participants' legal guardians.

The sample included 24 children (18 male and 6 female, mean age = 7.4 ± 2.7 years) diagnosed with autistic disorder according to the Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV), and also 24 age- and sex-matched healthy controls (18 male and 6 female, average age = 7.2 ± 1.8 years).⁸

Blood samples were collected between 7 and 9 a.m., after an 8-hour fast. Samples were centrifuged at $2465 \times g$ for 10 minutes at $4^\circ C$, and frozen at $-80^\circ C$ for further analysis by high-performance liquid chromatography (HPLC), in duplicate, according to Turpeinen et al.⁹

For statistical analysis, independent samples *t* tests were used to determine numeric group differences. The chi-square test was used to assess binomial data such as sex. Statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS) version 14.0 (SPSS Inc., Chicago, IL). Two-tailed probabilities of $p < 0.05$ were considered significant.

Results

Among our 24 children with autism, ethnic origin was as follows: males, nine Caucasians and nine non-Caucasians; females, four Caucasians and two non-Caucasians. Among controls, the following numbers were found: males, 15 Caucasians and three non-Caucasians; females, four Caucasians and two non-Caucasians.

With respect to 25-OHD levels according to the sex, no significant differences were observed among children with autism ($p = 0.293$) and among controls ($p = 0.439$). Conversely, serum levels of 25-OHD were significantly lower in children with autism ($26.48 \pm 3.48 \text{ ng mL}^{-1}$) when compared with typically developing subjects ($40.52 \pm 3.13 \text{ ng mL}^{-1}$) ($p < 0.001$). Ethnic differences were not taken into consideration in these analyses.

Discussion

Our results corroborate the previous study by Meguid et al.,⁴ who found $28.5 \pm 16.4 \text{ ng mL}^{-1}$ and $40.1 \pm 11.8 \text{ ng mL}^{-1}$ of 25-OHD in children with autism and typically developing subjects, respectively ($p < 0.001$).

The 25-OHD serum levels found in our sample confirm that children with autism present insufficiency for this vitamin, according to the classification proposed by Holick¹⁰: deficiency, levels $< 20 \text{ ng mL}^{-1}$; insufficiency, levels between 20 and 29 ng mL^{-1} ; and normal, levels $> 30 \text{ ng mL}^{-1}$. Thus, our findings underscore the presence of differences in 25-OHD levels between autistic and typically developing children.

In this light, it is possible to suggest that vitamin D indeed plays a role in normal brain development. Thus, the present findings are useful for clinicians in the sense of calling their attention to the possible need for dietary supplementation with vitamin D during pregnancy and also in the treatment of children with autism and low vitamin D consumption. Notwithstanding, we know that this solely, or any other isolated factor, will not reverse their multifactorial condition.

Further studies are needed in order to confirm the prophylactic potential of vitamin D against ASDs, especially in view of our small sample size. We also suggest the performance of additional assays in the same population, namely serum calcium, parathyroid hormone, phosphate, and bone mineral density.

Acknowledgements

The authors thank Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) and Fundação de Amparo à Pesquisa do Estado de Minas Gerais (FAPEMIG) for the financial support provided. The authors are also grateful to the children and their families for having agreed to participate in our study.

References

1. Cannell JJ. Autism and vitamin D. *Med Hypotheses*. 2008;70:750-9.
2. Shamberger RJ. Autism rates associated with nutrition and the WIC Program. *J Am Coll Nutr*. 2011;30:348-53.
3. Fernell E, Barnevik-Olsson M, Bagenholm G, Gillberg C, Gustafsson S, Saaf M. Serum levels of 25-hydroxyvitamin D in mothers of Swedish and of Somali origin who have children with and without autism. *Acta Paediatr*. 2010;99:743-7.
4. Meguid N, Hashish AF, Anwar M, Sidhom G. Reduced serum levels of 25-hydroxy and 1,25-dihydroxy vitamin D in Egyptian children with autism. *J Altern Complement Med*. 2010;16:641-5.
5. Tuohimaa P, Keisala T, Minasyan A, Cachat J, Kalueff A. Vitamin D, nervous system and aging. *Psychoneuroendocrinology*. 2009;34:5278-86.
6. Humble MB. Vitamin D, light and mental health. *J Photochem Photobiol B*. 2010;101:142-9.
7. Bakare MO. Association of hypomelanotic skin disorders with autism: links to possible etiologic role of vitamin-D levels in autism? *Hypothesis*. 2011;9:1-9.
8. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders, 4th edition, Text Revision (DSM-IV-TR)*. Washington: APA; 1994.
9. Turpeinen U, Hohenthal U, Stenman UH. Determination of 25-hydroxyvitamin D in serum by HPLC and immunoassay. *Clin Chem*. 2003;49:1521-4.
10. Holick MF. Vitamin D status: measurement, interpretation, and clinical application. *Ann Epidemiol*. 2009;19:73-8.

Correspondence

Nádia R. B. Raposo
Núcleo de Pesquisa e Inovação em Ciências da Saúde, Universidade Federal de Juiz de Fora
Rua José Lourenço Kelmer, s/nº, Campus Universitário
36036-900 – Juiz de Fora, MG – Brazil
Tel.: +55 (32) 2102.3809
E-mail: nadiafox@gmail.com