World Journal of Psychiatry

Submit a Manuscript: https://www.f6publishing.com

World J Psychiatry 2022 September 19; 12(9): 1255-1257

DOI: 10.5498/wjp.v12.i9.1255

ISSN 2220-3206 (online)

LETTER TO THE EDITOR

Sodium selenite may be not the optimal speciation as an effective therapy for arsenic-induced anxiety-/depression-like behavior

Xiao-Hua Ren, Xiao-Xuan Wang, Lian-Ping He

Specialty type: Psychiatry

Provenance and peer review: Invited article; Externally peer reviewed.

Peer-review model: Single blind

Peer-review report's scientific quality classification

Grade A (Excellent): 0
Grade B (Very good): B
Grade C (Good): C, C
Grade D (Fair): 0
Grade E (Poor): 0

P-Reviewer: Byeon H, South Korea; Kaur M, United States; Stachiv I, Czech Republic

Received: March 3, 2022
Peer-review started: March 3, 2022
First decision: April 18, 2022
Revised: April 20, 2022
Accepted: August 26, 2022
Article in press: August 26, 2022
Published online: September 19, 2022

Xiao-Hua Ren, Xiao-Xuan Wang, Lian-Ping He, School of Medicine, Taizhou University, Taizhou 318000, Zhejiang Province, China

Corresponding author: Lian-Ping He, PhD, Teacher, School of Medicine, Taizhou University, No. 1139 Shifu Avenue, Jiaojiang District, Taizhou 318000, Zhejiang Province, China. lianpinghe@tzc.edu.cn

Abstract

Major depressive disorder is a serious and prevalent neuropsychiatric disorder, affecting more than 350 million people worldwide. Here, sodium selenite (SS) was selected as the selenite supplement to improve the behavior in a mouse model of depression induced by As. SS may be not the optimal speciation for selenite supplementation and the source of the SS used in the study was not disclosed. There are many mouse models of depression and anxiety; however, in the current study, a classical mouse model of depression was not used. Thus, several questions still need to be further discussed. Taken together, the results indicate that SS may be not the optimal speciation as an effective therapy for As-induced anxiety-/depression-like behavior.

Key Words: Depression; Arsenic; Major depressive disorder; Sodium selenite; Optimal speciation

Core Tip: Sodium selenite (SS) may be not the optimal speciation for selenite supplementation and the source of the SS used in the study was not disclosed. There are many mouse models of depression and anxiety; however, in the current study, a classical mouse model of depression was not used.

Citation: Ren XH, Wang XX, He LP. Sodium selenite may be not the optimal speciation as an effective therapy for arsenic-induced anxiety-/depression-like behavior. *World J Psychiatry* 2022; 12(9): 1255-1257

URL: https://www.wjgnet.com/2220-3206/full/v12/i9/1255.htm

DOI: https://dx.doi.org/10.5498/wjp.v12.i9.1255

TO THE EDITOR

Major depressive disorder is a highly disabling psychiatric syndrome associated with deficits of specific subpopulations of cortical GABA-ergic interneurons[1,2]. We were pleased to read the article by Samad *et al*[3]. Their work highlights that Se, as a dietary source and/or supplement, is an effective therapy for As poisoning and its associated disorders. Furthermore, this study provides important findings regarding the prevention and treatment of anxiety disorders and depression. However, we believe there are several issues with the research design that need to be addressed. First, the use of sodium selenite (SS) as the Se supplement to improve the behavior of depression-like behavior in mice induced by As. Second, the use of the mouse model of depression. There are many mouse models of depression and anxiety; however, the authors chose not to use a classical mouse model of depression. As a result, questions remain regarding the validity of the study.

The main weakness of the study is SS as a means of Se supplementation. In particular, Se biological activity is dependent on its metabolic disposition; for example, absorption and excretion. It was observed that selenomethionine (SeMet) in organic form is more rapidly and completely (98%) absorbed than SS (84%) in inorganic form, and that liver uptake occurs faster after intake of organically bound Se than that of inorganic Se (SS)[4,5]. Moreover, various excretion indices confirm that SeMet has lower excretion (4%) than SS (18%)[4]. SS was also reported to induce DNA damage, particularly DNA strand breaks and base damage[6]. Se nanoparticles can also be used as a means to supplement Se. A recent study found Se nanoparticles to be a Se species with novel biological activities, bioavailability, and low toxicity[7]. Therefore, SS may not be the optimal speciation for selenite supplementation and as the source of the SS used in the study was not disclosed, questions remain.

The failure to select a suitable mouse model for depression was another issue with the study. A chronic unpredictable mild stress (CUMS) mouse model of depression is widely used[8]. As-induced depressive-like behavior cannot be used as a model of depression. Whether dietary Se can alleviate symptoms of the CUMS mouse model of depression needs to be further determined. In addition, dietary Se supplementation for depression in large-scale clinical trials is also necessary. As-induced depression-like behavior in mice may be associated with a large number of inflammatory factors and neurotransmitter changes that were not explored in this study.

Conclusion

Overall, SS may be not the optimal speciation for selenite supplementation and the source of the SS used in the study was not disclosed. The failure to select a suitable mouse model for depression was another issue, which the authors need to address.

FOOTNOTES

Author contributions: Ren XH and He LP contributed to the conception of research; Ren XH and Wang XX wrote the letter; Wang XX and He LP contributed to the revision of the letter; all authors approved the final manuscript for submission.

Supported by Curriculum Reform Project of Taizhou University in 2021, No. xkg2021087.

Conflict-of-interest statement: All the authors report no relevant conflicts of interest for this article.

Country/Territory of origin: China

ORCID number: Xiao-Hua Ren 0000-0002-5240-4459; Xiao-Xuan Wang 0000-0002-3314-3222; Lian-Ping He 0000-0002-9627-5599.

S-Editor: Gao CC
L-Editor: Kerr C
P-Editor: Gao CC

REFERENCES

1 **Yang XY**, Ma ZL, Storm DR, Cao H, Zhang YQ. Selective ablation of type 3 adenylyl cyclase in somatostatin-positive

interneurons produces anxiety- and depression-like behaviors in mice. *World J Psychiatry* 2021; **11**: 35-49 [PMID: 33643860 DOI: 10.5498/wjp.v11.i2.35]

2 **Porter GA**, O'Connor JC. Brain-derived neurotrophic factor and inflammation in depression: Pathogenic partners in crime? *World J Psychiatry* 2022; **12**: 77-97 [PMID: 35111580 DOI: 10.5498/wjp.v12.i1.77]

3 **Samad N**, Rao T, Rehman MHU, Bhatti SA, Imran I. Inhibitory Effects of Selenium on Arsenic-Induced Anxiety-/Depression-Like Behavior and Memory Impairment. *Biol Trace Elem Res* 2022; **200**: 689-698 [PMID: 33745108 DOI: 10.1007/s12011-021-02679-1]

4 **Ben-Parath M**, Case L, Kaplan E. The biological half-life of 75Se-selenomethionine in man. *J Nucl Med* 1968; **9**: 168-169 [DOI: 10.1016/s0001-2998(72)80067-9]

5 **Patterson BH**, Levander OA, Helzlsouer K, McAdam PA, Lewis SA, Taylor PR, Veillon C, Zech LA. Human selenite metabolism: a kinetic model. *Am J Physiol* 1989; **257**: R556-R567 [PMID: 2551194 DOI: 10.1152/ajpregu.1989.257.3.R556]

6 **Letavayová L**, Vlcková V, Brozmanová J. Selenium: from cancer prevention to DNA damage. *Toxicology* 2006; **227**: 1-14 [PMID: 16935405 DOI: 10.1016/j.tox.2006.07.017]

7 **Kumar A**, Prasad KS. Role of nano-selenium in health and environment. *J Biotechnol* 2021; **325**: 152-163 [PMID: 33157197 DOI: 10.1016/j.jbiotec.2020.11.004]

8 **Yan L**, Jayaram M, Chithanathan K, Zharkovsky A, Tian L. Sex-Specific Microglial Activation and SARS-CoV-2 Receptor Expression Induced by Chronic Unpredictable Stress. *Front Cell Neurosci* 2021; **15**: 750373 [PMID: 34899189 DOI: 10.3389/fncel.2021.750373]

Published by **Baishideng Publishing Group Inc**
7041 Koll Center Parkway, Suite 160, Pleasanton, CA 94566, USA
Telephone: +1-925-3991568
E-mail: bpgoffice@wjgnet.com
Help Desk: https://www.f6publishing.com/helpdesk
https://www.wjgnet.com