



OPEN ACCESS

EDITED AND REVIEWED BY
Honglin Dong,
City University of London, United Kingdom

*CORRESPONDENCE

Hamid Zand
✉ Hamid_zand@sbmu.ac.ir;
✉ hamidzand@gmail.com

RECEIVED 12 May 2025
ACCEPTED 16 May 2025
PUBLISHED 29 May 2025

CITATION

Rastgoo S, Pourvali K, Raeissadat SA,
Eslamian G and Zand H (2025)
Corrigendum: Co-administration of
vitamin D and N-acetylcysteine to
modulate immunosenescence in
older adults with vitamin D deficiency:
a randomized clinical trial.
Front. Immunol. 16:1627178.
doi: 10.3389/fimmu.2025.1627178

COPYRIGHT

© 2025 Rastgoo, Pourvali, Raeissadat, Eslamian
and Zand. This is an open-access article
distributed under the terms of the [Creative
Commons Attribution License \(CC BY\)](#). The
use, distribution or reproduction in other
forums is permitted, provided the original
author(s) and the copyright owner(s) are
credited and that the original publication in
this journal is cited, in accordance with
accepted academic practice. No use,
distribution or reproduction is permitted
which does not comply with these terms.

Corrigendum: Co-administration of vitamin D and N-acetylcysteine to modulate immunosenescence in older adults with vitamin D deficiency: a randomized clinical trial

Samira Rastgoo¹, Katayoun Pourvali¹,
Seyed Ahmad Raeissadat², Ghazaleh Eslamian¹
and Hamid Zand^{1*}

¹Department of Cellular and Molecular Nutrition, Faculty of Nutrition and Food Technology, National Nutrition and Food Technology Research Institute, Shahid Beheshti University of Medical Sciences, Tehran, Iran, ²Physical Medicine and Rehabilitation Department, Shahid Modarres Hospital, Shahid Beheshti University of Medical Sciences, Tehran, Iran

KEYWORDS

immune function, geroscience, cellular senescence, nutrition, aging

A Corrigendum on

Co-administration of vitamin D and N-acetylcysteine to modulate immunosenescence in older adults with vitamin D deficiency: a randomized clinical trial

by Rastgoo S, Pourvali K, Raeissadat SA, Eslamian G and Zand H (2025). *Front. Immunol.* 16:1570441. doi: 10.3389/fimmu.2025.1570441

In the published article, there was a typographical error in the legend of **Table 2**. “Vit D 5000” and “Vit D 5000 + NAC” were mistakenly written as “Vit D 50000” and “Vit D 50000 + NAC”. The correct terms are “Vit D 5000” and “Vit D 5000 + NAC”. The corrected legend appears below.

^aP<0.05; Vit D 1000 in compare Vit D 5000

^bP<0.05; Vit D 1000 in compare Vit D 5000 + NAC

^cP<0.05; Vit D 5000 in compare Vit D 1000 + NAC

^dP<0.05; Vit D 1000 + NAC in compare Vit D 5000 + NAC”

In the published article, there was a typographical error in the first row of **Tables 1 and 2**. “Vit D 5000” and “Vit D 5000 + NAC” were mistakenly written as “Vit D 50000” and “Vit D 50000 + NAC”. The correct terms are “Vit D 5000” and “Vit D 5000 + NAC”. The corrected versions of **Table 1** and **Table 2**, along with their captions “Table 1. Baseline characteristics at enrollment, according to randomized assignment to intervention groups.

Table 2. Serum concentrations of Vitamin D, immune system markers and inflammatory factors at baseline and the eighth week, according to randomized assignment to intervention groups” appear below.

The authors apologize for this error and state that this does not change the scientific conclusions of the article in any way. The original article has been updated.

Publisher’s note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

TABLE 1 Baseline characteristics at enrollment, according to randomized assignment to intervention groups.

Characteristic*	Vit D 1000 (n= 22)	Vit D 5000 (n= 22)	Vit D 1000 + NAC (n= 22)	Vit D 5000 + NAC (n= 22)	P value**
Age, year	69.5 ± 2.9	68.7 ± 4.0	70.3 ± 4.9	68.8 ± 4.6	0.561
Sex, no. (%)					
Male	9 (40.9)	10 (45.5)	14 (63.6)	7 (31.8)	0.811
Female	13 (59.1)	12 (54.5)	8 (36.4)	15 (68.2)	
Education, no. (%)					0.475
Primary school	4 (18.2)	3 (13.6)	3 (13.6)	2 (9.1)	
Secondary school	10 (45.5)	11 (50.0)	11 (50.0)	15 (68.2)	
Bachelor's degree	8 (36.4)	8 (36.4)	6 (27.3)	3 (13.6)	
Master's/doctoral degree	0 (0)	0 (0)	2 (9.1)	2 (9.1)	
Serum 25(OH)D, ng/mL	20.5 ± 4.0	19.3 ± 4.6	19.7 ± 4.9	18.9 ± 4.5	0.693
Time spent outdoors, min/d	61.8 ± 23.5	62.5 ± 22.2	58.7 ± 19.6	70.2 ± 19.3	0.322
BMI, kg/m ²	27.7 ± 1.8	27.1 ± 1.7	27.9 ± 2.0	26.9 ± 1.5	0.205
Waist circumference, cm	91.7 ± 8.2	94.0 ± 9.5	93.9 ± 9.4	93.8 ± 6.3	0.783
Physical activity (RAPA score)	3.73 ± 0.985	3.86 ± 1.167	3.91 ± 0.971	3.95 ± 1.133	0.906
Dietary intakes					
Energy intake, kcal/d	2051 ± 359	1902 ± 253	1935 ± 277	1948 ± 291	0.382
Carbohydrates, g/d	280 ± 53	257 ± 44	254 ± 41	262 ± 47	0.259
Protein, g/d	70 ± 14	64 ± 10	69 ± 12	67 ± 11	0.937
Fat, g/d	79 ± 18	77 ± 15	79 ± 14	80 ± 18	0.341
PUFA, g/d	23.0 ± 7.8	22.0 ± 4.8	21.5 ± 7.0	19.8 ± 6.8	0.468
MUFA, g/d	24.0 ± 6.0	20.7 ± 5.3	23.7 ± 8.1	23.2 ± 6.8	0.368
Fiber, g/d	13.8 ± 5.2	12.8 ± 2.9	13.7 ± 4.6	14.0 ± 5.5	0.813
Zinc, mg/d	7.9 ± 2.5	8.5 ± 2.4	9.0 ± 2.4	8.2 ± 1.8	0.427
Vitamin E, mg/d	17.3 ± 8.0	16.6 ± 9.7	18.6 ± 9.7	13.8 ± 6.7	0.306
Vitamin A, µg/d	1126 ± 762	678 ± 570	710 ± 589	897 ± 825	0.130
Vitamin C, mg/d	155 ± 75	162 ± 56	154 ± 66	188 ± 79	0.332
Vitamin D, µg/d	0.056 ± 0.264	0.356 ± 0.693	0.311 ± 0.614	0.473 ± 0.611	0.140
Selenium, µg/d	0.126 ± 0.027	0.127 ± 0.028	0.128 ± 0.030	0.118 ± 0.027	0.635
Beta-carotene, µg/d	815 ± 794	417 ± 628	389 ± 595	413 ± 742	0.134

*Values are mean ± standard deviation unless otherwise noted.
**Using ANOVA or Chi-square, as appropriate.
25(OH)D, 25-hydroxyvitamin D; BMI, body mass index; MUFA, monounsaturated fatty acid; NAC, N-acetylcysteine; PUFA, polyunsaturated fatty acids.

TABLE 2 Serum concentrations of vitamin D, immune system markers and inflammatory factors at baseline and the eighth week, according to randomized assignment to intervention groups.

	Vit D 1000 (n= 22)	Vit D 5000 (n= 22)	Vit D 1000 + NAC (n= 22)	Vit D 5000 + NAC (n= 22)	P value
Serum 25(OH)D, ng/mL					
Baseline	20.5 ± 4.0	19.3 ± 4.6	19.7 ± 4.9	18.9 ± 4.5	0.693*
Week 8	27.1 ± 4.3	44.6 ± 7.4	25.6 ± 4.3	44.9 ± 10.0	<0.001**a,b,c,d
Changes ***	6.6 ± 3.4	25.3 ± 5.2	5.9 ± 5.8	26.0 ± 9.1	<0.001**a,b,c,d
Serum IL-6, pg/mL					
Baseline	83.5 ± 69.1	93.3 ± 62.9	96.6 ± 85.4	81.4 ± 48.0	0.852*
Week 8	43.5 ± 55.1	40.7 ± 59.1	46.3 ± 104.9	27.1 ± 42.5	0.852**
Changes ***	-40.0 ± 77.6	-52.7 ± 86.0	-50.3 ± 105.7	-54.4 ± 62.2	0.852**
Serum CRP, mg/L					
Baseline	5.69 ± 2.10	6.26 ± 1.87	6.26 ± 1.87	6.13 ± 1.46	0.749*
Week 8	4.78 ± 1.46	4.45 ± 0.98	4.45 ± 0.98	4.58 ± 1.46	0.380**
Changes ***	-0.91 ± 1.61	-1.81 ± 1.72	-1.54 ± 2.15	-1.82 ± 1.58	0.380**
NLR					
Baseline	1.89 ± 0.77	1.73 ± 0.47	2.06 ± 0.74	1.99 ± 0.67	0.404*
Week 8	1.61 ± 0.67	1.42 ± 0.27	1.53 ± 0.37	1.46 ± 0.44	0.423**
Changes ***	-0.28 ± 0.76	-0.31 ± 0.32	-0.53 ± 0.60	-0.52 ± 0.51	0.423**
SA-β-gal activity (green area ratio%)					
Baseline	3.02 ± 1.75	3.30 ± 2.03	3.03 ± 1.98	4.20 ± 2.18	0.171*
Week 8	2.40 ± 1.46	1.60 ± 1.32	2.01 ± 1.33	1.68 ± 1.31	0.001**a,b
Changes ***	-0.62 ± 1.32	-1.70 ± 1.59	-1.02 ± 1.58	-2.52 ± 1.52	0.001**a,b

Values are mean ± standard deviation unless otherwise noted.

*Based on ANOVA.

**Based on ANCOVA adjusted for baseline values and age.

***Changes reflect week 8 – baseline values.

^aP<0.05; Vit D 1000 in compare Vit D 5000.

^bP<0.05; Vit D 1000 in compare Vit D 5000 + NAC.

^cP<0.05; Vit D 5000 in compare Vit D 1000 + NAC.

^dP<0.05; Vit D 1000 + NAC in compare Vit D 5000 + NAC.

25(OH)D, 25-hydroxyvitamin D; CRP, c-reactive protein; IL-6, interleukin-6; NLR, neutrophil-to-lymphocyte ratio.