

Cyboran Katarzyna, Kuc Monika, Siedlak Agnieszka, Machaj Dominik, Placzek Alicja. The impact of magnesium supplementation on the occurrence of selected disease states and physical performance - a review of the literature. *Journal of Education, Health and Sport*. 2022;12(9):99-103. eISSN 2391-8306. DOI <http://dx.doi.org/10.12775/JEHS.2022.12.09.013>
<https://apcz.umk.pl/JEHS/article/view/JEHS.2022.12.09.013>
<https://zenodo.org/record/7030224>

The Journal has had 40 points in Ministry of Education and Science of Poland parametric evaluation. Annex to the announcement of the Minister of Education and Science of December 21, 2021. No. 32343. Has a Journal's Unique Identifier: 201159. Scientific disciplines assigned: Physical Culture Sciences (Field of Medical sciences and health sciences); Health Sciences (Field of Medical Sciences and Health Sciences).

Punkty Ministerialne z 2019 - aktualny rok 40 punktów. Załącznik do komunikatu Ministra Edukacji i Nauki z dnia 21 grudnia 2021 r. Lp. 32343. Posiada Unikatowy Identyfikator Czasopisma: 201159. Przynależność dyscypliny naukowej: Nauki o kulturze fizycznej (Dziedzina nauk medycznych i nauk o zdrowiu); Nauki o zdrowiu (Dziedzina nauk medycznych i nauk o zdrowiu).

© The Authors 2022;

This article is published with open access at Licensee Open Journal Systems of Nicolaus Copernicus University in Torun, Poland
Open Access. This article is distributed under the terms of the Creative Commons Attribution Noncommercial License which permits any noncommercial use, distribution, and reproduction in any medium, provided the original author (s) and source are credited. This is an open access article licensed under the terms of the Creative Commons Attribution Non commercial license Share alike. (<http://creativecommons.org/licenses/by-nc-sa/4.0/>) which permits unrestricted, non commercial use, distribution and reproduction in any medium, provided the work is properly cited. The authors declare that there is no conflict of interests regarding the publication of this paper.

Received: 07.08.2022. Revised: 10.08.2022. Accepted: 28.08.2022.

The impact of magnesium supplementation on the occurrence of selected disease states and physical performance - a review of the literature

Katarzyna Cyboran katarzyna_cyboran@o2.pl; Medical Faculty, Institute of Medical Sciences, Collegium Medicum, Oleska Street 48, 45-052 Opole Poland

Monika Kuc - kuc.monika96@gmail.com; Medical Faculty, Institute of Medical Sciences, Collegium Medicum, Oleska Street 48, 45-052 Opole Poland

Agnieszka Siedlak – aga.siedlak.as@gmail.com; Medical Faculty, Institute of Medical Sciences, Collegium Medicum, Oleska Street 48, 45-052 Opole Poland

Dominik Machaj - dominik5a4@tlen.pl; Faculty of Medicine, Medical University of Lublin, Chodźki Street 19, 20-093 Lublin Poland

Alicja Płaczek - alicja60@poczta.onet.pl; Medical Faculty, University of Rzeszow, Pigoń Street 6, 35-310 Rzeszow, Poland

SUMMARY

Magnesium is one of the important elements in the human body. It plays an extremely important role in over 300 enzymatic reactions. Magnesium is one of the seven macroelements. Macronutrients are elements that constitute not less than 0.01% of the dry weight of each organism. By definition, their daily requirement exceeds 100 milligrams. According to Harvard T.H Chan, school of public health, the recommended amount of magnesium intake is 400-420 mg per day for men and 310-320 mg for women. Interestingly, it is difficult to overdose on magnesium as excess magnesium is excreted in the urine.¹² However, high doses of magnesium can cause diarrhea or nausea.³ The diarrheal effect of magnesium salts results from the osmotic effect of unabsorbed salts in the intestine and colon and the stimulation of gastric motility.⁴

Keywords: magnesium, supplementation, hypertension, insulin resistance, blood pressure

INTRODUCTION AND PURPOSE

The main goal of this review is to indicate a correlation between the supplementation of magnesium and the health of people. In addition, we want to demonstrate the effect of magnesium on the reduction of the incidence of selected diseases.

DESCRIPTION OF THE STATE OF KNOWLEDGE

Daniel T Dibaba from the Department of Epidemiology and Biostatistics, School of Public Health, Indiana University, Bloomington, IN and co-authors analyzed the research results published before May 2017. on the effects of magnesium supplementation on blood pressure. These studies included people with preclinical or non-communicable diseases. Review applied articles publication in PubMed, ScienceDirect, Cochrane, clinicaltrials.gov, SpringerLink, and Google Scholar databases. As a result of this study, it has been proven that magnesium supplementation significantly lowers blood pressure in people with insulin resistance, pre-diabetes, or other noncommunicable chronic diseases. These disease states are recognized risk factors for hypertension. ⁵ Magnesium supplementation is inversely proportional to the occurrence of these diseases. ⁶⁷

Sun Ha Jee from the Department of Epidemiology and Disease Control, Yonsei University Graduate School of Health Science and Management, Seoul, Korea and co-authors did a meta-analysis of randomized trials that tested the effect of magnesium supplementation on blood pressure. Their meta-analysis revealed a correlation between the dose of magnesium and the reduction in blood pressure. To confirm this relationship, large-scale studies should be carried out on a representative group of patients with appropriately high doses of magnesium supplements. ⁸

¹ <https://www.hsph.harvard.edu/nutritionsource/magnesium/>

² https://www.medicalnewstoday.com/articles/286839#_noHeaderPrefixedContent

³ Instytut Medyczny (IOM). Rada ds. Żywności i Żywienia. Referencyjne Spożycie: Wapń, Fosfor, Magnez, Witamina D i Fluor . Waszyngton, DC: National Academy Press, 1997.

⁴ <https://naturalmedicines.therapeuticresearch.com/>

Parrazini Fabio from the Fondazione IRCCS Cà Granda, Dipartimento Materno-Infantile, Ospedale Maggiore Policlinico, Università degli Studi di Milano, Dipartimento di Scienze Cliniche e di Comunità, Università di Milano, Milan, Italy and co-authors in a review article on the use of magnesium in gynecology showed that magnesium supplementation is effective in preventing painful menstruation, premenstrual syndrome, menstrual migraine and in the prevention of climacteric symptoms. Despite the not fully understood mechanism of the action of the magnesium ion, a positive correlation has been demonstrated between the administration of magnesium and the alleviation or prevention of these symptoms. Therefore, magnesium supplementation may be a real treatment for these diseases.⁹

Nicola Veronese from the Department of Medicine-DIMED, Geriatrics Section, University of Padova, Padova, Italy (NV, LB, SC, FB, MDR, EDT, GB, SP, FM, AC, EM, and GS), and the Department of Cardiac, Thoracic and Vascular Sciences, Biostatistics, Epidemiology and Public Health Unit, University of Padova, Padova, Italy (EP) and co-authors investigated the effect of oral magnesium supplementation on the physical performance of healthy elderly women participating in a weekly exercise program. The purpose of their study was to find out whether twelve weeks of oral magnesium supplementation could improve their physical performance. Their research suggests that magnesium supplementation had a beneficial effect. This finding suggests that taking magnesium may delay the decline in exercise performance.¹⁰

Sara Chacko from Department of Epidemiology, School of Public Health, University of California, Los Angeles, CA 90095, USA and co-authors investigated magnesium intake, metabolic markers, inflammatory markers, global genomic and proteomic profiling in overweight people. Magnesium supplementation for 4 weeks in overweight people led to marked changes in gene expression and proteomic profiling consistent with beneficial effects on several metabolic pathways.¹¹

⁵ Daniel T Dibaba, Pengcheng Xun, Yiqing Song, Andrea Rosanoff, Michael Shechter and Ka He; The effect of magnesium supplementation on blood pressure in individuals with insulin resistance, prediabetes, or noncommunicable chronic diseases: a meta-analysis of randomized controlled trials; *Am J Clin Nutr.* 2017 Sep; 106(3): 921–929. Published online 2017 Jul 19. doi: 10.3945/ajcn.117.155291

⁶ Hruby A, O'Donnell CJ, Jacques PF, Meigs JB, Hoffmann U, McKeown NM. Magnesium intake is inversely associated with coronary artery calcification: the Framingham Heart Study. *JACC Cardiovasc Imaging* 2014;7:59–69.

⁷ Cahill F, Shahidi M, Shea J, Wadden D, Gulliver W, Randell E, Vasdev S, Sun G. High dietary magnesium intake is associated with low insulin resistance in the Newfoundland population. *PLoS One* 2013;8:e58278.

⁸ Sun Ha Jee 1, Edgar R Miller 3rd, Eliseo Guallar, Vikesh K Singh, Lawrence J Appel, Michael J Klag; The effect of magnesium supplementation on blood pressure: a meta-analysis of randomized clinical trials; 2002 Aug;15(8):691-6. doi: 10.1016/s0895-7061(02)02964-3.

CONCLUSIONS

Nowadays, magnesium is one of the most studied medical topics. It is believed that its level in the body, like vitamin D, is of great importance for human health. Most adults have magnesium deficient, but this is not recognized by medical professionals. The problem is the difficulty in determining its level. Screening for chronic magnesium deficiency is very difficult because normal serum levels can coexist with a deficiency in the body.¹² Our literature review shows how important it is to maintain the correct level of magnesium in the body. In our opinion, a large, multicenter study is needed that will systematize knowledge and determine the amounts of magnesium to be taken.

References

- 1 <https://www.hsph.harvard.edu/nutritionsource/magnesium/>
- 2 https://www.medicalnewstoday.com/articles/286839#_noHeaderPrefixedContent
- 3 Instytut Medyczny (IOM). Rada ds. Żywności i Żywienia. Referencyjne Spożycie: Wapń, Fosfor, Magnez, Witamina D i Fluor . Waszyngton, DC: National Academy Press, 1997.
- 4 <https://naturalmedicines.therapeuticresearch.com/>
- 5 Daniel T Dibaba, Pengcheng Xun, Yiqing Song, Andrea Rosanoff, Michael Shechter and Ka He; The effect of magnesium supplementation on blood pressure in individuals with insulin resistance, prediabetes, or noncommunicable chronic diseases: a meta-analysis of randomized controlled trials; *Am J Clin Nutr.* 2017 Sep; 106(3): 921–929. Published online 2017 Jul 19. doi: 10.3945/ajcn.117.155291
- 6 Hruby A, O'Donnell CJ, Jacques PF, Meigs JB, Hoffmann U, McKeown NM. Magnesium intake is inversely associated with coronary artery calcification: the Framingham Heart Study. *JACC Cardiovasc Imaging* 2014;7:59–69.
- 7 Cahill F, Shahidi M, Shea J, Wadden D, Gulliver W, Randell E, Vasdev S, Sun G. High dietary magnesium intake is associated with low insulin resistance in the Newfoundland population. *PLoS One* 2013;8:e58278.
- 8 Sun Ha Jee 1, Edgar R Miller 3rd, Eliseo Guallar, Vikesh K Singh, Lawrence J Appel, Michael J Klag; The effect of magnesium supplementation on blood pressure: a meta-analysis of randomized clinical trials; 2002 Aug;15(8):691-6. doi: 10.1016/s0895-7061(02)02964-3.
- ⁹ Fabio Parazzini 1, Mirella Di Martino 1, Paolo Pellegrino 2 ; Magnesium in the gynecological practice: a literature review; *Magnes Res.* 2017 Feb 1;30(1):1-7. doi: 10.1684/mrh.2017.0419.
- ¹⁰ Nicola Veronese 1, Linda Berton 1, Sara Carraro 1, Francesco Bolzetta 1, Marina De Rui 1, Egle Perissinotto 1, Elena Debora Toffanello 1, Giulia Bano 1, Simona Pizzato 1, Fabrizia Miotto 1, Alessandra Coin 1, Enzo Manzato 1, Giuseppe Sergi 1; Effect of oral magnesium supplementation on physical performance in healthy elderly women involved in a weekly exercise program: a randomized controlled trial; *Am J Clin Nutr.* 2014 Sep;100(3):974-81. doi: 10.3945/ajcn.113.080168. Epub 2014 Jul 9.
- ¹¹ Sara A Chacko 1, James Sul, Yiqing Song, Xinmin Li, James LeBlanc, Yuko You, Anthony Butch, Simin Liu; Magnesium supplementation, metabolic and inflammatory markers, and global genomic and proteomic profiling: a randomized, double-blind, controlled, crossover trial in overweight individuals; *Am J Clin Nutr.* 2011 Feb;93(2):463-73. doi: 10.3945/ajcn.110.002949. Epub 2010 Dec 15.
- ¹² Pramod Reddy , Linda R. Edwards; Magnesium Supplementation in Vitamin D Deficiency; *Am J Ther.* 2019 Jan/Feb;26(1):e124-e132. doi: 10.1097/MJT.0000000000000538.

- 9 Fabio Parazzini 1, Mirella Di Martino 1, Paolo Pellegrino 2 ; Magnesium in the gynecological practice: a literature review; *Magnes Res.* 2017 Feb 1;30(1):1-7. doi: 10.1684/mrh.2017.0419.
- 10 Nicola Veronese 1, Linda Berton 1, Sara Carraro 1, Francesco Bolzetta 1, Marina De Rui 1, Egle Perissinotto 1, Elena Debora Toffanello 1, Giulia Bano 1, Simona Pizzato 1, Fabrizia Miotto 1, Alessandra Coin 1, Enzo Manzato 1, Giuseppe Sergi 1; Effect of oral magnesium supplementation on physical performance in healthy elderly women involved in a weekly exercise program: a randomized controlled trial; *Am J Clin Nutr.* 2014 Sep;100(3):974-81. doi: 10.3945/ajcn.113.080168. Epub 2014 Jul 9.
- 11 Sara A Chacko 1, James Sul, Yiqing Song, Xinmin Li, James LeBlanc, Yuko You, Anthony Butch, Simin Liu; Magnesium supplementation, metabolic and inflammatory markers, and global genomic and proteomic profiling: a randomized, double-blind, controlled, crossover trial in overweight individuals; *Am J Clin Nutr.* 2011 Feb;93(2):463-73. doi: 10.3945/ajcn.110.002949. Epub 2010 Dec 15.
- 12 Pramod Reddy , Linda R. Edwards; Magnesium Supplementation in Vitamin D Deficiency; *Am J Ther.* 2019 Jan/Feb;26(1):e124-e132. doi: 10.1097/MJT.0000000000000538.