Review J Trace Elem Med Biol. 2020 Dec:62:126577.
doi: 10.1016/j.jtemb.2020.126577. Epub 2020 Jun 6.

Pivotal role of boron supplementation on bone health: A narrative review

Mariangela Rondanelli [1], Milena Anna Faliva [2], Gabriella Peroni [3], Vittoria Infantino [4], Clara Gasparri [5], Giancarlo Iannello [6], Simone Perna [7], Antonella Riva [8], Giovanna Petrangolini [9], Alice Tartara [10]

Affiliations expand

PMID: 32540741 DOI: 10.1016/j.jtemb.2020.126577

Free article

Abstract

Background: Boron is a trace element that plays an important role in numerous biological functions, including calcium metabolism, growth and maintenance of bone tissue. However, there are still no precise indications regarding a possible role of boron supplementation, and its amount of supplementation, to maintain bone health. So the aim of this narrative review was to consider the state of the art on the effectiveness of boron supplementation (alone or with other micronutrients) on growth and maintenance of bone in humans through control of calcium, vitamin D and sex steroid hormone metabolism in order to suggest a daily dosage of boron supplementation.

Main findings: This review included 11 eligible studies: 7 regarding the supplementation with boron alone and 4 regarding supplementation with boron and other nutrients. Despite the number of studies considered being low, the number of subjects studied is high (594) and the results are interesting.

Conclusions: The studies considered in this narrative review have evaluated the positive effectiveness on bone, in humans, through control of calcium, vitamin D and sex steroid hormone metabolism, considering a dietary supplementation of 3 mg/day of boron (alone or with other nutrients); this

supplementation is demonstrably useful to support bone health (in order to prevent and maintain adequate bone mineral density), also considering the daily dose of 3 mg is much lower than the Upper Level indicated by EFSA in the daily dose of 10 mg.

Keywords: Bone; Bone mineral density; Boron; Dietary supplementation; Nutrients.

Similar articles

The effect of supplementation of calcium, vitamin D, boron, and increased fluoride intake on bone mechanical properties and metabolic hormones in rat.

Ghanizadeh G, Babaei M, Naghii MR, Mofid M, Torkaman G, Hedayati M.

Toxicol Ind Health. 2014 Apr;30(3):211-7. doi: 10.1177/0748233712452775. Epub 2012 Jul 10.

PMID: 22782709

Silicon: A neglected micronutrient essential for bone health.

Rondanelli M, Faliva MA, Peroni G, Gasparri C, Perna S, Riva A, Petrangolini G, Tartara A.

Exp Biol Med (Maywood). 2021 Jul;246(13):1500-1511. doi: 10.1177/1535370221997072. Epub 2021 Mar 9.

PMID: 33715532 **Free PMC article.** Review.

An update on magnesium and bone health.

Rondanelli M, Faliva MA, Tartara A, Gasparri C, Perna S, Infantino V, Riva A, Petrangolini G, Peroni G.

Biometals. 2021 Aug;34(4):715-736. doi: 10.1007/s10534-021-00305-0. Epub 2021 May 6.

PMID: 33959846 **Free PMC article.** Review.

Effects of dietary boron supplementation on some biochemical parameters, peripheral blood lymphocytes, splenic plasma cells and bone characteristics of broiler chicks given diets with adequate or inadequate cholecalciferol (vitamin D3) content.

Kurtoğlu F, Kurtoğlu V, Celik I, Keçeci T, Nizamlioğlu M.

Br Poult Sci. 2005 Feb;46(1):87-96. doi: 10.1080/00071660400024001.

PMID: 15835257

Boron supplementation in peripartum Murrah buffaloes: The effect on calcium homeostasis, bone metabolism, endocrine and antioxidant status.

Sharma A, Mani V, Pal RP, Sarkar S, Datt C.

J Trace Elem Med Biol. 2020 Dec;62:126623. doi: 10.1016/j.jtemb.2020.126623. Epub 2020 Jul 19.

PMID: 32739828

See all similar articles

Cited by

Boron Salicylate Ester Compounds as Boron Therapeutics. Their Synthesis, Structural Characterizations and Anticancer Effects against MDA-MB-231.

Bolat M, Köse DA, Akbaba S.

Biol Trace Elem Res. 2024 Oct 3. doi: 10.1007/s12011-024-04394-z. Online ahead of print.

PMID: 39358580

Low-Mineral Water Diminishes the Bone Benefits of Boron.

Huang T, Hao Y, Tan Y, Dai Q, Chen W, Cui K, Luo J, Zeng H, Shu W, Huang Y.

Nutrients. 2024 Aug 28;16(17):2881. doi: 10.3390/nu16172881.

PMID: 39275197 **Free PMC article.**

Assessment of Selected Surface and Electrochemical Properties of Boron and Strontium-Substituted Hydroxyapatites.

Kolmas J, Samoilov P, Jaguszewska A, Skwarek E.

Molecules. 2024 Jan 31;29(3):672. doi: 10.3390/molecules29030672.

PMID: 38338415 **Free PMC article.**

Whey Protein Dietary Supplements: Metal Exposure Assessment and Risk Characterization.

Bethencourt-Barbuzano E, González-Weller D, Paz-Montelongo S, Gutiérrez-Fernández ÁJ, Hardisson A, Carrascosa C, Cámara M, Rubio-Armendáriz C.

Nutrients. 2023 Aug 11;15(16):3543. doi: 10.3390/nu15163543.

PMID: 37630733 **Free PMC article.**

Organoboronic acids/esters as effective drug and prodrug candidates in cancer treatments: challenge and hope.

Al-Omari MK, Elaarag M, Al-Zoubi RM, Al-Qudimat AR, Zarour AA, Al-Hurani EA, Fares ZE, Alkharraz LM, Shkoor M, Bani-Yaseen AD, Aboumarzouk OM, Yassin A, Al-Ansari AA.

J Enzyme Inhib Med Chem. 2023 Dec;38(1):2220084. doi: 10.1080/14756366.2023.2220084.

PMID: 37318308 **Free PMC article.** Review.

See all "Cited by" articles

Publication types

Review

MeSH terms

Bone Density

Bone and Bones / drug effects*

Bone and Bones / physiology*

Boron / pharmacology*

Calcium / metabolism

Dietary Supplements

Female

Gonadal Steroid Hormones / metabolism

Humans

Male

Vitamin D / metabolism

Substances

Gonadal Steroid Hormones

Vitamin D

Boron

Calcium

Related information

PubChem Compound (MeSH Keyword)

LinkOut - more resources

Full Text Sources

Archivio Istituzionale della Ricerca Unimi

Elsevier Science

Other Literature Sources

The Lens - Patent Citations Database