SYMPOSIUM NUTRITION AND HEALTH

Zürich, Donnerstag, 30. November 2023

Pflanzliche Ernährung in der Pädiatrie: Braucht es Strategien zur Vorbeugung von Nährstoffmangel?

Vitamin D- und Calcium-Mangel

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OSTSCHWEIZER KINDERSPITAL

SYMPOSIUM NUTRITION AND HEALTH

Zurich, Thursday, November 30, 2023

Conflicts of interest:

- Member of the Federal Commission for Nutrition since 2020

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Background: **Physiological role of Ca++ and Vitamin D**

Vitamin D

Functions:

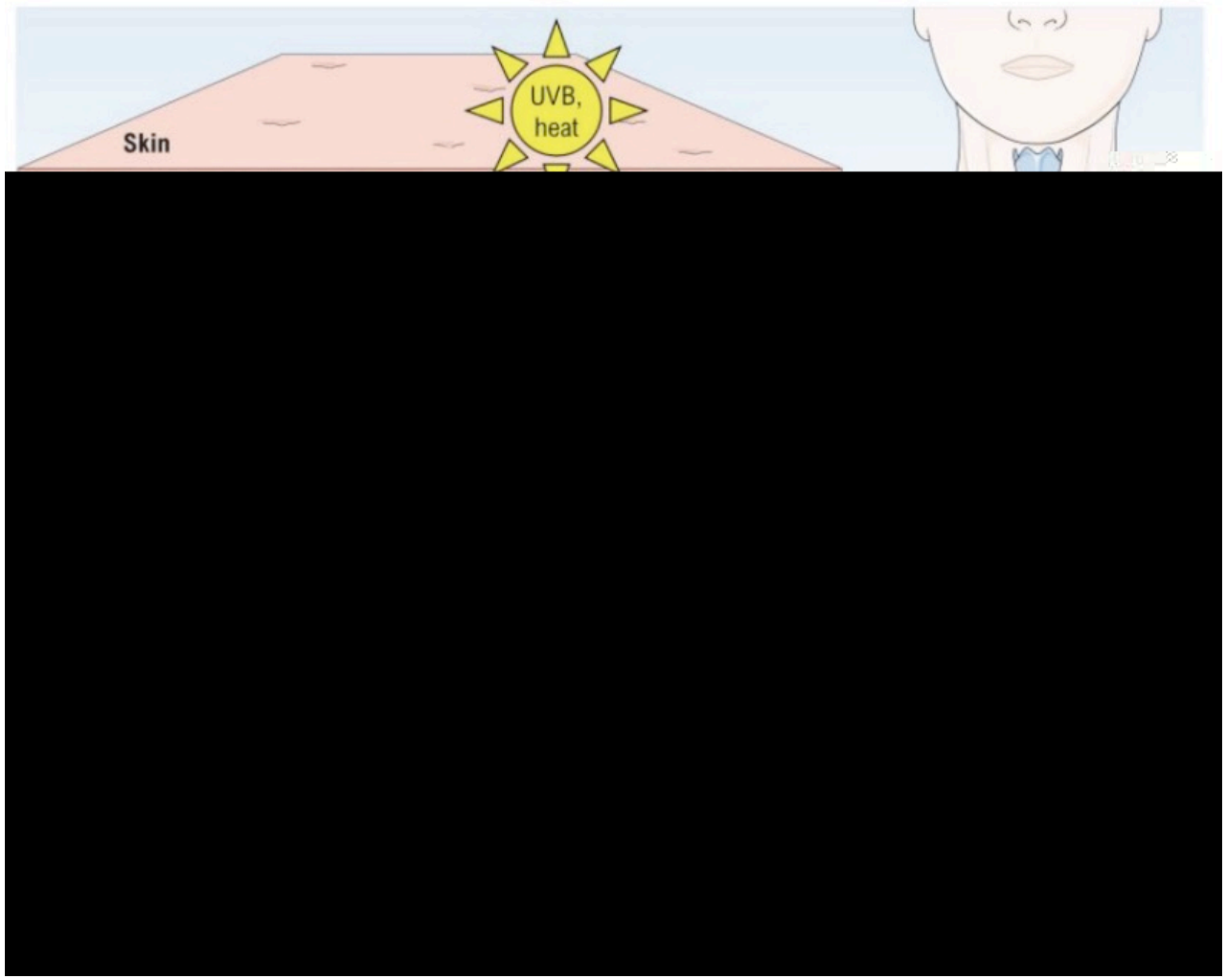
- Promotes the absorption of calcium and phosphate in the intestine and their incorporation into the bones.
- Regulates calcium and phosphate metabolism together with other hormones.
- Central for healthy bone and tooth formation.

Calcium

Functions:

- is the most important mineral in the human body in terms of quantity.
- 99% stored in bones/teeth
- Involved in various cell functions: Factor of blood coagulation, stabilization of the cell membrane, signal transmission in the cell and in the nervous system as well as muscles

Background: **Physiological role of Ca++ and Vitamin D**



doi:10.3390/ijms19020455

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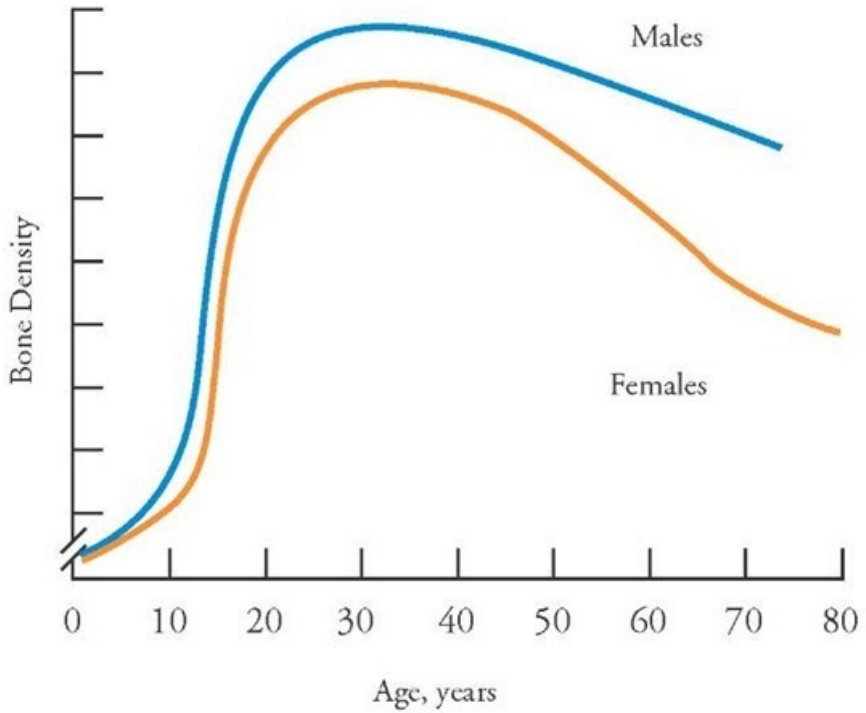
Bone health (calcium & vitamin D)



Nutritive factors for bone health:

- Vitamin D
- Calcium
- Vitamin K
- Magnesium
- Potassium
- Proteins (Isoflavones)
- Acid-base balance

good supply in vegan nutrition

Smith AM. Int J Nurs Pract 2006
Appleby P et al. EPIC. Eur J Clin Nutr 2007

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Background: **Health consequences of deficiency**

Hypovitaminose D and insufficient calcium intake

- Promotes osteomalacia (insufficient mineralisation) or osteoporosis (decreased bone density; increased bone fragility) because calcium is broken down from the bones.
- General tiredness
- Muscle weakness
- Diffuse bone and muscle pain
- In children: Rickets (skeletal deformity)

Biomarkers and thresholds to define deficiency

Bone metabolism:

***25-OH-cholecalciferol**; Ca, Ph, Creat (serum & urine, respectively), alk Phos, PTH*

Vitamin D, Calcium-Phosphatstoffwechsel	Vitamin D (25-OH-Cholecalciferol)	Keine Routinemässige Bestimmung empfohlen bei Supplementierung gemäss CH-Empfehlung und fehlenden zusätzlichen Risikofaktoren für einen Mangel.	>75 nmol/l optimal; 50-74 nmol/l adäquat; 25 – 50 nmol/l Insuffizienz, < 25 nmol/l schwerer Mangel
	Calcium, Phosphat, Creatinin (Serum) Calcium, Phosphat, Creatinin (Urin)	Bestimmung bei klinischer Symptomatik einer Rachitis, symptomatischem Vitamin D Mangel oder nutritiver Unterversorgung von Calcium bzw Vitamin D.	
	Alk. Phosphatase	Erhöht: u.a. Marker des Knochenstoffwechsel Erniedrigt: u.a. Marker für Zinkmangel	Altersentsprechende Normwerte beachten

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Dietary **sources of vitamin D**

Daily requirement:

(1 µg = 40 IU)

Nährstoffe	Alter und Geschlecht	Menge und Quellen	Referenzen	Weitere Hinweise
Vitamin D	7-11 Monate ♂	10 µg/Tag *Infos (22)	22	Infos
Vitamin D	7-11 Monate ♀	10 µg/Tag *Infos (22)	22	Infos
Vitamin D	1-3 Jahre ♂	15 µg/Tag *Infos (22)	22	Infos
Vitamin D	1-3 Jahre ♀	15 µg/Tag *Infos (22)	22	Infos
Vitamin D	4-6 Jahre ♂	15 µg/Tag (22)	22	Infos
Vitamin D	4-6 Jahre ♀	15 µg/Tag (22)	22	Infos
Vitamin D	7-10 Jahre ♂	15 µg/Tag (22)	22	Infos
Vitamin D	7-10 Jahre ♀	15 µg/Tag (22)	22	Infos
Vitamin D	11-14 Jahre ♂	15 µg/Tag (22)	22	Infos
Vitamin D	11-14 Jahre ♀	15 µg/Tag (22)	22	Infos
Vitamin D	15-17 Jahre ♂	15 µg/Tag (22)	22	Infos

Included in:

Egg, liver, fatty fish, mushrooms.

Other foods are generally low in vitamin D.

On average only approx. 2 to 4 micrograms (80 - 160 IU) of vitamin D per day through food.

	Vit. D µg/100 g
Felche, roh	22
Lachs, Wild	15–25*
Sardine im Öl, abgetropft	6
Fisch Ø, roh	5,3
Lamm/Schaf Ø, roh	3,8
Eier	2,9
Lachs, Zucht	2,5–6,25*
Pilz Ø, roh	2,6
Kalbfleisch Ø, roh	2,5

Quelle: Schweizer Nährwertdatenbank / *Vitamin D-Empfehlungen des Bundesamts für Lebensmittelsicherheit und Veterinärwesen (BLV)

Dietary **sources of calcium**

Daily requirement

Nährstoffe	Alter und Geschlecht	Menge und Quellen	Referenzen	Weitere Hinweise
Calcium	7-11 Monate ♂	280 mg/Tag (30)	30	Infos
Calcium	7-11 Monate ♀	280 mg/Tag (30)	30	Infos
Calcium	1-3 Jahre ♂	450 mg/Tag (30)	30	Infos
Calcium	1-3 Jahre ♀	450 mg/Tag (30)	30	Infos
Calcium	4-6 Jahre ♂	800 mg/Tag (30)	30	Infos
Calcium	4-6 Jahre ♀	800 mg/Tag (30)	30	Infos
Calcium	7-10 Jahre ♂	800 mg/Tag (30)	30	Infos
Calcium	7-10 Jahre ♀	800 mg/Tag (30)	30	Infos
Calcium	11-14 Jahre ♂	1150 mg/Tag (30)	30	Infos
Calcium	11-14 Jahre ♀	1150 mg/Tag (30)	30	Infos
Calcium	15-17 Jahre ♂	1150 mg/Tag (30)	30	Infos

Nutrient table BLV

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Dietary **sources of calcium**

Daily requirement

- **Included in:**

Dairy products, calcium-rich mineral water,

some vegetables, pulses, tofu, nuts or oilseeds

Oxalates (e.g. from rhubarb and spinach) and phytates (from wholegrain products and pulses) can reduce the absorption of calcium.

① Calciumgehalt in Lebensmitteln

LEBENSMITTEL (PORTIONSGRÖSSE)	CALCIUM
Nüsse, Samen, Kerne * / 25 g	43 mg
Milch / 200 ml | **Joghurt, natur** / 180 g | **Hart- und Halbhartkäse** / 30 g	255 mg
Eier / 2 Stück, 110 g	53 mg
Fleisch (Durchschnitt) / 110 g	7 mg
Fisch (Durchschnitt) / 110 g	25 mg
Sardine aus der Dose / 110 g	428 mg
Tofu, mit Calciumsalz hergestellt / 110 g	242 mg
Tofu, mit Nigari hergestellt / 110 g	79 mg
Seitan / 110 g	40 mg
Hülsenfrüchte / 60 g, Trockengewicht	58 mg
Brot / 100 g	29 mg
Kartoffeln / 240 g | **Teigwaren** / 60 g, Trockengewicht	13 mg
Gemüse* / 120 g	28 mg
Weiss- oder Grünkohl / 120 g | **grüne Bohnen** / 120 g	62 mg
Federkohl / 120 g	288 mg
Mineralwasser mit 300 mg Calcium pro Liter / 200 ml	60 mg
Hahnenwasser (Mittelwert Schweiz) / 200 ml	14 mg
Pflanzendrink (Durchschnitt: Reis, Soja, Hafer, Mandel) nicht angereichert / 200 ml	16 mg
Pflanzendrink mit Calcium angereichert / 200 ml	240 mg

Quellen: Schweizer Nährwertdatenbank: **www.naehrwertdaten.ch**

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Are individuals (including infants and children) consuming a plant-based diet (flexitarian, vegetarian, vegan) at risk of deficiency? What is the available evidence?

Nutrient supply toddlers

- Evaluation of 430 VG, VN, and omnivorous (OM) fed children (1-3 years old).
- Energy and macronutrient supply
- Anthropometry
- Nutrient supply evaluated (questionnaire and 3-day dietary protocol)

→ Critical nutrient intakes in all 3 groups are **vitamin D (without supplement), iodine, and DHA**, (with OM children having the highest intakes).

→ VN > VG children had lower **calcium** intake than OM, less than half of VN reached the h-AR.

→ 97% of VN children received **supplements** (esp. Vit B12, Vit D)

Table 2 Median daily intake (without supplements) of vitamins and minerals of vegan (VN), vegetarian (VG), and omnivorous (OM) children in the VeChi Diet Study by diet group

	VN (n = 139)	VG (n = 127)	OM (n = 164)	h-AR	Basic model[A]		Fully adjusted model[B]	
					p	Partial η^2	p	Partial η^2
Vitamin A (retinol eq) (µg/d)[a]	550 (377–779)	475 (331–654)	560 (372–854)	205	0.008	0.022	0.008	0.024
β-carotene (mg/d)[b]	3.2 (1.9–5.1)	2.5 (1.4–3.8)	2.3 (1.4–4.6)	–	0.020	0.018	0.002	0.031
Vitamin E (mg/d)[c]	8.3 (6.1–11.7)[1]	7.4 (5.1–9.9)[1]	5.1 (3.9–7.0)[1]	5.0	<0.0001	0.200	<0.0001	0.196[§]
Vitamin K (µg/d)[d]	82 (53–120)[1,2]	67 (41–86)[1]	46 (26–72)[2]	–	<0.0001	0.099	<0.0001	0.130
Vitamin B_1 (µg/d)[e]	569 (437–754)[1,2]	513 (377–611)[1]	481 (398–605)[2]	400	<0.0001	0.038	<0.0001	0.124
Vitamin B_2 (µg/d)[f]	429 (325–537)[1]	461 (375–641)[2]	639 (517–800)[1,2]	500	<0.0001	0.175	<0.0001	0.202[§]
Vitamin B_6 (mg/d)[g]	0.8 (0.6–1.1)[1,2]	0.7 (0.6–0.8)[1]	0.7 (0.6–0.9)[2]	0.5	0.002	0.030	<0.0001	0.117
Folate (µg/d)[h]	143 (106–197)[1,2]	116 (96–149)[1]	108 (90–135)[2]	90	<0.0001	0.148	<0.0001	0.148[§]
Vitamin C (mg/d)[i]	63 (44–84)[1]	54 (41–66)	45 (32–63)[1]	15	<0.0001	0.076	<0.0001	0.073[§]
Potassium (mg/d)[j]	1839 (1387–2204)[1,2]	1567 (1227–1858)[1]	1513 (1309–1861)[2]	–	<0.0001	0.065	<0.0001	0.113[§]
Calcium (mg/d)[k,#]	320 (251–453)[1]	399 (280–567)	445 (356–553)[1]	390	<0.0001	0.059	<0.0001	0.060
Magnesium (mg/d)[l]	241 (180–310)[1]	188 (143–240)[1]	164 (134–195)[1]	65	<0.0001	0.147	<0.0001	0.292[§]
Iron (mg/d)[m]	8.9 (6.0–11.6)[1]	7.3 (5.5–9.0)[1]	6.0 (4.7–7.4)[1]	5.0/10.0*	<0.0001	0.111	<0.0001	0.300
Zinc (mg/d)[n]	4.9 (3.7–6.2)	4.7 (3.8–5.6)	5.0 (4.1–5.8)	3.6	0.194	0.008	0.111	0.012
Iodine (µg/d)[o]	31 (22–44)[1]	33 (23–45)[1]	47 (36–61)[1]	65	<0.0001	0.118	<0.0001	0.167[§]
	VN (n = 139)	VG (n = 127)	OM (n = 164)	h-AR	p †	r		
						VN vs VG	VG vs OM	VN vs OM
Vitamin B_{12} (µg/d)	0.2 (0.1–0.4)[1]	0.6 (0.3–1.0)[1]	1.5 (1.1–2.3)[1]	0.7	<0.0001	0.399	0.471	0.656
Vitamin D (µg/d)	0.7 (0.3–1.1)	0.8 (0.4–1.4)	0.8 (0.5–1.6)	10	0.006	0.120	0.017	0.143

Weder S. et al. Nutrients **2019**, 11, 832; doi:10.3390/nu11040832.
Weder S. et al. European Journal of Nutrition; **2022**:61,1507-1520

Nutrient supply - Children cohort

gefördert durch das Bundesministerium für Ernährung und Landwirtschaft

- Cross-sectional study
- 149 vegetarian, 115 vegan, and 137 omnivorous eating children and adolescents (6-18 yrs, mean age: 12.7 ± 3.9 yrs).
- Anthropometry, nutritional intake, and nutritional status were examined

Table 2. Energy and nutrient intake (including fortification, without supplements) of vegetarian (VG, $n = 145$), vegan (VN, $n = 110$) and omnivore (OM, $n = 135$) participants of the German VeChi Youth Study ($n = 390$, 6–18 years old) [1].

	VG	VN	OM	Total Model	Pairwise Comparison		
	P50 (P25; P75)	P50 (P25; P75)	P50 (P25; P75)	p [2] [η^2]	VG-VN p [2]	VG-OM p [2]	VN-OM p [2]
Energy (kcal/day)	1708 (1367; 1975)	1634 (1358; 1903)	1737 (1431; 2150)				
(MJ/day)	7.2 (5.7; 8.3)	6.8 (5.7; 8.0)	7.3 (6.0; 9.0	0.9922 [0.0001]	0.9366	0.9922	0.9922
ED (kJ/g) [3]	5.94 (5.11; 7.08)	5.39 (4.68; 6.14)	6.16 (5.26; 7.19)	0.0152 [0.0238]	0.0039	0.6110	0.0512
Macronutrients							
Protein (g/kg BW/day)	1.14 (0.88; 1.53)	1.16 (0.89; 1.67)	1.36 (1.07; 1.74)	0.0011 [0.0386]	0.0180	0.0011	0.5918
Carbohydrates (%E)	54.7 (50.2; 59.3)	56.5 (50.6; 61.2)	49.1 (45.0; 54.6)	0.0002 [0.0679]	0.2994	0.0002	0.0002
Free sugars (%E) [4]	11.6 (8.1; 15.4)	6.6 (4.0; 9.5)	10.5 (7.3; 15.5)	0.0002 [0.0929]	0.0002	0.1789	0.0002
Dietary fibre (g/1000 kcal)	14.7 (12.0; 17.7)	21.9 (18.0; 25.5)	12.0 (10.1; 14.2)	0.0002 [0.2082]	0.0002	0.0006	0.0002
Fat (%E)	32.3 (28.0; 37.8)	29.4 (25.3; 36.6)	36.4 (30.7; 40.6)	0.0037 [0.0316]	0.0368	0.0376	0.0010
SFA (%E)	12.5 (9.9; 15.6)	7.8 (5.9; 10.3)	15.9 (12.9; 18.8)	0.0002 [0.1888]	0.0002	0.0002	0.0002
MUFA (%E)	10.3 (8.7; 12.3)	9.5 (7.6; 13.0)	11.8 (10.2; 14.0)	0.0008 [0.0282]	0.1370	0.0178	0.0022
PUFA (%E)	6.1 (4.7; 7.9)	8.6 (7.0; 10.8)	4.8 (3.9; 6.0)	0.0002 [0.1556]	0.0002	0.0002	0.0002
Vitamins							
Retinol-Equivalents (µg/1000 kcal)	435 (317; 641)	465 (330; 698)	453 (337; 650)	0.2719 [0.0076]	0.9175	0.1116	0.2759
Tocopherol-Equivalents (mg/1000 kcal)	7.2 (5.7; 9.4)	9.6 (7.9; 11.6)	6.0 (4.8; 7.6)	0.0002 [0.0978]	0.0002	0.0015	0.0002
Vitamin C (mg/1000 kcal)	45 (31; 64)	67 (43; 91)	44 (30; 66)	0.0015 [0.0361]	0.0004	0.2731	0.0398
Folate-Equivalents (µg/1000 kcal)	191 (101; 147)	152 (126; 185)	109 (83; 131)	0.0002 [0.0623]	0.0002	0.0768	0.0002
Vitamin B1 (µg/1000 kcal)	440 (360; 558)	605 (497; 700)	465 (413; 560)	0.0002 [0.0927]	0.0002	0.0413	0.0012
Vitamin B2 (µg/1000 kcal)	476 (382; 588)	381 (304; 483)	544 (458; 645)	0.0002 [0.0754]	0.0002	0.0149	0.0002
Vitamin B12 (µg/1000 kcal)	0.6 (0.4; 1.1)	0.1 (0.0; 0.2)	1.6 (1.2; 2.0)	0.0002 [0.2057]		0.0002	
Minerals							
Calcium (mg/1000 kcal)	390 (300; 494)	305 (236; 424)	400 (330; 474)	0.0011 [0.0266]	0.0026	0.9247	0.0182
Magnesium (mg/1000 kcal)	176 (153; 210)	251 (206; 305)	153 (135; 179)	0.0002 [0.2220]	0.0002	0.0216	0.0002
Iron (mg/1000 kcal)	6.8 (5.6; 7.8)	9.2 (7.6; 10.8)	5.7 (5.2; 6.6)	0.0002 [0.1922]	0.0002	0.0099	0.0002
Zinc (mg/1000 kcal)	4.7 (3.9; 5.3)	5.1 (4.3; 6.0)	5.0 (4.4; 5.6)	0.0002 [0.531]	0.0002	0.0137	0.1680

Alexy, U. et al. Nutrients **2021,** 13, 1707.

Safety of a vegan diet? - Children cohort

- Cross-sectional study
- 149 vegetarian, 115 vegan, and 137 omnivorous eating children and adolescents (6-18 yrs, mean age: 12.7 ± 3.9 yrs).
- Anthropometry, nutritional intake, and nutritional status were examined

Results:

- median **calcium intake** of VN was <50% of the reference value (VG: 56%, OM: 67%)
- No significant difference in **25-OH vitamin D3** between diet groups (VN more often supplemented)

Conclusion:

- Importance of dietary calcium sources (+/- fortified foods and drinks; +/- supplementation)

Limitations of study:

- "only" cross-section design
- non-representative population

Alexy, U. et al. Nutrients **2021,** 13, 1707.

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Ca^{++} & Vit D: children studies

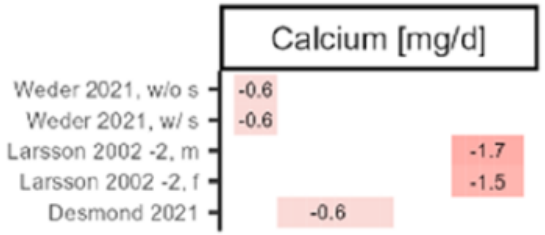
CRITICAL REVIEWS IN FOOD SCIENCE AND NUTRITION
https://doi.org/10.1080/10408398.2023.2263574
Taylor & Francis Group
REVIEW
OPEN ACCESS Check for updates

Health aspects of vegan diets among children and adolescents: a systematic review and meta-analyses

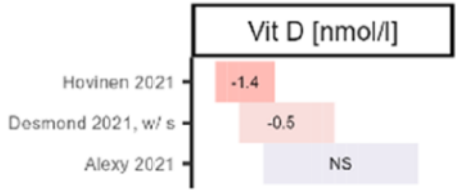
Alina Koller[a], Sabine Rohrmann[b], Maria Wakolbinger[c], Jan Gojda[d], Eliška Selinger[e,f], Monika Cahova[g], Martin Světnička[d,h,i], Sandra Haider[c], Sabrina Schlesinger[j,k], Tilman Kühn[l,m,n,o] and Jeffrey W. Keller[p]

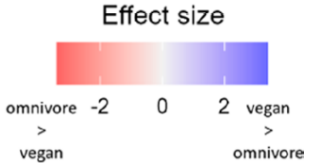
Systematic review to evaluate health outcomes among vegan children and adolescents aged 0 to 18 years. 18 studies included.

Nutrient intake:



Biomarkers:





→ 40% (confidence interval from -64% to 0%) lower calcium intake among vegan children
→ no difference in vitamin D intake
→ Only one study compared bone mineral density (Desmond 2021)

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Bone health: children studies

Growth, body composition, and cardiovascular and nutritional risk of 5- to 10-y-old children consuming vegetarian, vegan, or omnivore diets

Małgorzata A Desmond,[1,2] Jakub G Sobiecki,[2,3] Maciej Jaworski,[4] Paweł Płudowski,[4] Jolanta Antoniewicz,[5] Meghan K Shirley,[6] Simon Eaton,[7] Janusz Książyk,[2] Mario Cortina-Borja,[8] Bianca De Stavola,[8] Mary Fewtrell,[1] and Jonathan CK Wells[1]

- **Objective:** growth, body composition, cardiovascular and nutritional risk factors in vegetarian, vegan or omnivore fed children.
- **Method:** cross-sectional. 5-10 years old (63 vegetarian, 52 vegan, 72 omnivorous)
  measured: Anthropometry, Laboratory parameters, DEXA, Physical activity.

TABLE 3 Crude and adjusted mean differences of vegetarian and vegan children relative to omnivore children in bone, cardiovascular, and body iron status outcomes[1]

Outcome group	Vegetarian Δ (95% CI)	Vegan Δ (95% CI)	Vegetarian Δ (95% CI)	Vegan Δ (95% CI)	Vegetarian Δ (95% CI)	Vegan Δ (95% CI)
Bone status[2]	Model 1[3]		Model 2[4]		Model 3[5]	
TBLH BMC,[6] %	–7.8 (–13.6, –2.1)**	–16.4 (–24.4, –8.4)**	–7.3 (–14.3, –0. 2)*	–15.2 (–25.4, –4.9)**	11 (–1.6, 3.8)	–3.7 (–7.0, –0.4)*
L2–L4 BMC,[6] %	–5.3 (–10.5, 0.0)	–10.5 (–17.1, –3.9)**	–4.6 (–10.5, 1.3)	–9.3 (–17.6, –1.1)*	–0.05 (–4.6, 3.7)	–5.6 (–10.6, –0.5)*
BMAD *z* score	–0.086 (–0.408, 0.237)	–0.652 (–1.052, –0.253)**	–0.056 (–0.465, 0.353)	–0.615 (–1.099, –0.132)*	—	—
	–3.3 (–11.5, 4.9)	–12.6 (–21.8, –3.4)**	–2.2 (–12.5, 8.1)	–11.3 (–22.4, –0.2)*	—	—

- **Conclusion:**

vegan diet had a ***healthier cardiovascular risk profile***, but also with ***increased nutritional risk in*** terms of deficiencies and ***lower bone density and height***. Vegetarians show less pronounced nutritional deficiencies but (unexpectedly) less favorable cardiometabolic risk profiles.

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Desmond MA et al Am J Clin Nutr 2021;113:1565-1577.

Nutrient Intake Ca^{++} and Vit D

nutrients Nutrients 2023, 15, 4341. MDPI

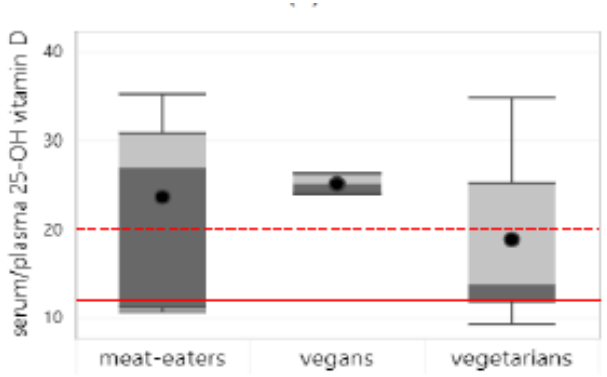
Review

Nutrient Intake and Status in Children and Adolescents Consuming Plant-Based Diets Compared to Meat-Eaters: A Systematic Review

Nicole Neufingerl and Ans Eilander *

Systematic review: nutrient intake and status of children and adolescents (2-18 y); literature search 2000 - 2022. 30 studies included

Results:
- In all diets, risks of inadequate intakes of vitamin D and calcium.



Incl. supplements

cut-off value for Vit D insufficiency (<20 ug/L)

cut-off to indicate Vit deficiency (< 12 ug/l)

Boxplots represent 25th, 50th, and 75th percentiles of mineral intake based on studies that assessed intake from foods only, with whiskers at the <1.5 interquartile range (IQR). Black dots represent mean intake. White dots outliers.

estimated average requirement (EAR) for the age and gender (lowest and highest dietary requirements)

→ Heterogeneity of Ca^{++} supply in studies high (3 out of 5 insufficient intake in VG and VN compared to OM).

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Comment on **national and international and recommendations** (i.e. WHO, ESPGHAN, BLV, ...) for individuals consuming a plant-based diet. Discuss **dietary recommendations, fortified products, dietary supplements**

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ESPGHAN "Complementary feeding" (JPGN 2017)

TABLE 1. Nutrients that may become deficient in different vegetarian and vegan diets

	Type of diet			
	Vegetarian			
Nutrient	Lacto-ovo	Lacto	Ovo	Vegan
Iron	X	x	x	x
Zinc	X	x	x	x
Calcium			x	x
B12			x	x
B2				x
Vitamin D	X	x	x	x
Vitamin A				x
n-3 fats (DHA)	X	x	x	x
Protein	X	x	x	x

DHA = docosahexaenoic acid.

Vegan diets with appropriate supplements can support normal growth and development. Regular medical and dietetic supervision should be given and followed to ensure nutritional adequacy of the diet. The consequences of failing to do this can be severe and include irreversible cognitive impairment and death.

Vegan diets should only be used under appropriate medical or dietetic supervision to ensure that the infant receives a sufficient supply of vitamin B12, vitamin D, iron, zinc, folate, n-3 LCPUFA, protein, and calcium, and that the diet is sufficiently nutrient and energy dense. Parents should understand the serious consequences of failing to follow advice regarding supplementation of the diet.

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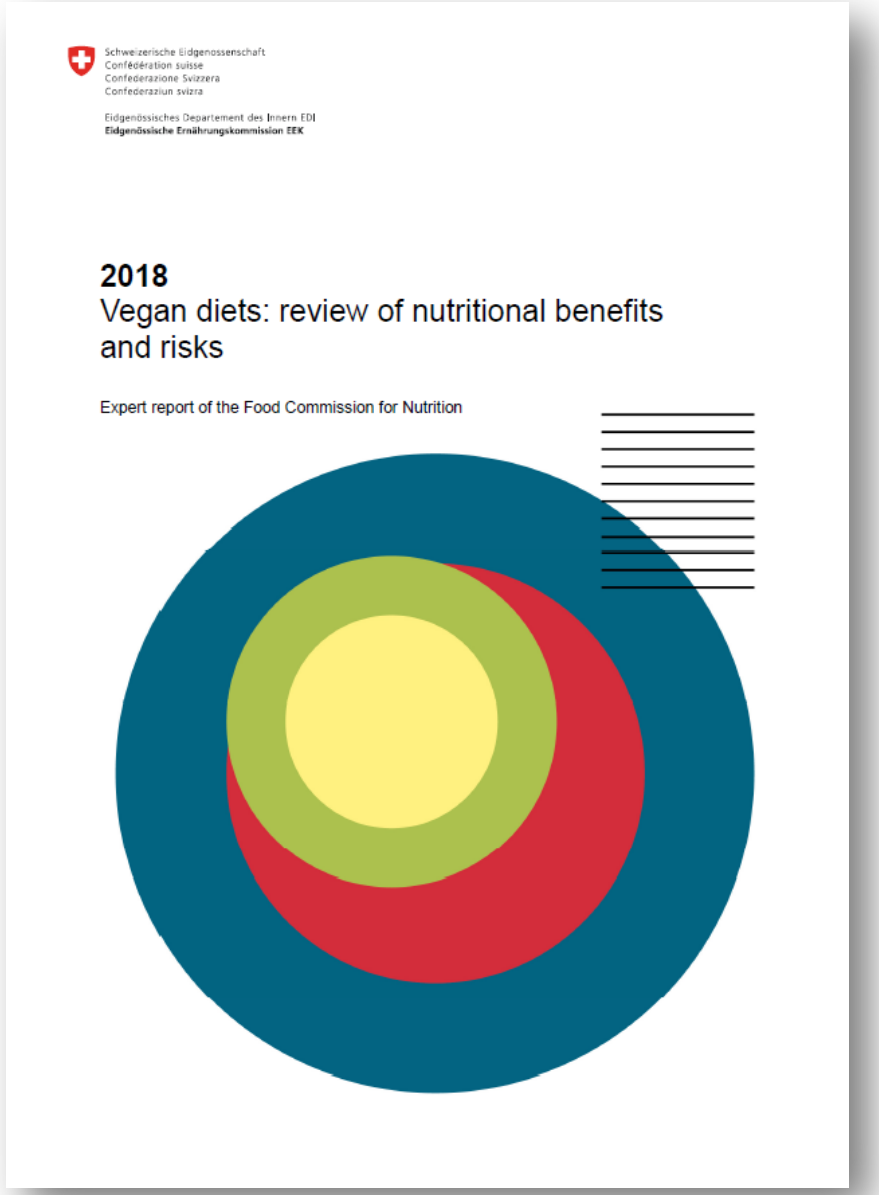
2016 - 2018: Expert report on vegan diet (Switzerland)



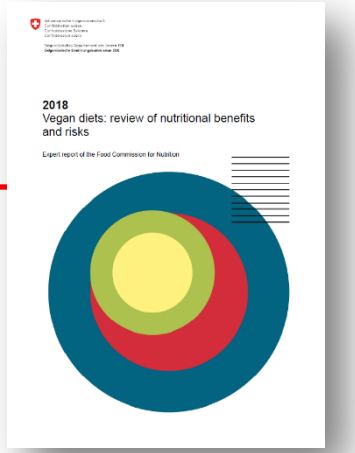
Expert panel including representatives from:

- Medicine
- Food science
- Vegan society
- Ethics

Federal Commission for Nutrition (FCN). Vegan diets: review of nutritional benefits and risks.
Expert report of the FCN. Bern: Federal Food Safety and Veterinary Office, 2018

OSTSCHWEIZER KINDERSPITAL

EEK 2018 recommendation (Switzerland)



- Well-planned and supplemented vegan diets could theoretically meet nutrient requirements cover

- In reality, however, a deficiency of certain nutrients is often widespread

- **Thus in infancy and toddler age vegan diet not recommended**, but ...

- If highly motivated individuals wish to transition to or continue on a vegan diet, they should be indicated to
  - the dietary guidelines,
  - the required supplementation (always Vit B12) and
  - possible monitoring measures recommended

Federal Commission for Nutrition (FCN). Vegan diets: review of nutritional benefits and risks.
Expert report of the FCN. Bern: Federal Food Safety and Veterinary Office, 2018

FCN 2018 recommendation (Switzerland)

Age group	Recommenda-tion	Specific dietary recommendations & supplementations	Testing
Infants	Not recom-mended	Exclusive breast feeding until 6 months Breast fed: according to laboratory analysis, B_{12} supplementation (of mother and infant) Formula-fed: adapted soy-infant formula Solid food • A sufficient supply of protein sources covering all essential amino acids • Energy-dense solid food, containing with ALA-rich oil supplements (linseed, walnut or rapeseed) Supplement • iron (mainly in breast-fed infants after 6 months) • Vitamin K, Vitamin D as for all infants • Vitamin B_{12} • evaluate zinc and iodine intake Dietitian/pediatrician support (diet diary / lab controls)	analysis of vitamin B_{12} * (infant's and mother's blood) consider also zinc, vit D, *Quick*, ferritin, TSH
Toddlers	Not recom-mended	• Check for energy intake (percentiles) developmental milestones and micronu-trient intakes • Limit raw food (lower digestibility, difficult to ingest, caloric density) • Advise about grinding nuts (choking risk)) • Check calcium intake (Ca-supplemented drinks, calcium rich mineral water) • Check iodine supplementation (salt) • Mandatory vitamin B_{12} supplementation • Vitamin D as recommended for all toddlers Dietitian/pediatrician support (based on the analysis of 3-day dietary records / lab controls)	analysis of vitamin B12 * consider also zinc, vit D, Quick, ferritin, TSH

Federal Commission for Nutrition (FCN). Vegan diets: review of nutritional benefits and risks.
Expert report of the FCN. Bern: Federal Food Safety and Veterinary Office, 2018

Focus on health care professionals:

ssp sgp
SWISS SOCIETY OF PAEDIATRICS
Ihre Ärztinnen und Ärzte für Kinder und Jugendliche
Les médecins de vos enfants et adolescents
I medici dei vostri bambini e adolescenti

Handlungsanweisungen vegetarische und vegane Ernährung im Säuglings- und Kleinkindesalter

11.03.2020

Pascal Müller, Karolin Rose, Angelika Hayer, Laetitia-Marie Petit, Josef Laimbacher

Chapters:

- Critical nutrients in a vegetarian or vegan diet and consequences of a poorly controlled vegetarian/vegan diet.
- Practical nutrition principles in vegan diet (with calculated daily examples).
- Necessity of supplements with examples
- Laboratory analyses and their interpretation

https://www.paediatrieschweiz.ch/handlungsanweisungen-vegetarische-vegane-ernaehrung/

OSTSCHWEIZER KINDERSPITAL

Practical recommendation in early childhood

Food group	general recommendation*	supplementary recommendation for a vegan diet
Beverages	7 dl unsweetened beverages	• prefer calcium-rich tap or mineral water (> 300 mg calcium / liter) • when eating a diet high in dietary fiber (from whole grain products, legumes, etc.), make sure to drink enough fluids
Vegetables and fruits	Daily 3 portions of vegetables and 2 portions of fruit	• consider variety (e.g. different varieties, different colors) • preferably one dark green vegetable (e.g. broccoli, pea) daily • Eat iron-rich foods (e.g. whole grains, legumes, soy products) together with vitamin C-rich fruits or vegetables (e.g. peppers, broccoli, citrus fruits)
Starchy foods	3-4 servings daily, prefer whole grains for cereal products	Consider variety

*according to the fact sheet "nutrition for childreen" of the swiss society for nutrition (2019); www.sge-ssn.ch/ich-und-du/download/merkblaetter-und-unterlagen/

OSTSCHWEIZER KINDERSPITAL

Practical recommendation in early childhood

Food group	general recommendation*	supplementary recommendation for a vegan diet
Protein-rich foods	Daily 3-4 portions of milk/products and additionally 1 portion of meat, fish, eggs, tofu, quorn, seitan and other protein-rich foods	• Replace dairy products, meat, fish and eggs with soy products (e.g. calcium-enriched soy drink/yoghurt, tofu, minced meat), chickpeas, lentils and other plant-based protein sources • Consider variety • In addition to (calcium-enriched) soy products, other sources are needed to cover the calcium requirement, e.g. Ca-rich vegetables, Ca-rich water, Ca-enriched foods
Nuts, seeds and kernels	Daily 1 tsp unsalted nuts, seeds and/or kernels in ground form or as a mush	• Larger quantities desirable • consider variety
Oils and fats	Daily 3 tsp of high-quality vegetable oil. In addition, butter, margarine, cream etc. can be used sparingly (approx. 1 tsp)	Prefer vegetable oils with a high content of alpha-linolenic acid (omega-3 fatty acid) such as linseed oil, linseed yolk oil, hemp oil, tree nut oil, rapeseed oil

*according to the fact sheet "nutrition for childreen" of the swiss society for nutrition (2019); www.sge-ssn.ch/ich-und-du/download/merkblaetter-und-unterlagen/

OSTSCHWEIZER KINDERSPITAL

What dietary supplement products are available on the market in Switzerland? What to prescribe?

Vitamin D:

Different (medical) supplements of vitamin D available in Switzerland (Swissmedic listed) as well as food supplements (drops, tablets, capsules).

Vitamin D (Cholecalciferol)[III]	400 IE im 1. LJ 600 IE im 2. und 3. LJ	• ViDe 3 Tropfen (Wild): 1 Trpf enthält 100 IE (nicht vegan) • Dibase 10000 IE (Gebro Pharma): 1 Trpf enthält 200 IE (nicht vegan) enthält 800 IE • Vitamin D3 (Bjökovit): 1 Trpf enthält 800 IE • u.a.

Source: Handlungsempfehlungen, SGP 2020

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What dietary supplement products are available on the market in Switzerland? What to prescribe?

Calcium:

Different products of Calcium available in Switzerland (Swissmedic listed) like sachets, tablets, chewables.

Also in combination with vitamin D3.

Broad range of dietary supplements with Calcium alone, in combination with Vit D3 as well as multi-micronutrient (children-) products.

Conclusion

- **Calcium supply** in a plant-based diet is **often below the recommendation**, whitch is even more critical in **combination with hypovitaminosis D**
- (scarce) date indicate risk of **reduced bone density** in a vegan diet.
- Supply via (fortified) food combinations possible.
- Pay attention to calcium-enriched foods (especially drinks)

- Supplement **vitamin D** with 400 - 600 IU up to 3 years of age, regardless of diet
- Then, depending on the risk constellation (e.g. supplement in winter months)

→ get professional advice and support (dietician, pediatrician)

Thank you for your attention!

OSTSCHWEIZER KINDERSPITAL