

# Micronutrient status and intake in omnivores, vegetarians and vegans

## Project: 429

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**Background:** An increasing number of people living in Switzerland change their dietary habits from an omnivorous into a vegetarian or even vegan diet. Following a diet without meat or even without any animal products may lead to deficiencies of some vitamins, minerals and trace elements. Therefore, such a diet needs to be well-planned and possibly include supplementation of critical micronutrients. The influence of a vegetarian or vegan diet on micronutrient status in healthy adult individuals living in Switzerland has to our knowledge never been assessed using biochemical indicators.

**Objective:** The aim of this study was to provide important data on the vitamin and mineral status of vegetarian and vegan adults living in Switzerland and thereby identify potential health risks due to an inadequate intake of micronutrients in a population avoiding animal source products.

**Method:** A total of 206 healthy adult female and male subjects between the age of 18 and 50 were recruited in the region of Lausanne and Zurich. They were consuming either an omnivorous ( $n_{OV}=100$ ), vegetarian ( $n_{VG}=53$ ) or vegan ( $n_{VN}=53$ ) diet since at least 1 year. Measures of weight and height were taken. Plasma concentration of the vitamins A, C, E, B1, B2, B6, B12, folic acid, pantothenic acid, niacin, biotin and  $\beta$ -carotene as well as Fe, Mg, Zn and urinary iodine status was determined. Dietary intake was assessed by means of a 3-day weighed food record. For the evaluation of the physical activity level and other lifestyle characteristics, questionnaires were used.

**Results:** Micronutrient status and intake differed across the diet groups. The biggest differences usually occurred between omnivores and vegans, with vegetarians showing intermediate values. Omnivores had the lowest intake of Mg, vitamin C, vitamin E, niacin and especially folic acid. They consumed more protein, saturated fatty acids (SFA) and cholesterol but less carbohydrates, polyunsaturated fatty acids (PUFA), sugar and fiber than the other groups. Vegans reported low intakes of Ca and a marginal consumption of vitamin D and vitamin B12. Despite a similar intake of total energy, BMI was significantly lower in vegans as compared to vegetarians and omnivores. In the omnivorous group, the prevalence of folic acid deficiency was as high as 58%. Vegetarians showed the highest prevalence of vitamin B6 and niacin deficiency (58% and 34% respectively). Among vegans, 47% were Zn deficient. In spite of negligible dietary vitamin B12 intakes in vegans, the prevalence of vitamin B12 deficiency was very low in all groups. Fe status indicators were comparable across the diet groups. More vegans (29%) than vegetarians (6%) and omnivores (3%) reported to not drink any alcohol. The groups did not differ regarding tobacco consumption and physical activity level.

**Conclusion:** Even though the groups differed substantially regarding micronutrient status and intake, deficiency prevalence was similar for all assessed minerals and vitamins except Zn, vitamin C, B6, niacin and folic acid. This indicates that vegetarians and vegans living in Switzerland are mostly well informed about nutrition and therefore consume a diversified, well-balanced diet. No matter what dietary pattern is followed, good knowledge and an appropriate behavior are needed in order to benefit from potential positive health consequences and avoid health risks.