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An analysis of vitamin D and calcium intakes of 21st century vegans

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The increased rate of growth in the global population and the environmental cost of the livestock sector may eventually lead to a need for reducing animal product consumption and diverting to more sustainable plant based sources. According to Food and Agriculture Organization of United Nations, 56 billion animals are slaughtered every year for human consumption emitting 18 % of human induced green houses gases (more than the transportation sector) and occupying 26 % of the terrestrial surface for grazing and 33 % of the cultivable land for feed crop production⁽¹⁾. These figures are estimated to double by 2050 to sustain the global population that is expected to reach 9.6 billion.

Veganism, an advocate of animal product exclusion, has the potential to become the “diet of the future” owing to not only its sustainability but also low morbidity and mortality rates⁽²⁾. The biggest nutritional barrier to Veganism is the potential risk of micro-nutrient deficiencies including Vitamin D and Calcium due to the exclusion of the primary food sources. The unsatisfactory vitamin D and Calcium intakes of vegans have been demonstrated by the EPIC-Oxford study conducted between 1993 and 1999⁽³⁾. However, this profile may have changed in the last 16 years due to the significant change of dietary habits and the market expansion of dairy-replacement products that are typically fortified with 0.75ug of vitamin D₂ and 120 mg of Calcium per 100 g. The aim of this study was to collect up-to-date dietary information from vegans and investigate changes in the dietary intakes with a specific focus on Vitamin D and Calcium.

Participants were recruited by advertising the study through online vegan societies and University of Surrey. 18 vegans (3 males and 15 females) aged 19–56 were eligible for the study by meeting all the set criteria: A minimum age of 18, exclusion of all meat, fish, dairy products and eggs for at least 3 months prior to the start of the study and a reported healthy profile. Participants were sent a personal lifestyle questionnaire to collect information on age, anthropometric profile and use of dietary supplements. Dietary analysis was carried out using a validated Food Frequency Questionnaire and a 3-day food diary. Food companies were contacted regarding vitamin D and calcium contents of their products where needed.

The mean vitamin D and Calcium intakes from all sources were 8.5 ug/day (95 % CI 2.5, 14.8) and 666.2 mg/day (95 % CI 391.0, 941.8) respectively. These values were both higher than what was previously observed in the EPIC study (0.7ug/day (95 % CI 0.6, 0.8) and 557 mg/day respectively). When supplemental intake was excluded, the vitamin D intake declined to 2.5ug/day (95 % CI 1.4, 3.6). Only 16.7 % of the participants achieved the recommended amount daily vitamin D intake (10ug/day). None of the participants achieved sufficient vitamin D intakes based on dietary sources only. Plant milks had the highest percentage contribution to the daily vitamin D and Calcium intakes of vegans.

Based on this small pilot study the mean vitamin D intake of vegans appears to have increased substantially by almost 12 fold in the last 16 years. This increase remained substantial even without dietary supplements indicating the impact of food fortification. However, despite this increase, none of the participants maintained a sufficient vitamin D intake based on dietary sources, reinforcing that the current vegan diets are not able to satisfy sufficient vitamin D intakes. The number of participants with satisfactory vitamin D intakes remained low even with supplemental intake. Considering that insufficient vitamin D intake is a concern for not only vegans but also for the general population in UK, strategies to increase vitamin D intake should be considered such as increased food fortification. Meanwhile vegans should be encouraged to take dietary supplements to counteract for the identified insufficient intakes.

(1) Steinfeld *et al.* (2006). *Food and Agriculture Organization of the United Nations*.

(2) Timothy *et al.* (2006). *Proceedings of the Nutrition Society*, 65(1):35–41.

(3) Crowe, Steur, Allen, Appleby, Travis, Key (2011). *Public Health Nutr* 14(02):340–346.