European Commission

ODIN | FOOD-BASED SOLUTIONS FOR OPTIMAL VITAMIN D NUTRITION AND HEALTH THROUGH THE LIFE CYCLE

New data on Vitamin D from the ODIN Project

Food-based solutions for optimal vitamin D nutrition and health through the life cycle

Short summary of the Symposium of 3rd of March 2016 in Brussels

Research and Innovation

1. WHO IS AT RISK OF VITAMIN D DEFICIENCY? AND WHY?

Vitamin D is supplied to the body by its production in the skin on exposure to ultraviolet B (UVB) sun light of sufficient strength, and also dietary supply. Vitamin D deficiency will be most evident during winter. Much of Europe will experience a 'vitamin D winter' during which the strength of ultraviolet B (UVB) light from the sun will be too weak to allow for vitamin D to be synthesised in the skin for typically about 4 to 6 months of the year. If dietary vitamin D is sufficiently high, this will protect against low vitamin D status during winter, but for many in Europe intakes are relatively low. For those who have limited sun exposure during summertime, again especially if coupled with low intakes, the risk of vitamin D deficiency is also increased. There are certain sub-groups of the general healthy population who have higher risk of vitamin D deficiency and these include in particular people of dark-skin types (as melanin in skin reduces the penetration of UVB and thus contributes to lower vitamin D status). Breastfed babies not receiving vitamin D supplements, teenagers, pregnant women and the elderly (especially if not taking vitamin D supplements) have been shown to have lower vitamin D status than other age-groups within the population.

2. WHAT ARE THE TYPICAL SYMPTOMS OF VITAMIN D DEFICIENCY?

Vitamin D deficiency is when the amount in blood drops below accepted levels. This will be silent in many cases as it requires a blood test to confirm its presence (see question 3). Serious and sustained vitamin D deficiency can lead to rickets in children and osteomalacia in adults, and these metabolic bone diseases cause pain and disability. Vitamin D deficiency (even more moderate deficiency) has been linked to increased risk of various other chronic non-skeletal diseases, such as cardiovascular disease, diabetes and certain cancers, amongst others. It is important to note, however, the role of vitamin D in the causation of these non-skeletal diseases needs to be substantiated fully. ODIN is investigating the role of vitamin D in some of these non-skeletal health outcomes in early and later life to help address some of this uncertainty.

3. HOW CAN WE MEASURE EASILY THE VITAMIN D LEVEL IN OUR BODY?

The only way to assess a person's vitamin D status is by a blood test in which the level of a key metabolite of vitamin D, 25-hydroxyvitamin D, will be measured. The level of 25-hydroxyvitamin D in blood will indicate whether a person has vitamin D deficiency, inadequate vitamin D status or sufficient vitamin D status. Measurement of circulating 25-hydroxyvitamin D levels is the best test of vitamin D status as it reflects vitamin D produced in the skin on exposure to summer sunshine and that obtained from food and supplements.

4. WHAT ARE THE BEST SOURCES OF VITAMIN D IN FOOD?

Very few foods in nature contain high levels of vitamin D. The flesh of fatty fish (such as salmon, tuna, and mackerel) and fish liver oils are among the best sources. Smaller amounts of vitamin D are found in egg yolks and meat. Some foods can have vitamin D added, such as certain milks, margarine, breakfast cereals, breads and others. These vitamin D fortified foods will have labelling to indicate that vitamin D is added.

5. WHAT ARE THE RECOMMENDED DIETARY INTAKES FOR VITAMIN D ?

The Institute of Medicine in the United States suggests that the average person needs 10 µg of vitamin D each day. Some people will need as high as 15 to 20 µg of vitamin D. The relevant expert authorities in the UK and Nordic region recommend 10 µg of vitamin D each day. All of these recommended intakes have been established with a view to protecting the bone health of the population. ODIN will over the next 12 months also provide new information on what the recommended dietary intake for vitamin D for children, teenagers, pregnant women and dark-skinned ethic groups. These subgroups are covered in the current recommendations but have been based on very limited experimental data up to now.

6. WHAT ARE THE NEWEST FINDINGS OF ODIN IN RESPECT TO VITAMIN D STATUS AND INTAKE?

ODIN has just reported that based on the most complete analysis of vitamin D status of European populations, 1 in 8 citizens have circulating levels of 25-hydroxyvitamin D which are indicative of vitamin D deficiency (i.e., less than 30 nmol/L), and that 40% of Europeans do not have levels that may be required to maintain good bone health (i.e., less than 50 nmol/L). The project has also shown that prevalence of vitamin D deficiency may be as high as a quarter to two-thirds of dark-skinned individuals in certain European countries, much higher than their white counterparts in the same countries and highlighting these as particular at-risk groups. ODIN has shown that the average vitamin D intakes in the majority of European populations are not reaching 10 µg of vitamin D per day, which undoubtedly contributes to the observed low vitamin D status. To address this, ODIN has worked on developing and providing proof that certain food-based strategies, in which additional vitamin D is incorporated into specific foods, can boost vitamin D intakes and improve status.

7. HOW MUCH DO THEY DEFER FROM WHAT WAS ALREADY KNOWN?

The new ODIN data on vitamin D status in Europe is landmark as it is based on standardized data for serum 25-hydroxyvitamin D for 55,844 European children, adolescents, adults and older adults, ranging from as southerly as Crete to northerly as northern Norway. This was achieved by drawing together 14 existing population studies and standardized data for serum

25-hydroxyvitamin D as the cornerstone of the work. This provides the first firm results on prevalence of vitamin D deficiency in Europe and critically which highlight that 1 in 8 are deficient. The use of standardized data allows for a much better estimate of prevalence and also for comparisons across countries because it minimises the impact of these different studies having used different methods for measuring vitamin D status.

Likewise ODIN has used a standardized approach to assessment of vitamin D intake in various European national nutrition surveys, again providing for a much better estimate of intakes and the degree of inadequacy of vitamin D intakes in Europe.

ODIN has provided key new data from animal feeding studies as well as dietary intervention studies with healthy individuals on the role of food-based solutions for increasing vitamin D intakes and lowering prevalence of deficiency. Such foods range from bread made from UV yeast, UV-exposed edible mushrooms, vitamin D-fortified low-fat cheese, and also meat (beef & pork), eggs and framed fish all of which have higher contents of vitamin D due to inclusion of higher levels in the feedstuffs for the animals and fish, a process known as 'bio-addition' or 'bio-fortification' with vitamin D. The latest findings can be viewed on the ODIN website: www.odin-vitd.eu/

8. IS THERE A RISK OF OVERDOSE OF VITAMIN D?

Like with most nutrients, there is risk associated with overconsumption of vitamin D. Too high an intake of vitamin D can cause an increase in blood calcium levels (known as hypercalcaemia) which can cause tissue calcification and damage, if left unchecked. To protect the European population the European Food Safety Agency (EFSA) have set Tolerable Upper Intake Levels (ULs) of vitamin D (i.e., intake levels not to be exceeded): 100 µg/day for adults (including pregnant and lactating women) and adolescents (aged 11-17 years), 50 µg/day for children (aged 1-10 years; taking into account their smaller body size) and for infants, the UL of 25 µg/day. EFSA and ODIN data on vitamin D intakes from surveys in European countries indicate that intakes in high consumers are below the ULs for vitamin D for all population groups. Vitamin D intake modeling work within ODIN to test the impact of the food-based solutions for vitamin D uses these ULs as a safety guide to ensure the strategies developed for tackling vitamin D deficiency are both effective, but also of paramount importance are safe. ODIN data suggests that the likelihood of exceeding the UL relates more to consumption of high dose vitamin D supplements (i.e., those with 50 µg/day of more) than from just food alone, even foods in which vitamin D is added.