DEPARTMENT OF HEALTH

memo

DATE: **March 2, 2022**

TO: **WIC Coordinators and Local Agency Staff**

FROM: **Carole Kelnhofer, WIC Training Coordinator**

SUBJECT: **Vitamin D- Topic of the Month**

Vitamin D has been a hot topic in nutrition for many years. The important role vitamin D plays in calcium absorption, immune function, and bone and heart health are just some of the known benefits. Vitamin D (calciferol) is a fat-soluble vitamin and acts as a hormone to support many functions in the body. Vitamin D can be found in certain foods and in supplements and is also produced naturally as a result of sunlight reaching the skin.

What does vitamin D do in the body?

When vitamin D enters the body, it must go through a biological process called hydroxylation to be utilized by the body. Hydroxylation is a two-step process that occurs first in the liver, converting vitamin D to 25-hydroxyvitamin D (calcidiol) and finally in the kidneys, where it becomes the active form 1,25-dihydroxyvitamin D (calcitriol). Once activated, the vitamin D can get to work in the body.

Some of the many functions of vitamin D:

- Promote calcium and phosphorus absorption
- Support bone growth and remodeling
- Reduce risk of rickets (in children) and osteomalacia/osteoporosis (in adults)
- Promote cell growth and neuromuscular repair
- Reduce inflammation
- Support immune function
- Enhance glucose metabolism

Sources of Vitamin D

Very few foods contain vitamin D naturally, although some foods are fortified with the vitamin. Vitamin D supplements can be found in two forms, vitamin D_2 (ergocalciferol- plant based) and vitamin D_3 (cholecalciferol- fish based). Vitamin D_3 is also the form produced in the body when ultraviolet rays (UVB) penetrate the skin. While both types may raise vitamin D levels in the body, vitamin D_3 has been found to be more effective at increasing and maintaining levels. For this reason, many fortified products and supplements contain vitamin D_3.

Common sources of vitamin D:

- Sunlight – depending on the time of day, season of the year and latitude

- Fatty Fish (ex: trout, salmon, tuna, sardines)
- Egg Yolk
- Fortified Foods (ex: milk, soy beverage, breakfast cereals, and orange juice)
- Dietary Supplements

Since vitamin D is a fat-soluble vitamin, there are limits to daily intake. Fat-soluble vitamins are stored in the liver and adipose tissue for long periods of time, so high dosages can lead to toxicity. Generally, eating a healthy diet would not put an individual at risk for these higher levels; however, caution should be taken when it comes to supplements. Read below for the recommended dietary allowance (RDA) for vitamin D.

Recommended Daily Allowance

Recommended intake of vitamin D (along with other vitamins), has been established by an expert committee of The National Academies of Science, Engineering, Medicine (NASEM). The RDAs are set based on the average daily intake that is sufficient to meet nutrient requirements for healthy individuals. In the table below you will see the RDAs for vitamin D.

Age	Individual	Pregnancy	Lactation	Tolerable Upper Intake Levels (ULs)
0-6 months **7-12 months**	400 IU 400 IU			1,000 IU 1,500 IU
1-3 years **4-8 years**	600 IU 600 IU			2,500 IU 3,000 IU
9-18 years	600 IU	600 IU	600 IU	4,000 IU
19-70 years	600 IU	600 IU	600 IU	4,000 IU
>70 years	800 IU			4,000 IU

Source: Vitamin D, *National Institute of Health (NIH), Office of Dietary Supplements, 2021*

Who is at risk for deficiency?

Vitamin D deficiency has become more common with a high amount of indoor screen time, a decrease in outdoor activity, and an increase in sunscreen usage. Additionally, at higher latitudes there is decreased UVB reaching the earth's surface. This is especially evident in the winter months. In Minnesota, decreased UVB rays between October and April limits the ability to produce vitamin D through sun exposure.

It is important to note that although sunlight can be a vitamin D source, the American Academy of Pediatrics (AAP) strongly recommends that all children be kept out of direct sunlight as much as possible, and that they wear sunscreen to limit long term sun exposure which could lead to skin cancer. Shade and adequate clothing are generally recommended for infants rather than sunscreen, especially for those less than 6 months of age.

The following factors increase the risk of deficiency:

- Darker skin pigment
- Limited sun exposure or wearing full clothing covering the skin
- Living at higher latitudes
- Those with certain medical conditions (ex: fat malabsorption syndrome or inflammatory bowel disease)
- Those on certain medications (ex: some weight-loss medications, diuretics, statins, and steroids)
- Those following a strict vegan diet
- Exclusively breast/chestfed infants
- Certain gastric bypass surgeries
- Obesity

A vitamin D deficiency can lead to rickets, bone loss, muscle weakness/pain, fatigue, lower immune status, developmental delays, and in some cases depression, as well as subclinical effects. Additionally, a recent systematic review Vitamin D Status and SARS-CoV-2 Infection and COVID-19 Clinical Outcomes found that patients with a vitamin D deficiency had a greater susceptibility to SARS-CoV-2 infections along with increased risk of hospital admission and mortality.

Testing vitamin D levels

Testing vitamin D status may be completed by a healthcare provider. This is done by measuring blood serum levels and is reported in both nanomoles per liter (nmol/L) and nanograms per milliliter (ng/mL). An adequate level is thought to be greater than or equal to 50 nmol/L (20 ng/mL) and less than 125 nmol/L (50 ng/mL).

If a participant had levels under 50 nmol/L, it would be considered inadequate, with a level **under 30 nmol/L (12 ng/mL) associated with a deficiency**. A participant that is found to be deficient in vitamin D will likely receive an individualized treatment plan by their healthcare provider.

What do participants need to know?

Participants need to know the evidence-based information that supports their informed decision-making process when choosing supplements and foods for themselves and their family. You may choose to share with participants the benefits of vitamin D and its sources, especially for those at highest risk, such as infants.

It may also be helpful to let participants know which WIC foods will help with their daily intake. The Getting More Vitamin D education card is a great tool to reinforce all that you have shared, and participants may use it as a resource when speaking to their healthcare provider.

Tips for participants

- **Few foods are rich in vitamin D:** Most Americans are not able to eat enough vitamin D rich foods for their daily needs. Be attentive to include foods fortified with vitamin D such as WIC allowed milk and fortified soy beverage. Other dairy products such as cheese and some yogurts often do not contain vitamin D.
- **Milk alone cannot meet a child's vitamin D needs:** The RDA for children is 600 IU and it would take more than the recommended limit of 16 oz of milk to meet vitamin D needs. The American Academy of Pediatrics (AAP) recommends that children who are ingesting less than 32 oz. (1 quart) per day of vitamin D-fortified milk should receive a vitamin D supplement of 400 IU/day. That supplemental vitamin D, plus the 200 IU in 2 cups of WIC milk each day, will provide 600 IU RDA.
- **Infants need vitamin D:** Breastfed infants can get it through vitamin supplementation since breastmilk contains only small amounts. Formula is fortified with vitamin D but does not provide enough until the infant is taking 32 oz. **The AAP recommends 400 IU vitamin D supplementation for all infants consuming less than 32 oz. formula per day.**
- **Get the kids involved**: Talk to your kids about vitamin D and other important nutrients. Share with them foods that help their bodies grow and support their development.
- **Ask your healthcare provider**: Ask your healthcare provider which vitamin D supplement is best for each member of your family. **Medical Assistance covers the cost of vitamin supplements for pregnant women and children to age 18 with a doctor's prescription.**

NOTE: Encourage participants to discuss and disclose any supplements and medications they are taking with their healthcare provider, to determine if there are any potential interactions.

Having the conversation about supplementation

With discussing supplementation, it is best to remember our scope of practice at WIC. We may offer education and information regarding supplementation, but we must not "prescribe" a supplement to a participant.

When providing education surrounding any topic, one technique that may be used is Explore-Offer-Explore Sandwich Technique. Below we will take a look at some phrases that can be used with this technique.

The CPA can **explore** the participant's interest level in learning about vitamin D by an asking open-ended question such as:

- "*What have you heard about vitamin D*?"
- "*Tell me what your healthcare provider has told you about vitamin D?*"
- "*What would you like to know about vitamin D?"*

This may be followed up with asking permission to **offer** what you have learned about vitamin D. If the participant is open, share a few of the evidence-based facts shared in this article.

- "*Can I share with you some information I have learned about vitamin D*?"
- "*The Academy of Pediatrics has recommendations on vitamin D that some parents have found to be helpful. Would you be interested in hearing more?"*

Once you have shared some facts and recommendations about vitamin D, **explore** how the participant feels about the information.

- *"What do you think about the information I have shared?"*
- *"Tell me what you think about these recommendations?"*
- *"In what way does this information apply to you?"*

Use reflective listening to check your understanding of what the participant tells you and to explore next steps.

- "*It seems like vitamin D supplements is something you are interested in trying. What steps might you take to choose the one that is right for you?"*
- *"You are thinking you would like to begin vitamin D supplementation and plan to ask your healthcare provider which one is best for you. Is that correct?"*

The intent is to allow the participant to decide how best to use the information that you have shared to make change as needed.

NOTE: If a participant asks you for a specific vitamin recommendation, encourage them to speak to their healthcare provider.

Continue to share topic suggestions with Carole.Kelnhofer@state.mn.us.

Other Resources for Staff:

Vitamin D and your health: Breaking old rules, raising new hope (Harvard Health Publishing, September 13, 2021)

Vitamin D in Children: Can We Do Better? (Pediatrics, June 2020)

Vitamin D and Bone Health (Today's Dietitian, April 2018)

Fat-Soluble Vitamins: A, D, E, and K – 9.315 (Colorado State University Extension, September 2017)

Reference- Complete Listing of Hyperlinks:

Vitamin D (https://ods.od.nih.gov/factsheets/VitaminD-HealthProfessional/)

Vitamin D Status and SARS-CoV-2 Infection and COVID-19 Clinical Outcomes (https://www.frontiersin.org/articles/10.3389/fpubh.2021.736665/full)

Getting More Vitamin D (https://www.health.state.mn.us/docs/people/wic/nutrition/english/genvitamind.pdf)

The National Academies of Science, Engineering, Medicine (https://www.nationalacademies.org/)

Explore-Offer-Explore Sandwich Technique (https://www.oregon.gov/oha/ph/HealthyPeopleFamilies/wic/Documents/orwl/explore_offer_explore.pdf)

Vitamin D and your health: Breaking old rules, raising new hope (https://www.health.harvard.edu/staying-healthy/vitamin-d-and-your-health-breaking-old-rules-raising-new-hopes)

Vitamin D in Children: Can We Do Better? (https://publications.aap.org/pediatrics/article/145/6/e20200504/76922/Vitamin-D-in-Children-Can-We-Do-Better)

Vitamin D and Bone Health (https://www.todaysdietitian.com/newarchives/0418p42.shtml)

Fat-Soluble Vitamins: A, D, E, and K – 9.315 (https://extension.colostate.edu/topic-areas/nutrition-food-safety-health/fat-soluble-vitamins-a-d-e-and-k-9-315/)

Minnesota Department of Health - WIC Program, 85 E 7th Place, PO BOX 64882, ST PAUL MN 55164-0882; 1-800-657-3942, health.wic@state.mn.us, www.health.state.mn.us; to obtain this information in a different format, call: 1-800-657-3942.

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