State of Alaska Epidemiology Bulletin

Department of Health and Social Services
Adam Crum, MSPH, Commissioner
Anne Zink, MD, Chief Medical Officer

Division of Public Health
Heidi Hedberg, Director

Editors:
Joe McLaughlin, MD, MPH
Louisa Castrodale, DVM, MPH

3601 C Street, Suite 540
Anchorage, Alaska 99503 http://dhss.alaska.gov/dph/Epi

Local (907) 269-8000
24 Hour Emergency (800) 478-0084

Bulletin No. 21 November 30, 2021

Update on Prevention of Rickets in Alaska Children

Background

During 1999–2013, rickets was more common among Alaska Native children than among children in the general US population.[1] One possible reason for this disparity was declining maternal dietary intake of vitamin D-containing foods like salmon.[2] In 2016, the Yukon Kuskokwim Health Corporation (YKHC) started routine prenatal vitamin D supplementation of pregnant women with 1,000 IU of vitamin D in addition to routine prenatal vitamins. In 2018, the Alaska Vitamin D Workgroup published Alaska-specific recommendations for vitamin D supplementation in infants and pregnant women (Table).[3] This *Bulletin* presents findings from a study evaluating the impact of routine YKHC prenatal vitamin D supplementation on 25(OH)D concentrations, a survey of knowledge, attitudes and behaviors regarding supplementation, and an update on rickets cases in Alaska Native children.

Table. Alaska Vitamin D Workgroup Recommendations for Vitamin D Intake and Supplementation[3]

Population		Dietary Intake/ Supplementation	Screening
Infants (0–12 months)	Exclusively or partially breast-fed	Supplement with 800 IU/day D-Drops	Not routinely recommended
	Exclusively formula-fed	Supplement with 400 IU/day D-Drops in addition to 400 IU/Liter in formula	
Pregnant Women		Supplement with 1,000 IU/day in addition to daily prenatal vitamin containing 400 IU/day (not to exceed 4,000 IU/day)	Not routinely recommended
Children		Follow National Academy of Medicine[5] diet/supplementation intake recommendation of 600 IU/day	Not routinely recommended

Methods

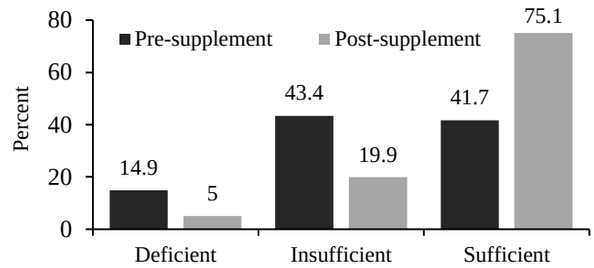
We compared 25-hydroxyvitamin D (25(OH)D) concentrations in Yukon Kuskokwim (YK) Delta prenatal women from 2015–2016 (pre-supplementation) with those from 2017–2019 (post-supplementation). YKHC conducted a web-based survey to evaluate knowledge, attitudes, and behaviors about vitamin D supplementation among YK Delta residents. We also reviewed the incidence of childhood rickets (ICD9, ICD10) diagnosed in Alaska Native children aged <10 years at the Alaska Native Medical Center (ANMC) during 2001–2021.

Results

Of the 1,522 prenatal women in the study, 175 (11.5%) were from the pre-supplementation period and 1,347 (88.5%) were from the post-supplementation period. All were evaluated during late pregnancy (>20 weeks gestation). The mean 25(OH)D concentrations increased by 36.5% (from 20.0 ng/ml pre-supplementation to 27.3 ng/ml post-supplementation; p<0.0001) during the study period. The proportion of women with deficient (<12 ng/ml) and insufficient (12 ng/ml-<20 ng/ml) 25(OH)D concentrations decreased by 66.4% and 54.1%, respectively (p<0.0001; Figure).

The late pregnancy mean 25(OH)D level was 35.9 ng/mL for women with >120 days of vitamin D refills versus 25.4 ng/mL for women with 0 days of refills (Kruskal-Wallis Test: Chi-Square 69.16, DF 4, p<0.0001).

Figure. Vitamin D Status Pre-Supplementation (2015–2016) and Post-Supplementation (2017–2019) among Prenatal Women in the Yukon Kuskokwim Delta Region



Overall, 95 YK Delta residents completed surveys, including 36 (34%) pregnant women, 27 (28%) YKHC employees, 17 (18%) mothers, and 25 (27%) health care providers (more than one response possible). Most respondents (86, 91%) said it was important for pregnant women to take daily vitamin D supplements. Sixty-one (64%) stated that they already knew about prenatal and infant supplementation recommendations. Of these, 31 (51%) had heard from their prenatal provider, 22 (36%) had heard from another provider, and <10% each reported hearing from another source (e.g., pharmacy, WIC flyer). Of the 36 pregnant women who completed the survey, 33 (92%) reported taking daily/near daily vitamin D supplements. Of 32 parents of infants completing the survey, 13 (41%) reported giving their infant daily or near daily vitamin D drops. The incidence of childhood rickets diagnosed in AN children aged <10 years at ANMC decreased 49% from 4.88 cases per 100,000 children during 2001–2016 to 2.51 cases per 100,000 children during 2017–2020.

Discussion

During the study period, 25(OH)D levels increased by 36.5% among prenatal women in the YK Delta after initiation of routine prenatal supplementation with 1,000 IU of vitamin D in addition to routine prenatal vitamins. Moreover, the proportion of prenatal women with deficient 25(OH)D levels decreased by 66.4%. Receiving >120 days of refills (vs. no refills) was also associated with higher vitamin D levels in this population of prenatal women. Awareness of the importance of vitamin D supplementation among pregnant women and infants was high among survey respondents. However, while 92% of pregnant women who responded reported routinely taking vitamin D supplements, only 41% of mothers reported routinely giving their infant vitamin D drops. Finally, the incidence of childhood rickets diagnosed at ANMC appears to be decreasing.

The results of this report provide additional evidence in support of the Alaska Vitamin D Workgroup Recommendations for vitamin D intake and supplementation (Table).[3] Clinicians should educate prenatal women and parents about these recommendations in conjunction with promoting healthy dietary sources of vitamin D.[3]

References

1. Singleton R, et al. Rickets and vitamin D deficiency in Alaska Native children. *J Pediatr Endocr Metab* 2015;28;815–23.
2. O'Brien D, et al. Declines in traditional marine food intake and vitamin D levels from the 1960s to present. *Public Health Nutr* 2016;1–8.
3. Alaska Epidemiology *Recommendations and Reports*. "Vitamin D Supplementation and Screening for the Prevention of Rickets and Osteomalacia in Alaska." Vol. 20. No. 4, September 12, 2018.
4. American College of Obstetricians and Gynecologists. Committee Opinion No. 495: Vitamin D: Screening and supplementation during pregnancy. *Obstet Gynecol* 2011;118:197–8.
5. Institute of Medicine 2011 Dietary reference intakes for calcium and vitamin D. Washington, DC: The National Academies Press.

(Contributed by: Rosalyn Singleton, MD, Rachel Lescher, MD, Timothy Thomas, MD, Gretchen Day, MPH, Alaska Native Tribal Health Consortium; Ken Thummel, PhD, U. Washington; Leanne Ward, MD, U. Ottawa; Joseph Klejka, MD, Christine Desnoyers, David Compton, MD, Yukon Kuskokwim Health Corporation.)