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Case Report: Severe Hypercalcemia after Neonatal Exposure to Vitamin D, Underappreciated Risk of Dietary Supplements

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Abstract: **Vitamin D supplements are frequently introduced in infants according to medical guidelines. However, an overdose of vitamin D can lead to life-threatening hypercalcemia. We report the case of a 3-month-old infant with severe hypercalcemia. After asking the parents for details, an error in the use of vitamin D was identified. Indeed, the parents followed the advice of their midwives. They replaced the prescribed vitamin D drug with a different strength and dosage supplement without the necessary dose conversion. In fact, there are many medications and supplements that contain vitamin D, which provide a variety of concentrations and units of measurement. This case highlights the central role of therapeutic education. In general, it is necessary to harmonize the regulation and labeling of dietary supplements and drugs containing vitamin D.**

Keywords: **vitamin D, overdose, intoxication, dietary supplement, hypercalcemia, pharmacovigilance, misuse, case report.**

I. INTRODUCTION

Vitamin D is a fat-soluble hormone that is synthesized endogenously or from external vitamin sources. Vitamin D performs pleiotropic functions (1, 2), mainly in relation to phosphorus-calcium and bone homeostasis, which is crucial in the newborn (3). French Agency for Food, Environment and Labor Santé & Food Safety (ANSES) (4) and the European Food Safety Authority (EFSA) have reviewed the Nutritional Guideline for vitamin D. As an Adequate Intake (AI) for infants < 6 months corresponds to 10 µg or 400 IU per day. In this context, as recommended in the recommendations, vitamin D supplementation in newborns is started systematically under medical supervision (5).

The Institute of Medicine (IOM) and EFSA have also established upper tolerable limits (UL) of vitamin D based on age (6, 7), although the acute toxicity threshold is not yet clear (3).

Based on a risk of growth retardation and hypercalcemia of, the UL of vitamin D for children is < 6 months is 25 mcg or 1000 IU per day (4, 7, 8). We present a case of vitamin D overdose in a child caused by improper substitution of a dietary supplement for a prescribed dietary supplement.

II. CASE DESCRIPTION

in August 2020, a 3-month-old infant was referred to the and 5 days of amenorrhea), he was born at term, weighing 2. 3 kg. At the time of admission, the infant weighted 4. 5 kg. Blood pressure was later reassessed several times, Clinical examination was unremarkable except a global < 20 mmol/L for a kaliuresis of 33 mmol/L, suggestive of as well as lumbar puncture results were all negative. puncture had been performed because the infant presented with global hypotonia and severe behavioral changes, in the absence after admission, an abdominal ultrasound confirmed 3 days later revealed some

deposits in the bladder, which were deemed clinically not significant. 3 days later as no inflammatory syndrome nor bacteria in infant milk and intravenous hydration. Calcemia was assessed for the first time 12 days after admission to hospital and was at 3. 08 mmol/L (normal values: 2. 15–2.55 mmol/L) with an albuminemia of 41 g/L (normal of quantification (normal values: 18–88 ng/L), whereas calcidiol was above the upper limit of quantification (normal values: 30–400 ng/mL) and calcitriol was 200 pg/mL (normal value < Phosphate was 1. 8 mmol/L (normal values: 1. 6–2. 4 Serum creatinine was 23 µmol/L (normal values: 15– 37 µmol/L) while urea was 2. 3 mmol/L (normal values: 1. 8–6. 4 Urinary calcium was 2. 75 mmol/L with a creatininuria of 1 mmol/L. of 1 mmol/L. of 1 mmol/L.Electrocardiogram was normal and no arrhythmia was The infant was kept hydrated and calcemia progressively decreased to reach 2. 78 mmol/L in a close monitoring of his calcemia recommended. follow-up consultation, 2 weeks later, calcemia was 2. 6 mmol/L was clinically asymptomatic. Renal ultrasound was suggestive of overdose of vitamin D was identified. recommended daily dose for breastfed newborn, the maternity medical staff initially had prescribed 4–5 drops per day of , a brand name containing cholecalciferol dosed at 10,000 International Unit (IU)/mL, one drop containing 300 IU of vitamin D (9). Once at home, a caring midwife suggested to the parents to replace the initially prescribed vitamin D supplementation by a so-called “natural” vitamin D-based drugs including vitamin D may contain endocrine disrupters, as well as preservatives, and believed that “natural” vitamin D, The midwife suggested several DS, available on the Internet, parents to maintain “the same dose” as the one initially prescribed Thereupon, the parents bought on the Internet the DS Sunday brand of D3 10,000 IU (+ vitamin K2). is deemed to contain 10,000 IU per drop (and not per mL), and the manufacturer’s recommendation consists of one drop every 10 days. every 10 days. However, as initially prescribed with ZymaD 4–5 drops per day were administered. Exposed the infant to 40,000–50,000 IU per day, which represents exposition conducted to a symptomatic severe vitamin D overdose, with a 15-day hospital stay and potential sequelae such.

III. DISCUSSION

This case highlights the pivotal role of health practitioners in limiting the risk of drug and dietary supplement misuse, even for specific domains, blurred frontiers between recommended use and potentially harmful errors may lead to serious health hazards. considering the current hype surrounding vitamin D. Vitamin D overdose is suspected when hypercalcemia coexists infant likely presented severe symptomatic hypercalcemia, as hospitalization. week of hospitalization. preventing diagnostic delay and unwarranted investigations. Vitamin D Intoxication in an Infant Acute intoxication with calcitriol lasts a few days only, because of its short half-life.its transport binding protein, hence a circulating half-life of 2–3 Therefore, intoxication with calcidiol can last for months. Vitamin D intoxications have been reported in patients consuming large doses of vitamin D-containing supplements, either voluntarily or as medication and dietary supplement errors. packaging and formulations of dietary supplements, resulting in prescription or administration errors (11, 13, 16, 17). in an error in drug administration. the medicinal vitamin D by a dietary supplement of different The risk is further increased by the plethora of alternate and expression of dosages. vitamin D are available in France, not to mention the DS and The labeling of vitamin D products (drugs and dietary supplements) suffers from a lack of harmonization, misleading the consumer and exposing to Besides, products containing vitamin D are framed by two distinct regulations, regarding their qualification as drug allows the manufacturer to put a dietary supplement on the their DS, maintaining confusion with equivalent drugs.However, vitamin D content of unlicensed DS is believed consuming DS are seldom suspicious toward those products, considered innocuous and branded as healthy, while they consider drugs with Marketing Authorization Holders as Indeed, the increasing use of DS is partly due to the presence in drugs of antioxidant excipients such as butylhydroxytoluene (BHT), considered harmful by parents Anyhow, some drugs The error risk when dispensing or administering medications Mother and child both have their own classes or presentations (e. , vitamin D, vaccines) exposing to potential errors. their child. Our case highlights the risk of vitamin D overdose, effect of vitamin D and there is elsewhere growing hype This may lead more and more patients to the containing vitamin D. reports about vitamin D intoxication have been published all add-on preventable sources of errors, insomuch as most cases of vitamin D intoxication could be easily Whatever the drug, there is a need for patients to be the appropriate dosage. of vitamin D intoxication, early assessment of calcemia to recommend drugs containing vitamin D over DS of the regulation, dosing and recommendations for use of dietary supplements. Dietary supplements.

IV. DATA AVAILABILITY STATEMENT

The original contributions presented in the study are includedin the article/**Supplementary Material**, further inquiries can be directed to the corresponding author/s.

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

REFERENCES

[1] Brewer LC, Michos ED, Reis JP. Vitamin D in atherosclerosis, vascular disease, and endothelial function. *Curr Drug Targets.* (2011) 12:54–60. doi: 10.2174/138945011793591617

[2] Delvin E, Souberbielle J-C, Viard J-P, Salle B. Role of vitamin D in acquired immune and autoimmune diseases. *Crit Rev Clin Lab Sci.* (2014) 51:232–47. doi: 10.3109/10408363.2014.901291

[3] Braegger C, Campoy C, Colomb V, Decsi T, Domellof M, Fewtrell M, et al. Vitamin D in the healthy European paediatric population. *J Pediatr Gastroenterol Nutr.* (2013) 56:692–701. doi: 10.1097/MPG.0b013e31828f3c05

[4] ANSES. *Actualisation des références nutritionnelles françaises en vitamines et minéraux (saisine n˚2018-SA-0238 – références nutritionnelles)* Maisons-Alfort (2021).

[5] Holick MF. The D-lightful vitamin D for child health. *J Parenter Enteral Nutr.*(2012) 36:9S−19S. doi: 10.1177/0148607111430189

[6] Ross AC, Manson JE, Abrams SA, Aloia JF, Brannon PM, Clinton SK, et al. The 2011 report on dietary reference intakes for calcium and vitamin D from the institute of medicine: what clinicians need to know. *J. Clin Endocrinol Metabol.* (2011) 96:53–8. doi: 10.1210/jc.2010-2704

[7] Turck D, Bresson J, Burlingame B, Dean T, Fairweather-Tait S, Heinonen M, et al. Update of the tolerable upper intake level for vitamin D for infants. *EFS2.* (2018) 16:5365. doi: 10.2903/j.efsa.2018.5365

[8] Pilz S, März W, Cashman KD, Kiely ME, Whiting SJ, Holick MF, et al. Rationale and plan for vitamin D food fortification: a review and guidance paper. *Front Endocrinol.* (2018) 9:373. doi: 10.3389/fendo.2018. 00373

[9] Vidailhet M, Mallet E, Bocquet A, Bresson J-L, Briend A, Chouraqui J-P, et al. Vitamin D: still a topical matter in children and adolescents. A position paper by the Committee on Nutrition of the French Society of Paediatrics. *Archives de Pédiatrie.* (2012) 19:316–28. doi: 10.1016/j.arcped.2011. 12.015

[10] Holick MF, Binkley NC, Bischoff-Ferrari HA, Gordon CM, Hanley DA, Heaney RP, et al. Evaluation, treatment, and prevention of vitamin D deficiency: an endocrine society clinical practice guideline. *J Clin Endocrinol Metab.* (2011) 96:1911–30. doi: 10.1210/jc.2011-0385

[11] Galior K, Grebe S, Singh R. Development of vitamin D toxicity from overcorrection of vitamin D deficiency: a review of case reports. *Nutrients.* (2018) 10:80953. doi: 10.3390/nu10080953

[12] Marcinowska-Suchowierska E, Kupisz-Urbańska M, Łukaszkiewicz J, Płudowski P, Jones G. Vitamin D toxicity–a clinical perspective. *Front Endocrinol.* (2018) 9:550. doi: 10.3389/fendo.2018.00550

[13] Vogiatzi MG, Jacobson-Dickman E, DeBoer MD. Vitamin D supplementation and risk of toxicity in pediatrics: a review of current literature. *J Clin Endocrinol Metabol.* (2014) 99:1132–41. doi: 10.1210/jc.2013-3655

[14] Wortsman J, Matsuoka LY, Chen TC, Lu Z, Holick MF. Decreased bioavailability of vitamin D in obesity. Am J Clin Nutr. (2000) 72:690– 3. doi: 10.1093/ajcn/72.3.690

[15] Jones G. Pharmacokinetics of vitamin D toxicity. Am J Clin Nutr. (2008) 88:582S−6S. doi: 10.1093/ajcn/88.2.582S

[16] Lowe H, Cusano NE, Binkley N, Blaner WS, Bilezikian JP. Vitamin D toxicity due to a commonly available "over the counter" remedy from the Dominican Republic. J Clin Endocrinol Metab. (2011) 96:291–5. doi: 10.1210/jc.2010-1999

[17] Taylor PN, Davies JS. A review of the growing risk of vitamin D toxicity from inappropriate practice. Br J Clin Pharmacol. (2018) 84:1121– 7. doi: 10.1111/bcp.13573

[18] Wan M, Patel A, Patel JP, Rait G, Jones SA, Shroff R. Quality and use of unlicensed vitamin D preparations in primary care in England: retrospective review of national prescription data and laboratory analysis. Br J Clin Pharmacol. (2021) 87:1338–46. doi: 10.1111/bcp.14521

[19] ANSES. AVIS de l'Agence nationale de sécurité sanitaire de l'alimentation, de l'environnement et du travail relatif à ≪ des intoxications à la vitamine D chez des nourrissons par mésusage de compléments alimentaires ≫. (2021). Available online at: https://www.anses.fr/fr/system/files/NUT2020VIG0186.

[20] ANSES. Vitamine D : privilégier les médicaments pour éviter le surdosage chez les nourrissons | Anses - Agence nationale de sécurité sanitaire de l'alimentation, de l'environnement et du travail. (2021) Available online at: https://www.anses.fr/fr/content/vitamine-d-privil%C3%A9gier-les-m%C3%A9dicaments-pour-%C3%A9viter-le-surdosage-chez-les-nourrissons (accessed December 20, 2021).