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ORIGINAL ARTICLE

Effect of maternal supplementation with vitamin E on the concentration of α-tocopherol in colostrum☆,☆☆

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KEYWORDS
Maternal supplementation;
Vitamin E;
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Abstract

Objective: To evaluate the effect of maternal supplementation with vitamin E on the concentration of α-tocopherol in colostrum and its supply to the newborn.

Method: This randomized clinical trial enrolled 99 healthy adult pregnant women; of these, 39 were assigned to the control group and 60 to the supplemented group. After an overnight fast, 5 mL of blood and 2 mL of colostrum were collected. After the first sampling (0 h milk), the supplemented group received 400 IU of supplementary vitamin E. Another 2 mL milk aliquot was collected in both groups 24 h after supplementation (24 h milk). The samples were analyzed by high-performance liquid chromatography. The α-tocopherol content provided by colostrum was calculated by considering a daily intake of 396 mL of milk and comparing the resulting value to the recommended daily intake for infants aged 0–6 months (4 mg/day).

Results: The initial mean concentration of α-tocopherol in colostrum was 1509.3 ± 793.7 μg/dL in the control group and 1452.9 ± 808.6 μg/dL in the supplemented group. After 24 h, the mean α-tocopherol concentration was 1650.6 ± 968.7 μg/dL in the control group ($p > 0.05$) and 2346.9 ± 1203.2 μg/dL in the supplemented group ($p < 0.001$), increasing the vitamin E supply to the newborn to 9.3 mg/day. Initially, 18 women in the supplemented group provided colostrum α-tocopherol contents below 4 mg/day; after supplementation only six continued to provide less than the recommended amount.

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Conclusion: Maternal vitamin E supplementation increases the supply of the vitamin to the infant by providing more than twice the Recommended Daily Intake.

PALAVRAS-CHAVE
Suplementação materna;
Vitamina E;
Alfa-tocoferol;
Requerimento nutricional;
Recém-nascido;
Colostro humano

Efeito da suplementação materna com vitamina E sobre a concentração de α-tocoferol no colostro

Resumo

Objetivo: Avaliar o efeito da suplementação materna com vitamina E sobre a concentração de α-tocoferol no colostro e o fornecimento desta para o recém-nascido.
Método: O estudo clínico randomizado foi realizado com 99 parturientes adultas e saudáveis, sendo 39 alocadas no grupo controle e 60 no grupo suplementado. Após jejum noturno, foram coletadas 5 mL de sangue e 2 mL de colostro das parturientes. Após a primeira coleta (leite 0 h), o grupo suplementado recebeu suplementação com 400 UI de vitamina E. Foi realizada nova coleta de 2 mL de colostro, em ambos os grupos, 24 h após a suplementação (leite 24 h). As amostras foram analisadas por Cromatografia Líquida de Alta Eficiência. A quantidade de α-tocoferol fornecida pelo colostro foi considerada para uma ingestão diária de 396 mL de leite e comparada com a Ingestão Diária Recomendada para crianças de 0 a 6 meses (4 mg/dia).
Resultados: A concentração média inicial de α-tocoferol no colostro foi 1509,3 ± 793,7 μg/dL no grupo controle e 1452,9 ± 808,6 μg/dL no grupo suplementado. Após 24 horas a concentração média de α-tocoferol no grupo controle foi 1650,6 ± 968,7 μg/dL ($p > 0,05$), já no grupo suplementado a concentração média foi 2346,9 ± 1203,2 μg/dL ($p < 0,001$), aumentando assim a oferta de vitamina E para o recém-nascido para 9,3 mg/dia. Inicialmente 18 mulheres do grupo suplementado forneciam valores inferiores a 4 mg/dia de α-tocoferol em seu colostro, após suplementação apenas 6 continuaram a fornecer quantidade inferior ao recomendado.
Conclusão: A suplementação materna com vitamina E promove o aumento do fornecimento da vitamina para o recém-nascido, fornecendo mais do que o dobroda Ingestão Diária Recomendada.

Introduction

Vitamin E is the generic term used to describe eight different molecules: α-, β-, γ-, and δ-tocopherol and α-, β-, γ-, and δ-tocotrienol.[1] Among them, α-tocopherol is the only isomer related to nutritional needs of vitamin E. Vitamin E is considered one of the best biological antioxidants due to the protection offered to the plasma membrane and low-density lipoproteins against oxidation reactions and lipid peroxidation.[2]

Newborns are considered high-risk for vitamin E deficiency due to oxidative stress generated by postnatal transition from the intrauterine environment, relatively low in oxygen, to the extrauterine one, significantly richer in oxygen.[3] Considering this vitamin deficiency risk, it is recommended that the α-tocopherol intake during the first six months of the infant's life be 4 mg/day.[4]

It is known that the placental transfer of α-tocopherol from the mother to the infant is limited, even if there is an increase in maternal intake of vitamin E.[5] Thus, the newborn may have low reserves of vitamin E, making it necessary that breast milk provide an adequate amount of vitamin E to ensure the formation of vitamin reserves and reinforce the newborn's defenses against oxidative stress.[6]

Insufficient intake of this nutrient at this stage of life (especially from the 6th to 8th week) can affect the development of the immune and pulmonary systems.[7] However, if regular breastfeeding occurs, nutritional deficiency symptoms are generally not observed in children.[8]

Venous supplementation with high doses of vitamin E in infants increases the risk of sepsis and reduces supplementation efficiency in fighting severe retinopathy.[9] Therefore, maternal supplementation to improve the nutritional status of the neonate through satisfactory amounts of α-tocopherol provided by colostrum becomes the safest way to prevent possible vitamin E deficiency, as it will be slowly released during the feedings, contributing to the formation of body reserves, since placental transfer is limited.[6]

Thus, the aim of this study was to investigate the effect of maternal supplementation with vitamin E on the concentration of α-tocopherol in colostrum and consequently on the supply of this vitamin for the neonate.

Methods

Ethical considerations

The study was approved by the Research Ethics Committee – REC da Universidade Federal do Rio Grande do Norte – CAAE 0260.0.051.294-11.