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Can Growing-Up Milk Help Boost the Child's Key Nutrients for Growth and Development?

The initial 1000 days of early life is a crucial period for proper growth and neurodevelopment. Hence, receiving the adequate nutrients is of utmost importance. With transition to the toddler stage, there is a concern that toddlers may not adequately consume nutrients supporting neurodevelopment, particularly folic acid, iron, iodine, choline, omega-3 fatty acids, and lutein, due to unavailability of such foods, low consumption rates, and lack of access.[1–3]

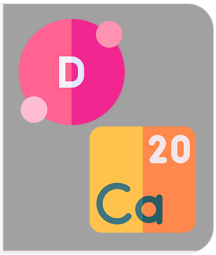
Feeding recommendations include continued breastfeeding until 2 years of age and/or introducing cow's milk at 1 year old.[4,5] However, consumption of cow's milk becomes a prominent part of an infant's diet between 9 and 11 months, increasing dramatically thereafter. This may result in a deficit of essential nutrients that may be lacking in cow's milk, such as iron and vitamin C.[5–7]

Key Nutrients Enabling Growth and Brain Development in Children

Adequate nutrition during infancy and early childhood is important to ensure that children reach their full potential in growth and development. Macronutrients including carbohydrates, proteins, and fats are the principal energy source in the diet, while micronutrients are fundamental in avoiding disease-induced deficiencies.

Protein supports growth and immune function when provided in appropriate amount and quality. Adequate quantity and quality of proteins in the diet are necessary for promoting proper growth without potentially increasing the risk of developing obesity.[8]

Vitamin D and **calcium** are vital for maintaining skeletal integrity and supporting neurodevelopment. Deficiency in vitamin D has been linked to conditions such as dementia, depression, autism, and schizophrenia, while calcium deficiency can result in issues such as rickets, affecting both physical and mental growth.[9,10]



Iron is particularly crucial for the developing brain in fundamental neuronal processes such as myelination, energy metabolism, and neurotransmitter function. Deficiency in iron, especially during the initial stages of life, can lead to irreversible deficits in cognition, motor function, and behaviour.[11]

DHA, choline, and lutein
Docosahexaenoic acid (DHA) is a long-chain polyunsaturated fatty acid influencing neural and visual development, with perinatal supplementation improving cognitive function. Choline is essential for early neurodevelopment and memory enhancement, acting as a precursor for cell membrane composition and signalling pathways. Lutein functions as an antioxidant and optical filter, showing potential impact on learning and development.[12,13]

Early nutrition in toddlers necessitates providing the right balance of key nutrients to ensure healthy growth and development (Table 1).

Table 1: Daily nutrient requirements and reference intakes in toddlers (1–3 years)[8–13]

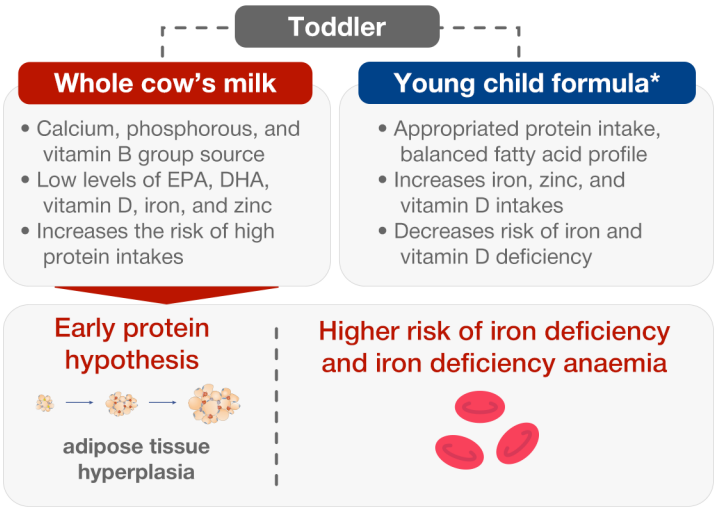
Nutrient/Vitamin/ Mineral	Recommended daily intake in toddlers (1–3 years)
DHA	100 mg (during the second year of life)
Choline	200 mg
Lutein	10 mg
Iron	7 mg
Vitamin D	15 mcg
Calcium	450 mg

DHA: Docosahexaenoic acid

Special Nutritional Needs of Toddlers

As toddlers experience increasing energy and nutrient demands, breastfeeding complemented with nutrient-dense family foods is recommended. Cow's milk remains a significant component of their diet during this stage. However, nutritional risks such as obesity and micronutrient deficiencies are prevalent among toddlers, potentially exacerbated by deficits in essential nutrients, as cow's milk lacks suffcient quantities of these vital elements (Figure 1).[4,5–7]

Figure 1: Toddlers' critical nutrients and milk types.[8]



Exclusive breastfeeding is recommended up to six months of age, with continued breastfeeding along with appropriate complementary foods up to 2 years of age or beyond.

Adapted from: Verduci E, et al. 2021.

DHA: Docosahexaenoic acid; EPA: Eicosapentaenoic acid.
*In some countries, Young Child Formula (YCF) is also referred to as Growing-Up Milk (GUM).

Failure to address nutrient deficiencies can lead to developmental setbacks, including lifelong impairments in brain function.[1] Hence, fortified growing-up milk (GUM) emerges as a potential solution for toddlers who do not consume adequate milk or foods rich in essential nutrients such as DHA, choline, and lutein, thereby supporting overall growth and development in infants and toddlers.[14]

Is Fortified GUM a Solution?

Infants consuming large amounts of cow's milk face higher risks of iron deficiency and iron deficiency anaemia. Limiting cow's milk intake during the second year of life is recommended, as it can lead to significant differences in macronutrient intake compared to breastfed infants. Therefore, as an alternative to cow's milk or breast milk for children aged 1–3 years, young child formulae, also known as toddler's milk or GUM, can be considered.[8]

A recent clinical trial demonstrated the eect of GUM with enhanced concentrations of DHA, choline, and lutein, showing it can impact/protect nutrient status and support growth in toddlers.[14]

Objective

To determine the effect of GUM on the biomarker levels of DHA, choline, and lutein, and measures of growth compared to cow's milk or no intervention over a 6-month period.

Study Participants

A total of 419 toddlers aged 18 months±2 weeks and their caregivers were included.

Intervention

Subjects were randomly allocated to three groups:

Group 1
Fortified GUM or standard GUM with varying DHA, choline, and lutein levels

Group 2
Cows' milk (COW)

Group 3
Non-intervention population (POP) consuming their usual diet

Primary Outcomes

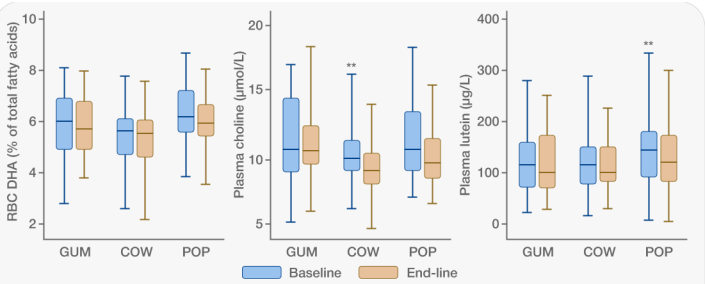
Red blood cell (RBC) DHA in percentage of total fatty acids and plasma concentrations of choline and lutein were measured in 252 toddlers.

Study Results[14]

1. Impact of GUM on the status of iron, vitamin D, RBC DHA, lutein, and choline

- Toddlers receiving GUM after 6 months had significantly *higher plasma ferritin and vitamin D levels, RBC DHA%, and plasma choline* concentrations compared to those given COW and POP.
- *Plasma lutein* levels remained stable between GUM and COW or GUM and POP at the end of the study.

Figure 2: Biomarker concentrations before and after 6-month intervention in 252 toddlers.



COW: Cow's milk; DHA: Docosahexaenoic acid; GUM: Growing-up milk; POP: Non-intervention population; RBC: Red blood cell.

2. Impact of GUM on anthropometric measurements

- GUM and COW or GUM and POP had similar weight-for-length z-scores at baseline.
- There was no difference in the end-line weight-for-length z-score between the different groups after adjustment for baseline and birthweight.

3. GUM impact on the nutrient intake of toddlers

- After the 6-month intervention, energy-adjusted choline intake significantly decreased in the COW (-49.7 mg [95% confidence interval (CI): -64.8, -34.6]) and POP (-58.6 mg [95 CI: -73.2, -44.0]) groups (both p<0.001) compared to that in the GUM group.
- After adjusting for baseline nutrient intakes, both groups had similar end-line DHA and lutein intakes.

Conclusion

GUM promotes age-appropriate growth and helps maintain the proper nutrient status of essential nutrients for growth and brain development.

Key Takeaways

- ☑ **Toddlerhood is a dynamic time of changes in eating patterns and associated nutrient intakes.**
- ☑ **Toddlers consuming GUM for 6 months, between the ages of 18 and 24 months, maintained their biomarker status of DHA and choline compared with toddlers consuming cow's milk or their habitual diet.**
- ☑ **GUM consumption has a protective effect on the biochemical status of DHA and choline.**
- ☑ **GUM may help to maintain nutrient status during a time of rapid growth and development.**
- ☑ **The giving of GUM to toddlers may help boost essential nutrients for growth and neurodevelopment.**

References

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