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Newborn Medicine Poster - 2019

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New England Donor Milk Macronutrient Analysis

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BACKGROUND:

- Human breast milk (BM) is the AAP-recommended form of nutrition for preterm infants
- The nutritional qualities of BM can vary significantly, especially with human donor breast milk (DBM)
- Human DBM is pooled, pasteurized BM that many preterm infants receive when mother's own BM is unavailable
- Little is known about the nutritional content of the DBM from our local HMBANA-accredited milk bank, Mothers' Milk Bank Northeast, which serves most of the area NICUs

OBJECTIVE:

- Describe the nutritional content of different batches of pooled, pasteurized DBM purchased from Mothers' Milk Bank Northeast
- Compare these results to the published standards[1] both with and without nutritional fortification

METHODS:

- Thirty (n=30) different pooled, pasteurized, frozen batches of DBM were thawed and a small aliquot (9ml) was removed from each
- Each aliquot was warmed, homogenized, and then immediately analyzed in triplicate
- Analysis occurred via a mid-infrared instrument (Miris Human Milk Analyzer™) per manufacturer's recommendations
- Each batch's macronutrient content was recorded and averaged
- To determine the total macronutrient content with fortification, we computed the addition of our unit's standard preterm milk fortification to each DBM sample
- The fortifier used in our unit is Similac® Human Milk Fortifier (HMF) Concentrated Liquid; 1 packet (0.5g protein, 0.21g fat, 0.75g carbohydrate per 5ml) is added to 25ml of BM providing an additional ~4 calories per oz
- Descriptive statistics were computed both with and without fortification, and compared to published standards[1]
- The study was reviewed by both the Baystate Medical Center IRB and the Research Committee of HMBANA.

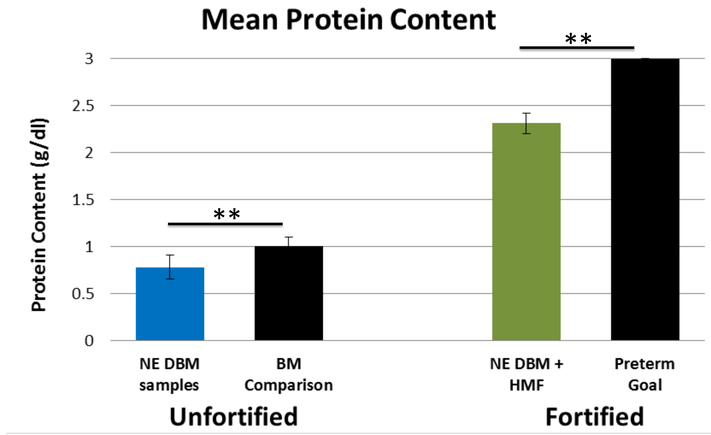

Figure 1: Mean protein content (g/dl) of the New England donor breast milk (NE DBM) samples compared to published standard, and when fortified (+HMF) as compared to published preterm protein goal (**p < 0.001)

Mothers' Milk Bank Northeast
Share the Health
Safe · Trusted · Lifesaving

Similac® Human Milk Fortifier, extensively hydrolyzed protein, concentrated liquid; Abbott Nutrition, Columbus, OH

Miris Heater™, Ultrasonic Processor™, Human Milk Analyzer™; MIRIS AB, Uppsala, Sweden

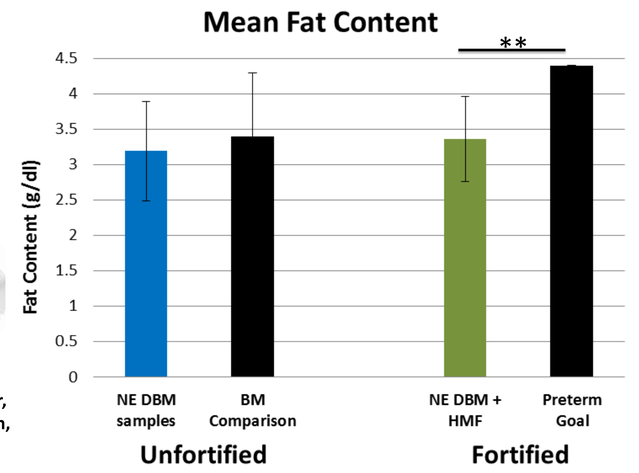

Figure 2: Mean fat content (g/dl) of the New England donor breast milk (NE DBM) samples compared to published standard, and when fortified (+HMF) as compared to published preterm fat goal (**p < 0.001)

RESULTS:

UNFORTIFIED RESULTS

- Mean true protein: 0.78 ± 0.13 g/dl (range 0.58 - 1.16) which is statistically well below the standard of 1.0 g/dl(See Figure 1)
- Mean fat: 3.19 ± 0.70 g/dl (range 1.99 - 4.89); not a statistically significant difference compared to the standard of 3.4 g/dl; however, 63% of batches were below the standard (See Figure 2)
- Mean carbohydrate: 8.12 ± 0.16 g/dl (range 7.69 - 8.30); all samples were above the standard
- Mean total energy: 19.87 ± 2.02 kcal/oz (range 16.5 - 24.9); 33% were below the standard of 19kcal/oz, and half of batches were less than 20 kcal/oz, which is the assumed caloric starting-point for fortification; 16% of batches were above 22 kcal/oz.

FORTIFIED RESULTS (DBM + Similac HMF)

- The mean protein content + fortification was 2.31 ± 0.11 g/dl; which is statistically well below the preterm protein goal of 3.0 g/dl (See Figure 1)
- The mean fat content + fortification was 3.36 ± 0.58 g/dl which is statistically below the preterm fat goal of 4.4g/dl (See Figure 2)
- The mean total energy + fortification was 22.96 ± 1.63 kcal/oz, or 76.52 ± 5.42 kcal/dl; 77% were below the assumed goal
- The mean Protein/Energy ratio + fortification was 3.03 ± 0.22 g/100kcal; half were below the preterm goal of 3.0 g/100kcal.

CONCLUSIONS:

- This study adds to the growing body of literature that most DBM batches fall below the assumed nutritional standards of human BM, especially in regards to fat and protein, and there is a large degree of variability among different DBM batches
- This may be due to a variety of factors including the extensive DBM processing, maternal factors, milk maturity, etc.
- Even with nutritional fortification, DBM from our local milk bank fails to meet the standard fat & protein goals for preterm infants
- This nutritional deficit, especially in those fed exclusive DBM, has been shown to impact growth as well as neurodevelopment
- Nutritional labelling and/or targeted fortification of DBM may help to alleviate these nutritional deficits.

REFERENCES:

1. Gidrewicz DA, Fenton TR. A systematic review and meta-analysis of the nutrient content of preterm and term breast milk. BMC Pediatr. 2014 Aug 30;14:216.