

The Impact of Post-Discharge Diet on Growth and Neurodevelopmental Outcomes in Preterm Infants

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Introduction

Premature infants are surviving at increased rates but continue to face an elevated risk of adverse neurodevelopment outcomes.¹ Human milk has demonstrated notable benefits for growth in the NICU. A 2019 study found that infants fed human milk supplemented with formula or fortifiers in the NICU exhibited better weight gain than those receiving unfortified human milk.²

The aim of this study is to investigate the dietary practices of premature infants after discharge from the NICU and its effect on growth and neurodevelopmental outcome.

Methods

A retrospective study of premature infants who were followed in the Neurodevelopment Clinic at Corewell Health Children’s Hospital in Royal Oak, MI between February 2020 and February 2024.

- Inclusion Criteria:**
- Discharged from Corewell Health Children’s Hospital NICU
 - Presentation to the clinic for an initial assessment between two- and six-months corrected age

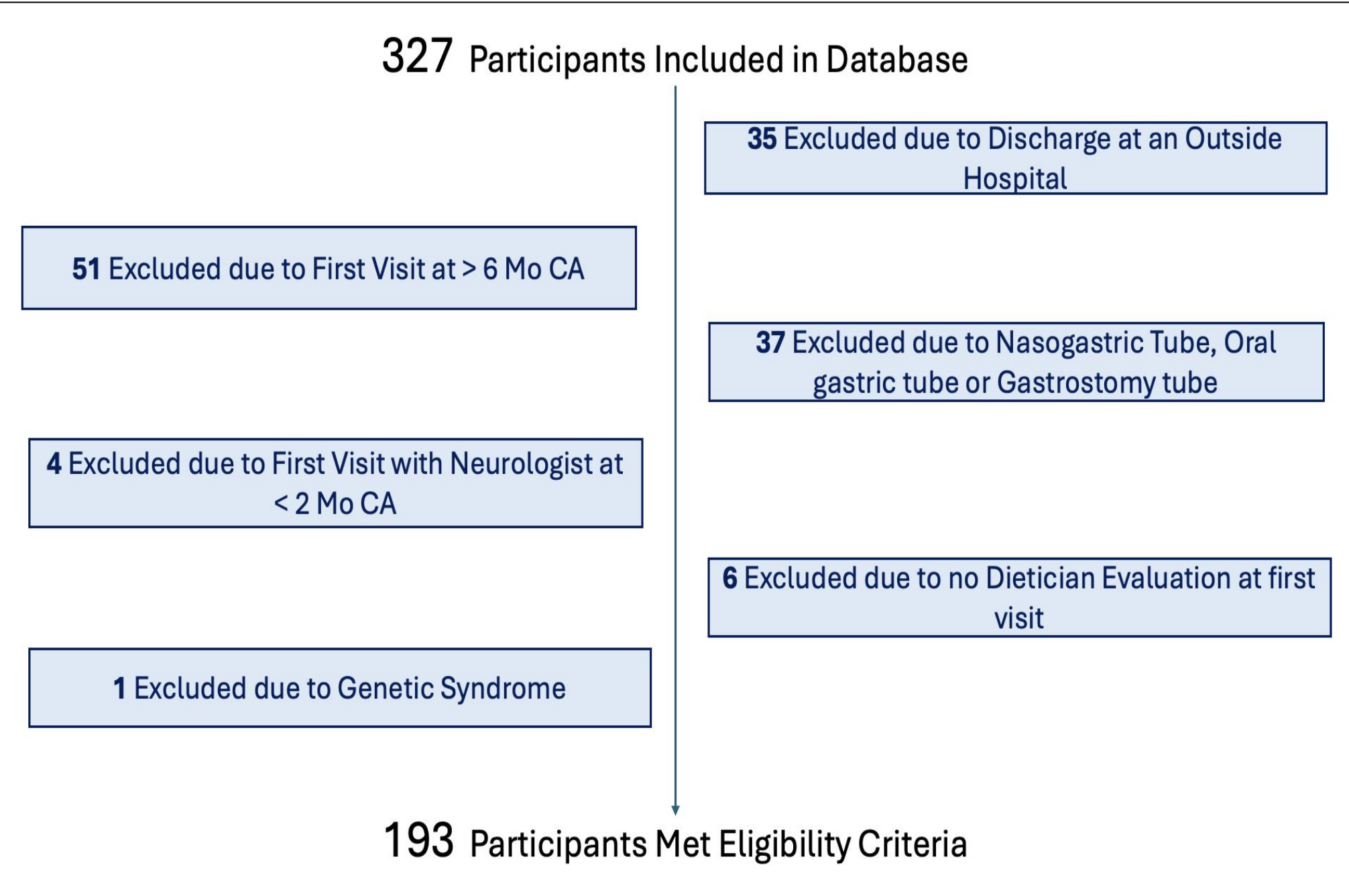
- Exclusion Criteria:**
- Genetic syndromes
 - Discharged with a nasogastric tube, or gastrostomy tube
 - Birth at ≥ 37 weeks gestational age

We identified the type of milk they received after discharge from NICU up until the first follow up visit (Human milk only vs. Synthetic Formula only, vs. Human Milk + Synesthetic Formula fortification vs. Human Milk + human milk Fortification).

We evaluated their growth parameters (weight, length, and head circumference) and Developmental scores (Alberta Infant Motor Scale and Peabody Score) at 8 – 10.99 months corrected age.

We evaluated the Bayley III Infant Development Scores at 24 months corrected age.

Figure 1: Inclusion and Exclusion Criteria



Results

Table 1: Growth Parameters at 8-10.99 Months Corrected Age

	Human Milk Only (N= 15)	Synthetic Formula Only (N= 64)	Human Milk + Formula Supplementation (N= 27)	P-value ¹	Adjusted P-value ²
Z-score for Weight [Med (IQR)]	-0.2 (-1.3, 0.5)	-0.3 (-1.1, 0.6)	-0.3 (-1.1, 0.7)	0.8873	0.7636
Z-score for Length [Med (IQR)]	-0.6 (-1.1, 0.7)	-0.7 (-1.3, 0.6)	-0.6 (-1.3, 0.6)	0.9137	0.8317
Z-score for Head Circumference [Med (IQR)]	0.8 (0.2, 1.2)	-0.1 (-0.9, 0.6)	0.0 (-0.6, 0.3)	0.0607	0.0689
Z-score for BMI [Med (IQR)]	0.1 (-0.7, 0.6)	-0.1 (-0.7, 0.8)	-0.2 (-0.7, 0.6)	0.9500	0.8705

¹ANOVA F-test p-value; ²Adjusted for demographic factors

Table 2: Developmental Outcomes at 8-10.99 Months Corrected Age

	Human Milk Only	Synthetic Formula Only	Human Milk + Formula Supplementation	P-value ¹	Adjusted P-value ²
Alberta Infant Motor Scale [Med (IQR)]	46.0 (37.0, 51.0) (N=11)	43.0 (28.0, 50.0) (N=57)	44.5 (31.5, 51.0) (N= 24)	0.4429	0.1543
Peabody Grasping (Months) [Med (IQR)]	9.0 (8.0, 10.0) (N=13)	9.0 (8.0, 10.0) (N=53)	9.0 (8.0, 10.0) (N= 23)	0.6013	0.1657
Peabody Visual Motor (Months) [Med (IQR)]	9.0 (8.0, 10.0) (N=13)	9.0 (8.0, 9.0) (N= 53)	9.0 (8.0, 10.0) (N= 23)	0.7696	0.3624

¹ANOVA F-test p-value ²Adjusted for demographic factors

Table 3: Dietary Practices and Bayley Scores at 24 Months Corrected Age

	Human Milk Only (N=6)	Synthetic Formula Only (N=27)	Human Milk + Formula Supplementation (N=11)	P-value ¹	Adjusted P-value ²
Corrected Age (Months) [Med (IQR)]	22.5 (22.0-24.0)	23.0 (21.0-26.0)	24.0 (23.0-26.0)	0.1752	0.1571
Cognitive Composite [Med (IQR)]	105 (105-110)	95 (90- 100)	100 (90-115)	0.1432	0.0855
Language Composite [Med (IQR)]	100 (91-106)	86 (66-97)	91 (79-106)	0.1556	0.0928
Motor Composite [Med (IQR)]	112 (91-115)	97 (85-110)	100 (85-112)	0.1907	0.1857

¹ANOVA F-test p-value ²Adjusted for demographic factors

Results

- 135 infants (70%) were discharged from NICU on human milk (with either synthetic formula fortification, or with human milk fortification, or human milk only). While 70 infants (36%) continued to receive some form of human milk on their first follow up visit.
- 49 infants (25%) were discharged with human milk with a human milk fortifier. By the 2-6 month corrected age visit, no infant was taking human milk fortifiers anymore.
- Head circumference trended larger in the human milk only group at 8 – 10.99 months corrected age, and this trend was present despite adjusting for significant variables (Table-1).
- The human milk only group also tended to do better on the Bayley III Developmental Assessment, mainly the language and cognitive assessments, and this trend was present despite adjusting for significant demographic variables (Table-3).

Conclusions

Despite the importance of human milk on long term neurodevelopment, half of premature infants discharged from our NICU switched to synthetic formula for feeding. This trend deserves further study to address the reasons behind it to improve neurodevelopmental outcome in this population.

References

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