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Research Article

Physical Development Indicators of Ealy Childhood Children with Different Types of Feeding

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Abstract

Introduction: Breastfeeding has a protective effect against the development of obesity across the lifespan, from childhood to adulthood. Specifically, children who are breastfed for up to six months have a lower risk of developing excess body weight compared to those who are exclusively formula-fed from birth.

Objective: This study aimed to evaluate the impact of different feeding types (breastfeeding versus formula feeding) on the physical development of children during the first three years of life, with a particular focus on weight and height trajectories.

Materials and Methods: The study assessed weight and height dynamics in 75 children at various developmental stages: from birth to 12 months, and during the second and third years of life, using monthly measurement records. Statistical comparisons between the breastfed and formula-fed groups were performed for body weight, height, and body mass index (BMI).

Results: Analysis of physical development over the first three years of life revealed no statistically significant differences in body weight or BMI during the first 12 months. However, at ages 2 and 3 years, significant differences in BMI were observed between the groups. At 2 years, the mean BMI in the breastfed group was 16.96 ± 0.47, compared to 19.26 ± 0.37 in the formula-fed group ($p < 0.05$). A similar trend persisted at 3 years: 16.96 ± 1.45 in breastfed children versus 18.57 ± 0.69 in formula-fed children ($p < 0.05$).

Conclusion: Early nutrition type influences later energy metabolism, appetite regulation, and susceptibility to overweight and obesity. Breastfeeding, in particular, may support the development of self-regulatory mechanisms in food intake and contribute to obesity prevention.

Keywords: *Infant; Breastfeeding; Obesity; Body Mass Index*

Introduction

Data from numerous studies indicate that the deterioration of global population health can often be traced back to early childhood, particularly to infant feeding practices during the first years of life. Supporting breastfeeding in Ukraine provides an opportunity to reduce morbidity and mortality during the first year of life, as well as to decrease disease incidence in later childhood. Numerous studies have demonstrated that the "earlier onset" of conditions such as diabetes, obesity, hypertension, and cancer may be associated with suboptimal infant feeding practices, including neglecting breastfeeding, early introduction of formula, and failure to follow recommended timing for complementary feeding.

Prolonged breastfeeding, particularly beyond two years, is associated with a reduced risk of developing type 2 diabetes, atherosclerosis, and other metabolic disorders in adulthood by approximately 39%. Moreover, breastfeeding exhibits a protective effect against obesity at various life stages, from childhood to adulthood. Specifically, children breastfed for at least six months have a 15% lower likelihood of developing excess body weight compared to those who were formula-fed from birth [1-3].

Studies have analyzed the association between feeding type in the first year of life and growth indicators at school age. Only 20% of participants were exclusively breastfed for the first six months. Results demonstrated a significant inverse relationship between breastfeeding and the risk of overweight and obesity later in life [4-6].

Formula feeding represents a significant risk factor for obesity in later childhood, due in part to higher protein intake per kilogram of body weight, especially when unmodified cow's milk is consumed. The World Health Organization (WHO) has set a target to reduce childhood obesity by 2025. Achieving this goal could have a profound impact on global population health, decreasing the risk of chronic cardiovascular diseases and influencing adult life expectancy [7-10].

Neglecting breastfeeding and early introduction of cow's milk or formula may increase the risk of developing diabetes. Studies have shown that the duration of breastfeeding significantly reduces this risk. Breastfeeding for 6 - 12 months is associated with a 61% reduction in disease risk, while breastfeeding for 2 - 3 months reduces risk by 31%. This protective effect is explained by the positive influence of breast milk on immune system development and the establishment of healthy gut microbiota [6,7]. Conversely, other studies have indicated potentially adverse effects of high dairy consumption during childhood. Dietary analyses of children up to 15 years old revealed that regular consumption of large amounts of milk, cheese, yogurt, and ice cream may be associated with an increased risk of type 1 diabetes.

Early childhood physical development is fundamental to future health, reflecting complex growth processes and metabolic stability. During the first 1,000 days of life, a child's body is particularly sensitive to external influences, among which nutrition plays a crucial role [11,12]. Infant feeding choices influence not only growth rates but also metabolic programming and immune system development. The WHO recommends exclusive breastfeeding for at least the first six months, emphasizing its critical role in optimal development. Breast milk provides an ideal balance of macro- and micronutrients, enzymes, and hormones. Numerous studies demonstrate that children breastfed for at least six months are less likely to experience excess weight compared to those fed exclusively with formula from birth.

Formula feeding, while meeting energy requirements, does not always account for the self-regulation of intake. Higher protein content, rapid nutrient delivery, and bottle-feeding without consideration of infant appetite may lead to hypercaloric intake. These factors are associated with accelerated weight gain, which has long-term consequences, including increased risk of overweight, obesity, insulin resistance, and hypertension in later life. Feeding type may also influence the development of future eating behaviors. Therefore, it is important not only to study the impact of feeding type on physical development during the first year of life but also to track subsequent changes at ages 2 and 3, when children's eating behaviors become more established and the risk of obesity becomes more evident [13-15].

Objective of the Study

The aim of this study was to evaluate the impact of different feeding types (breastfeeding versus formula feeding) on the physical development of children during the first three years of life, with a particular focus on changes in weight and height. This approach allows for the assessment of not only the short-term effects of feeding on growth but also potential long-term consequences, such as susceptibility to excessive weight gain later in childhood.

Materials and Methods

The study assessed weight and height dynamics in 75 children at various developmental stages: from birth to 12 months, and during the second and third years of life, using monthly measurement data. Statistical comparisons between the breastfed and formula-fed groups were performed for body weight, height, and body mass index (BMI).

Results

The majority of children, regardless of feeding type, demonstrated average physical development indicators (92.7%). Growth retardation was observed in 3.6% of children, while 5.5% exhibited excessive body weight. Among formula-fed children: 82.5% exhibited average physical development, 2.2% had delayed development, and 15.3% were overweight.

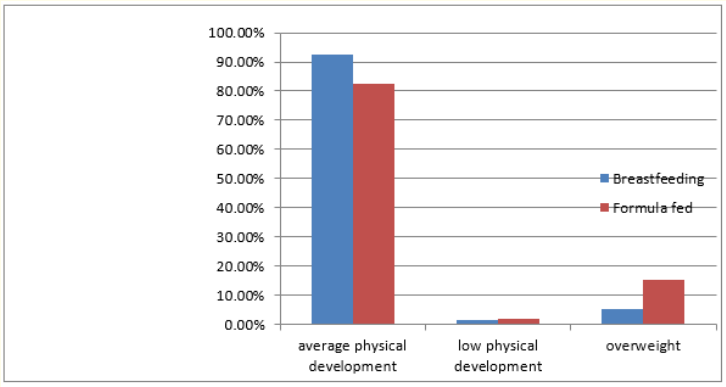

Figure 1: *Physical development indicators of children with different feeding types.*

Analysis of physical development during the first three years of life according to feeding type showed no statistically significant differences in body weight or BMI during the first 12 months. At 12 months of age, the mean body weight was 10,236.36 ± 1,236.82g in the breastfed group and 10,109.09 ± 991.18g in the formula-fed group ($p > 0.05$). Mean monthly weight gain up to 6 months also did not differ significantly between groups: 816.60 ± 195.01g in breastfed children versus 830.0 ± 124.28g in formula-fed children ($p > 0.05$). After 6 months of age, formula-fed children showed slightly higher average weight gain (353.27 ± 84.01g vs. 321.85 ± 84.48g), but this difference did not reach statistical significance. Thus, during the first year of life, feeding type did not have a significant impact on anthropometric indicators.

Age	Breastfed	Formula-fed	p-value
Up to 6 months	816.60 ± 195.01	830.0 ± 124.28	>0.05
After 6 months	321.85 ± 84.48	353.27 ± 84.01	>0.05

Table 1: *Average monthly weight gain by feeding type (mean ± SD).*

In contrast, at ages 2 and 3 years, significant differences in BMI were observed between groups. At 2 years, the mean BMI in the breastfed group was 16.96 ± 0.47, compared to 19.26 ± 0.37 in the formula-fed group ($p < 0.05$). A similar trend persisted at 3 years: 16.96 ± 1.45 in breastfed children versus 18.57 ± 0.69 in formula-fed children ($p < 0.05$). These results indicate a substantially increased risk of excessive weight gain in children who received formula feeding.

Age (years)	Breastfed	Formula-fed	p-value
1	16.1 ± 0.9	16.3 ± 1.0	>0.05
2	16.96 ± 0.47	19.26 ± 0.37	<0.05
3	16.96 ± 1.45	18.57 ± 0.69	<0.05

Table 2: *Mean BMI by feeding type (mean ± SD).*

These findings are consistent with previous research demonstrating the protective effect of breastfeeding on metabolic programming and obesity prevention. The underlying mechanisms may include the hormonal composition of breast milk, the development of appetite self-regulation in the child, as well as differences in protein content and nutrient absorption rates.

However, it is important to note that although our study highlights the significance of feeding type for physical development, these processes may also be influenced by other factors, such as genetics, family socio-economic status, maternal health, and additional socio-economic and environmental conditions.

Discussion and Conclusion

During the first year of life, body weight and body mass index (BMI) did not differ significantly between children who were breastfed and those who were formula-fed. Weight gain rates, both before and after 6 months, were similar in both groups, with a slight, non-significant advantage observed in formula-fed children after 6 months. At ages 2 and 3 years, a significant increase in BMI was observed in children who were formula-fed, indicating a higher risk of excessive body weight or obesity. The findings are consistent with the concept of metabolic programming, which suggests that early nutrition can influence future energy metabolism, appetite regulation, and susceptibility to overweight. In particular, breastfeeding may promote the development of self-regulatory mechanisms for food intake.

These results are highly relevant for the prevention of future diseases and for the development of effective pediatric recommendations during early childhood.

Bibliography

1. World Health Organization. “Exclusive breastfeeding for optimal growth, development and health of infants”. Geneva: WHO (2023).
2. UNICEF. “Celebrating the innocenti declaration on the protection, promotion and support of breastfeeding: past achievements, present challenges and priority actions for infant and young child feeding”. New York: UNICEF (2006): 64.
3. World Health Organization. “Global Nutrition Targets 2025 Breastfeeding Policy Brief”. Geneva: WHO (2014): 8.
4. Patnode CD., *et al*. “Breastfeeding and health outcomes for infants and children: a systematic review”. *Pediatrics* 156.1 (2025): e2025071516.
5. Wu Y., *et al*. “Study protocol for the Sino-Canadian Healthy Life Trajectories Initiative (SCHeLTI): a multicentre, cluster-randomised, parallel-group, superiority trial of a multifaceted community-family-mother-child intervention to prevent childhood overweight and obesity”. *BMJ Open* 11.4 (2021): e045192.
6. Miettinen ME., *et al*. “Breastfeeding and circulating immunological markers during the first 3 years of life: the diabimmune study”. *Diabetologia* 65.2 (2022): 329-335.
7. Yi DY and Kim SY. “Human breast milk composition and function in human health: from nutritional components to microbiome and MicroRNAs”. *Nutrients* 13.9 (2021): 3094.

8. Santos-Guzmán A., *et al*. "Addressing infant and young child feeding recommendations from a planetary health perspective". *Advances in Nutrition* 15.11 (2024): 100303.

9. Rito AI., *et al*. "Association between characteristics at birth, breastfeeding and obesity in 52 countries: The WHO European childhood obesity surveillance initiative - COSI 2015/2017". *Obesity Facts* 12.2 (2019): 226-243.

10. Cassidy TM. "Relational perspective in breastfeeding research". *Journal of Human Lactation* 40.3 (2024): 348-351.

11. Vargas AJ. "Human milk composition: An atlas for child health recommendations". *Advances in Nutrition* 15.1 (2024): 100151.

12. Miettinen ME., *et al*. "Breastfeeding and circulating immunological markers during the first 3 years of life: the DIABIMMUNE study". *Diabetologia* 65.2 (2022): 329-335.

13. Hamer DH., *et al*. "Importance of breastfeeding and complementary feeding for management and prevention of childhood diarrhoea in low-and middle-income countries". *Journal of Global Health* 12 (2022): 10011.

14. Gordon N. "Human milk composition and its importance". *Advances in Pediatrics* 67.1 (2020): 147-158.

15. Cascaes AM., *et al*. "Effect of breastfeeding and malocclusions: a systematic review and meta-analysis". *Acta Paediatrica* 104.S467 (2015): 54-61.

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