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The Long-Term Health Benefits of Breastfeeding: Obesity Prevention, Metabolic Health, and Cardiovascular Protection

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Abstract

Introduction:

Recent research highlights a link between early dietary habits, especially breastfeeding, and reduced obesity risk in adulthood. Breastfeeding provides essential nutrients and compounds that may shape an infant's metabolism. This article reviews current findings to guide parents in supporting lifelong healthy development.

Material and Methods:

This review examined 30 studies focusing on the relationship between breastfeeding and the risk of developing obesity. Relevant studies were identified through searches on PubMed and Google Scholar.

Literature Analysis:

The reviewed literature suggests a possible link between breastfeeding and a decreased likelihood of obesity in adulthood, although comprehensive, systematic research on this relationship is still scarce. Findings indicate that bioactive elements in breast milk and breastfeeding behaviors may play a role in early metabolic and appetite regulation, which could influence weight control later in life. Observational studies and case reports show varying

impacts, often dependent on factors like the duration and exclusivity of breastfeeding, as well as broader environmental influences.

Conclusions:

Breastfeeding offers significant long-term health benefits, including reduced risks of obesity, type 2 diabetes, and cardiovascular diseases. Studies show that longer breastfeeding duration is associated with healthier weight trajectories, improved metabolic outcomes, and lower BMI and HDL levels later in life. Exclusive breastfeeding for six months or more provides substantial protection against obesity in childhood and adulthood. Early formula introduction is linked to higher BMI trajectories and increased metabolic risks. These findings emphasize the importance of promoting breastfeeding as a key public health strategy to support long-term health and disease prevention.

Keywords: Breastfeeding; Obesity prevention; Cardiovascular health; Infant nutrition; Metabolic health; Childhood obesity

Introduction and Purpose:

Obesity is one of the most significant public health challenges of the 21st century, impacting individuals and society at large. It is characterized by excessive fat accumulation, which increases the risk of serious health conditions such as type 2 diabetes, hypertension, cardiovascular disease, and certain cancers. The rising prevalence of overweight and obesity in recent decades has driven researchers to explore its causes, including the influence of early-life dietary habits on obesity development in adulthood.

Research on the relationship between breastfeeding and adult obesity has yielded mixed results. Some studies suggest that breastfeeding for more than one month is associated with reduced waist circumference, waist-to-height ratio, and lower odds of obesity in adulthood [1][2]. Breastfed individuals have also shown lower BMI and higher HDL cholesterol levels compared to formula-fed counterparts [3]. However, the protective effect of breastfeeding on cardiovascular risk factors appears to be small and of limited public health importance [2].

The aim of this article is to present the current state of knowledge in this field and to provide practical insights for parents and caregivers seeking to support healthy development in children from the earliest stages of life.

Material and Methods:

This review examined 30 studies focusing on the relationship between breastfeeding and the risk of developing obesity. Relevant studies were identified through searches on PubMed and Google Scholar.

Analysis of the Literature

Breastfeeding reduces the risk of obesity.

A lower risk of being overweight in later childhood and adolescence was observed in children who received more breast milk than formula or who were breastfed for an extended period. [4] [5] [6] [7] [8] [9]

A random sample of 5,125 mother-child pairs was drawn from a national database, and maternal lifestyle factors, including breastfeeding practices, were collected through standardized telephone interviews. Using the International Obesity Task Force criteria, children's BMI was calculated based on measured weight and height data at age 8, with self-reported body measurements for early adulthood. Results showed that 22.4% of mothers breastfed for ≥ 6 months, with 15.2% exclusively breastfeeding for the same period. Exclusive breastfeeding for ≥ 6 months was linked to a lower risk of overweight at age 8 and in early adulthood, and a reduced risk of obesity in childhood (30% lower risk) and early adulthood (38% lower risk). These findings suggest that exclusive breastfeeding provides lasting protection against overweight and obesity through adolescence and into adulthood. [10]

A systematic review analyzed studies on the association between infant feeding and obesity, using Medline and Embase databases, along with manual searches. Data from 61 studies were examined, with 28 studies (298,900 participants) providing odds ratios comparing obesity risk between initially breastfed and formula-fed individuals. Results indicated that breastfeeding was associated with a lower obesity risk, particularly in smaller studies of less than 500 subjects and still present in larger studies. In six studies that controlled for parental obesity, maternal smoking, and social class, the association was somewhat reduced but remained significant. [11] A total of nine studies, comprising more than 69,000 participants, qualified for inclusion. The meta-analysis indicated a significant reduction in childhood obesity risk associated with breastfeeding, with an adjusted odds ratio of 0.78 (95% CI: 0.71-0.85) using a fixed-effects

model. The Q-test for heterogeneity showed consistency across study results, and further stratified analysis revealed no significant variations based on study type, age range, definitions of breastfeeding or obesity, or the number of confounding factors adjusted for. [12]

In addition to the benefits of a reduced risk of obesity in later years, it has also been shown to be associated with healthier dietary choices in children's future. Children who were exclusively breastfed for at least 3 months were more likely to consume water, fruits, and vegetables more frequently than the median daily rate, and less likely to consume 100% juice or sugar-sweetened beverages at the age of 6, compared to those who were never breastfed. An additional analysis, focusing solely on children who had ever been breastfed, revealed similar findings. Longer durations of any breastfeeding or exclusive breastfeeding were generally linked to a higher likelihood of consuming water, fruits, and vegetables more frequently and a lower likelihood of consuming sugar-sweetened beverages and 100% juice. [13]

Breastfeeding is associated with lower BMI and higher HDL levels in the future.

Breastfeeding is linked to higher average levels of total cholesterol and LDL during infancy, but to lower levels later in adulthood. These findings indicate that breastfeeding could provide lasting advantages for cardiovascular health and may influence considerations regarding the composition of formula milk. [14]

In a cohort of Third Generation participants (n=962, average age 41 years, 54% female), 26% reported having been breastfed. Compared to those who were not breastfed, breastfed individuals had a lower multivariable-adjusted BMI and higher HDL cholesterol levels. [15]

A study of over 15,000 children aged 9 to 14 years from the Growing Up Today Study found that breastfeeding was associated with a lower risk of being overweight in later childhood and adolescence. Children who were primarily breastfed in infancy had a reduced likelihood of being overweight compared to those formula-fed, with longer breastfeeding durations offering additional benefits. These findings highlight the potential protective role of breastfeeding against overweight during growth and development. [15]

A systematic review of epidemiological studies revealed that adults who were breastfed had mean total cholesterol levels that were lower compared to those who were fed formula milk. [16]

Breastfeeding is linked to healthier adult weight distribution.

This study, using data from the National Longitudinal Study of Adolescent Health, examined the link between breastfeeding and adult weight distribution in two groups: sibling pairs and

unrelated individuals. Regression models adjusted for factors like socioeconomic status, maternal smoking, birth weight, and genetic risk for obesity showed a significant inverse association between breastfeeding and waist-to-height ratio (WHtR) in adulthood. This relationship persisted even after accounting for genetic and maternal obesity factors, suggesting that breastfeeding may contribute to healthier weight distribution, with WHtR potentially serving as a better measure than BMI for such research. [17]

Breastfeeding reduces the risk of cardiovascular diseases.

The relationship between breastfeeding and the risk of cardiovascular diseases later in life remains a subject of active scientific investigation. Another study examines the long-term impact of infant feeding methods on adult cardiorespiratory risk factors, positing that early nutrition could program health outcomes in adulthood. Utilizing data from a cohort of 9,377 individuals born in the UK in 1958, feeding status was categorized as never breastfed, partially or wholly breastfed for less than one month, or breastfed for more than one month. Measurements taken at age 44-45 included various indicators of obesity, blood lipids, and inflammation.

The results show a significant association between breastfeeding for more than one month and reduced central obesity measures (waist circumference and waist/hip ratio) and decreased odds of obesity, even after adjusting for numerous variables, such as birth weight, maternal weight, smoking, and socioeconomic factors. This is particularly important given that obesity is one of the primary risk factors for cardiovascular diseases. [2]

Martin et al. found that the mean diastolic blood pressure was significantly lower among breastfed infants compared to those who were formula-fed. These findings imply that breastfeeding may have long-term effects on cardiovascular health; however, further research is needed to confirm these observations and elucidate their causes. [18]

Even if the difference might seem minor, Cook et al. emphasized that even small reductions in blood pressure values can lead to significant health benefits. As an illustration, a decrease of just 2 mmHg in the average blood pressure of a population has the potential to reduce hypertension prevalence by as much as 17%, lower the incidence of coronary heart disease events by 6%, and decrease the occurrence of strokes by 15%. [19]

Breastfeeding reduces the risk of future carbohydrate metabolism disorders.

Infancy breastfeeding has been linked to a decreased risk of type 2 diabetes, slightly reduced insulin levels in adulthood, and lower blood glucose and serum insulin levels during infancy. [20]

In a study involving 625 participants, individuals who were bottle-fed exhibited higher plasma glucose levels at 120 minutes and a greater prevalence of impaired glucose tolerance compared to those exclusively breastfed. Furthermore, they showed elevated fasting insulin levels, suggesting a potential degree of insulin resistance. [21]

The connection between breastfeeding and diabetes may be explained by these mechanisms, although additional biological factors could also play a role, which are yet to be uncovered. [4] Baur et al. reported an inverse relationship between fasting glucose levels and the presence of long-chain polyunsaturated fatty acids in skeletal muscle membranes. Since these fatty acids are found in breast milk but are absent from many formula brands, it has been suggested that alterations in skeletal muscle membranes may contribute to the development of insulin resistance. This could lead to compensatory hyperinsulinemia and, over time, β -cell dysfunction, eventually resulting in type 2 diabetes. [22] [4]

Numerous studies have shown that formula-fed infants exhibit higher basal and postprandial levels of insulin and neurotensin, a regulator of insulin and glucagon release. These variations might contribute to the earlier onset of insulin resistance and type 2 diabetes. [23] [24] [25]

The duration of breastfeeding and the timing of formula milk introduction have implications for growth patterns.

Longer breastfeeding duration has been associated with lower weight z-scores during infancy. Breastfeeding for less than four months was linked to a higher likelihood of rapid early growth. Between ages 1 and 8, children breastfed for four months or less had an increased chance of exceeding the 95th weight percentile compared to those breastfed for twelve months or more. The timing of formula milk introduction also plays a crucial role; introducing formula before six months was associated with a higher BMI trajectory through age 14 and a greater risk of obesity by age 20. [26]

The benefits of breastfeeding increase with its duration.

One Canadian case-control study on 1,172 adolescents aged 12-18 collected feeding histories through interviews, classifying subjects by obesity status and adjusting for variables like age, socioeconomic status, and family history. The results indicated a two- to fourfold increased risk of obesity among those not breastfed, suggesting a modest protective effect of breastfeeding, linked to its duration.

A second study conducted in Bavaria involved 9,357 children aged 5-6, assessing breastfeeding history and linking it to health exams. Overweight and obesity were defined relative to percentile distributions, and the study controlled for factors like socioeconomic status, parental

education, and early diet. Findings showed a lower prevalence of obesity in breastfed children (2.8%) compared to those never breastfed (4.5%), with a clear dose-response effect: the longer the exclusive breastfeeding, the lower the obesity rates, ranging from 3.8% to 0.8%. [27]

Several other studies provide evidence that the benefits of breastfeeding increase with its duration. Research consistently shows that longer breastfeeding periods are associated with greater reductions in the risk of obesity, improved metabolic health, and enhanced cardiovascular outcomes later in life. These findings underline the importance of promoting extended breastfeeding to maximize its positive health impacts. [28] [29] [30]

Conclusions

Breastfeeding has been consistently shown to provide significant and long-lasting health benefits, reducing the risk of obesity, improving metabolic health, and lowering the likelihood of cardiovascular diseases and carbohydrate metabolism disorders. Studies demonstrate that the duration of breastfeeding plays a crucial role, with longer breastfeeding periods associated with a greater reduction in the risk of obesity during childhood, adolescence, and adulthood. Furthermore, breastfeeding has been linked to healthier dietary habits, better weight distribution, and improved biomarkers such as BMI and HDL levels, contributing to overall cardiovascular health.

The timing of formula milk introduction is another critical factor, as early formula feeding has been associated with higher BMI trajectories and an increased risk of obesity and related metabolic disorders. Exclusive breastfeeding, particularly for six months or more, offers substantial protective effects against obesity, type 2 diabetes, and cardiovascular risks. These benefits are supported by robust evidence from meta-analyses, cohort studies, and systematic reviews.

Promoting and supporting extended breastfeeding practices is essential to maximize these health outcomes. Public health initiatives should emphasize the importance of breastfeeding, not only for its immediate benefits but also for its significant impact on long-term health, providing a foundation for healthier growth, metabolism, and disease prevention throughout life.

Disclosures

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