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Research Article

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Does Nighttime Breastfeeding Increase Obesity in Babies?

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Abstract

Co-sleeping has been practiced throughout human evolution and refers to mother and child sleeping in the same bed. In recent decades, some Western cultures have proposed avoiding co-sleeping due to the risk of sudden death in infants under 4 months of age. This could contradict the custom of mothers sleeping with their breastfed babies, a practice that fosters maternal-child bonding with a better response from the mother to the child's needs for shelter, affection and nourishment, allowing for nighttime breastfeeding on demand. This study aims to contribute to the recognition of the relationship between nighttime breastfeeding and the nutritional status of infants and to determine whether it provides protection against malnutrition or obesity in children in this age group.

Keywords: Breastfeeding; Night feeding; Co-sleeping; Obesity; Malnutrition

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Introduction

Childhood is a critical period of life in which optimal nutritional habits are established to achieve adequate growth and avoid diet-related diseases [1]. Adequate nutrition during infancy and early childhood is essential to ensure that children reach their full potential in growth, health and neurodevelopment. Poor nutrition increases the risk of disease and is directly or indirectly responsible for one-third of the estimated 9.5 million deaths that occurred in children under 5 years of age in 2006. Inappropriate nutrition can lead to childhood obesity, which is a growing problem in many countries [2].

An infant is a child who primarily feeds on milk. The infant period can be divided into:

- **Infant:** From one month of age to one year of age.
- **Older infant:** From the first year of life to two years of age. The infant has an accelerated growth rate that gradually decreases towards the second year of life when the growth rate stabilizes [3]. The recommendations of the WHO and UNICEF for optimal infant nutrition, as established in the Global Strategy are:

- Exclusive breastfeeding during the first 6 months of life
- Start adequate and safe complementary feeding from 6 months of age, maintaining breastfeeding until two years of age or more [2].

The Spanish Academy of Pediatrics (AEP) reminds us of the periods of child feeding as defined by the Nutrition Committee of the American Academy of Pediatrics:

Breastfeeding period: comprises the first 6 months of life, during which the child's diet should be exclusively breast milk or failing that, infant formula. Breast milk protein is of optimal quality and is the reference standard [4]. Breastfeeding should begin early, in the first hours after birth, avoiding bottle feeding. This promotes mother-child contact and provides the first stimulus for milk secretion.

It is well established that breastfeeding decreases the risk of death in childhood and protects the child against infections, necrotizing enterocolitis, obesity, type 2

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diabetes, leukemia and promotes neurodevelopment **(Table 1)** [5].

Table 1: Benefits of breastfeeding.

Benefits of breastfeeding	
For the child	**For the mother**
Decrease in infectious gastrointestinal and respiratory diseases	Decreased postpartum bleeding
Protection against allergic diseases such as asthma, rhinitis and atopy	Decreased menstrual bleeding and lactational amenorrhea
Protection against obesity, hypertension, dyslipidemia and type 2 diabetes mellitus during adulthood	Decreased risk of high blood pressure, obesity, type 2 diabetes and dyslipidemia
Decreased risk of developing leukemia during childhood	Longer intergenic period
Reducing the risk of developing necrotizing enterocolitis in newborns	Faster recovery of pre-pregnancy weight
Reduction in the risk of inflammatory bowel diseases and gluten allergies	Decreased risk of breast and ovarian cancer
Better neurodevelopment and better IQ score	-
Lower risk of attention deficit, autism spectrum disorder and behavioral disorders	-
Emotional affective relationship that favors the child's psychological development and mother reinforces her maternal behavior	

Transitional period: It is part of the second half of life, up to the first year of life. During this period, dietary diversification begins with the gradual introduction of complementary feeding and the introduction of foods other than breast milk or formula. It is beneficial for children to continue exclusive breastfeeding after six months, until the second year while receiving adequate and safe complementary feeding [6].

To start complementary feeding, the physical and system maturation of the baby should be taken into account to consider whether he or she is able to start with foods other than milk [7]. The number of recommended feedings is also subject to a variety of factors. It is suggested to start with one meal a day and progress to two between 6 and 8 months, then between 9 and 11 months three meals are recommended and between 11 and 23 months increase to four meals [4,8]. The volume of milk should complete a total of 400 ml to 500 ml/day, if this volume is not reached, another dairy product should be added during the day to contribute to covering calcium requirements [9].

Modified adult period: It covers the preschool and school age up to 7-8 years of age. During this period, the child gradually adopts a diet that is more similar to that of adults and gradually a diet that provides 30% of the total energy in the form of fat and of this a third in the form of saturated fat, instead of the 50% of saturated fat found in breast milk [1].

Co-sleeping and night feeding

Throughout the centuries, generations and human evolution, it has been a constant that children share a bed with their parents (known as co-sleeping), especially with their mothers. When children sleep with their mothers, they adapt to maternal rhythms and achieve mutual self-regulation [10]. Reference has been made to a greater maternal-child emotional bond in the practice of co-sleeping, which is common in many societies and is often associated with maintaining nighttime breastfeeding. Offering breastfeeding at night increases prolactin levels, which allows for the maintenance of adequate breast milk production. It has also been found that mothers with greater motivation for breastfeeding tend to co-sleep with their babies and those who co-sleep with their children consistently have a longer breastfeeding duration [11].

Generally, newborns experience constant feeding periods, even during the night. Around the second or third month of life, children spend more time sleeping at night, requiring fewer milk feeds during these hours. However, some infants, for emotional and social reasons, receive nighttime feedings, primarily breastfeeding. This in turn can lead to sleep disorders with awakenings conditioned by feeding, even when it is not necessary [12].

Some authors have found an association between short sleep duration in early life and the development of childhood obesity. In the cohort followed by Halal et al., it was found that 5.3% and 8% of children at 4 years of age had developed obesity and overweight respectively [13]. In a different sense, the study carried out by Olsen et al. showed that those children who shared their bed with their parents more frequently had a 3 times lower risk of being overweight [14].

Many cultures and societies continue to practice co-sleeping today; for example, in Norway, the incidence is 60% in the first year of life.

Materials and Methods

Study data and sample

A non-theoretical sample was taken consisting of a group of 88 infants aged between 4 and 12 months who attended an outpatient consultation in a private pediatric office consecutively for one month.

Inclusion criteria

The study included infants who had reached 4 months of age up to 12 months and 29 days of age, who had been full-term newborns (between 37 and 41 weeks 6 days of

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gestation), healthy, with weight and height within normal ranges for gestational age, had not been hospitalized in the neonatal period and did not suffer from any chronic or acute disease at the time of the study.

Exclusion criteria

Infants with a history of being born preterm, post term or with any neonatal pathology, a history of low birth weight (<2500 g) or large-for-gestational-age (>4000 g) at term were excluded. Those with any acute or chronic pathology at the time of the study were also excluded.

Procedures

A questionnaire containing 24 questions divided into three parts was applied.

Part 1: Patient identification data (ID number, initials of first and last names), patient's date of birth and age.

Part 2: Nighttime feeding, type of feedings received during the night, frequency of nighttime feedings, type of feedings received during the daytime.

Part 3: Anthropometric measurements and extrapolation to WHO growth charts and curves for weight for age, length-for-age, weight-for-height, Body Mass Index (BMI)-for-age and head circumference-for-age.

Weight was measured on a properly calibrated digital baby scale, length was measured with an infantometer and head circumference was measured with a generic tape measure. The calculation of BMI, standard deviation for weight, length, weight/length (w/l), head circumference (pc) and BMI was performed using the Anthro application and classification was made based on the WHO growth curves and charts.

Method

A database was designed in Excel, imported and analyzed using Epiinfo 7.1, yielding simple frequency analysis and bivariate analysis. The results are presented in statistical tables, graphs and measures of central tendency, standard deviation and intervals.

Information collection or processing: ethical aspects

The aspects established in Resolution 008430 of 1993 of the Republic of Colombia were taken into account, especially regarding informed consent, confidentiality of the data provided and exclusivity of the study for scientific purposes.

Results and Discussion

Information was obtained from 88 infants, of which 73.86% (65 children) were male and 26.13% female, aged between 4 and 12 months **(Table 2)**.

Table 2: Percentage of the population studied according to age.

Age months	Percentage (%)
4	21.05%
5	15.79%
6	5.26%
7	21.05%
8	15.79%
9	10.53%
10	5.26%
11	5.26%
Total	100.00%

It was also found that most of the children, 74 of them (84%), shared a bed-sharing relationship with their parents and all received nighttime breastfeeding: 65 of them received only breast milk (73.86%) and 23 of them received only formula milk (26.13%). None received any other type of nighttime feeding **(Figures 1,2 and Table 3)**.

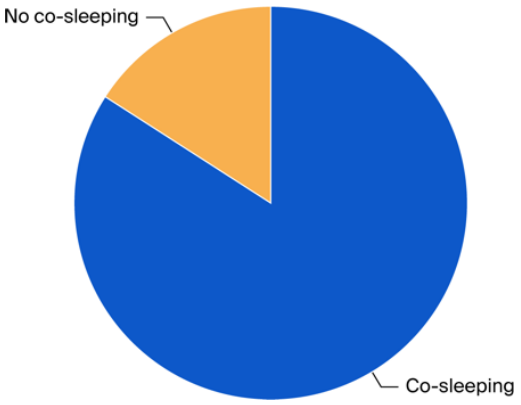

Figure 1: Co-sleeping practice.

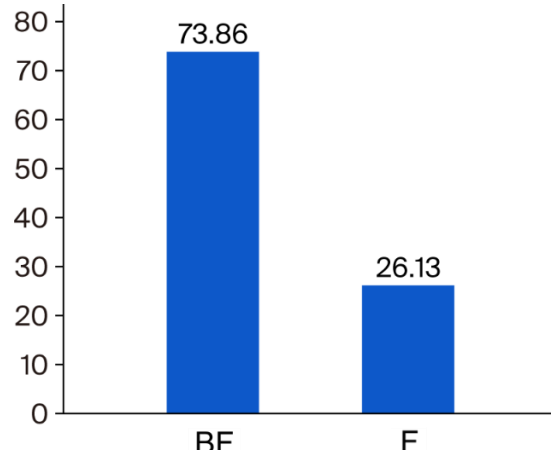

Figure 2: Type of night feeding.

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The frequency of awakenings to feed was most often once per night, followed by two awakenings and less frequently 3 or more times.

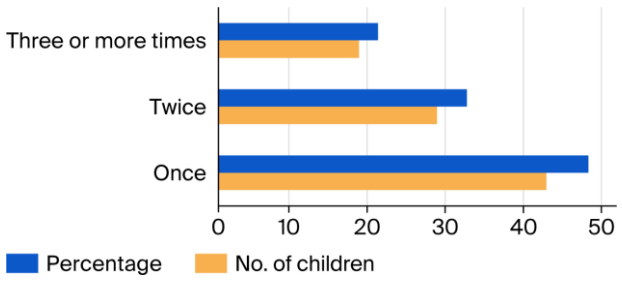

Figure 3: Frequency of waking up to eat.

Table 3: Nighttime feeding frequency by age.

Age in months	n	%
4	14	15.9
5	14	15.9
6	9	10.2
7	14	15.9
8	14	15.9
9	9	10.2
10	5	5.7
11	4	4.5
12	5	5.7
Total	88	100

Regarding daytime feeding, the majority (42%) of children received Breastfeeding (BF) + Formula (F) + Complementary Feeding (CF). Twenty percent received breastfeeding + complementary feeding. Sixteen percent received exclusive breast, another 16% exclusive formula and only 6% consumed formula + complementary feeding **(Figure 4)**.

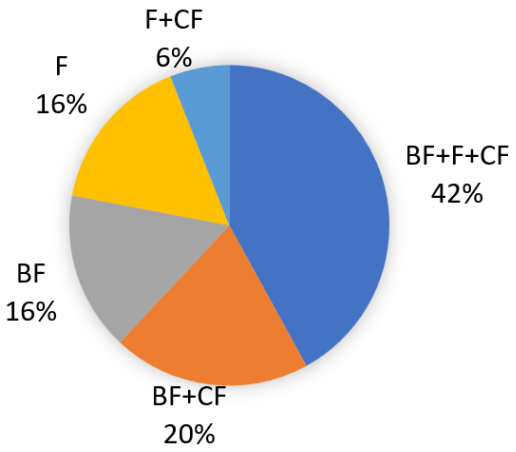

Figure 4: Daytime feeding type.

Regarding anthropometric indices, when weight-for-age (W/A) was assessed, the majority (56 children) were within the appropriate range, but none were underweighted. Regarding Length-for-Age (L/A), 79 children were adequately tall (89.77%) and nine of them were at risk of short stature, with standard deviations between -1 and -2.

The P/L indicator showed greater variability in its results, which are shown in the following table, but none of them with obesity **(Table 4)**.

Table 4: Nutritional classification of children.

Classification	Frequency	Percentage
Suitable	56	63.63%
Risk of malnutrition	4	4.54%
Risk of overweight	28	31.81%
Total	88	100.00%

After reviewing the results of this sample of children under one year of age who were co-sleeping and receiving nighttime feedings, the vast majority of which were breast milk or formula and no other type of food was reported. However, despite the continued nighttime breastfeeding in children who also received complementary feedings during the day, none of them were found to be obese. Approximately one-third were at risk of being overweight and four were at risk of malnutrition, the causes of which warranted further study.

Anthropometric indicators related to weight, height, weight/weight and BMI in most children were within normal ranges without compromising their nutritional status.

It is of great importance to consider that breastfeeding, primarily breast milk, offers many biological, immunological, nutritional and even emotional benefits to babies. It is well known that breastfeeding provides children with probiotics, which are very important in preventing various pathologies, including chronic and inflammatory conditions such as obesity. This protective effect may also be evident in infants who receive additional breast milk at night.

Some studies, such as the one conducted in Singapore, showed that children who were fed at night had a greater increase in BMI between 12 and 24 months of age, so their recommendation was to inform parents so that changes could be adopted to reduce the risk of childhood obesity [15].

Among the problems encountered by children who co-sleep and receive nighttime feedings are difficulty falling asleep, increased nighttime awakenings and sleep disturbances in parents. In the cohort studied in France, it was found that those children who were breastfed after 6 months of age had all of the above-mentioned conditions [16]. The greater number of night awakenings in children

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who are fed at night is more frequent in those who are breastfed compared to those who receive milk formula, although the differences may be minimal [17].

There are some references that relate night wakings with weight gain in infants and some studies even show that preschool and school children with more night wakings and fewer hours of sleep at night have a higher risk of developing childhood obesity [18,19]. The study conducted by O'Shea et al. showed that when caregivers reduced adaptive feeding during the night according to the child's age, the BMI remained stable, thus contributing to reducing the increase in this nutritional indicator and the risk of developing obesity later [20].

Knowing that Hispanic children are at greater risk for obesity and also that they sleep less as infants, Gray et al. conducted a study with mothers and their infants. They found that there are various social and economic reasons for co-sleeping and mothers acknowledge that breastfeeding at night helps their children calm down and helps them and their partners sleep better [21].

Conclusions

The present study shows that nighttime feeding continues to be a common practice in infants, especially with breast milk and less frequently with formula. Although previous publications report an increase in body mass index in preschoolers and schoolchildren who receive nighttime feedings, the study of infants receiving nighttime feedings did not find an increase in this indicator. This may suggest that breastfeeding, especially with breast milk, may be protective against obesity at this age.

However, further studies and larger samples are needed to more consistently determine the effect of nighttime feedings on children's nutritional status, even in those who receive nighttime foods other than breast milk and formula.

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