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The Relationship between Breastfeeding and Obesity in Infancy

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Abstract

Obesity is defined as excessive accumulation of fat which can cause health problems. Body Mass Index (BMI) is a simple indicator used to classify obesity and overweight in adults and children. The purpose of this study is to investigate the effect of breastfeeding duration on childhood obesity. The sample consisted of 674 women and children from the Municipal Kindergartens of Southern Athens. For the statistical analysis the chi-square independence test was used, the statistical function used was Fisher and Monte Carlo simulation and accounting linear regression.

Results

The duration of Breastfeeding more than 6 months reduces the risk of overweight and obesity in children aged 2 years.

Conclusion

Promoting breastfeeding as a public strategy for the prevention of childhood obesity and the better development of children.

Keywords: Breastfeeding, Childhood Obesity, Infancy Age, Body Mass Index

Introduction

Breastfeeding is the best way to feed a newborn and infant. Breastfeeding, which begins in the first hour after birth, is provided exclusively for six months and continues for up to two years or more, is one of the most powerful practices for promoting children's survival and well-being. Breastfeeding reduces the rates of childhood obesity, supports healthy brain development, and is associated with higher IQ tests among children and adolescent children at all income levels [1]. Obesity is a major public health problem internationally. The risk of poor health is strongly correlated with body mass index (BMI) [2]. Childhood obesity begins early in life during preschool years and for many, obesity is transferred to later childhood and adulthood. Once established, obesity is difficult to reverse and is associated with poorer health outcomes in the short and long term. Treating childhood obesity is important to reduce life-threatening risk and protect health [3].

The World Health Organization (WHO) has developed developmental models to describe the normal development of children from birth to 5 years under optimal environmental conditions [4]. Although these are not ideal for the entire pediatric population, these standards have been applied everywhere, regardless of nationality, socioeconomic status, and type of diet. Body Mass Index (BMI) for age Z Score <-2.0,> 1.0,> 2.0 and> 3.0 is recommended by WHO to classify children aged 0–5 years as, risk of being overweight, overweight and

obese, respectively [5]. Z scores are on a linear scale, with the same interval between distribution values this allows the calculation of the average and standard deviation [6].

Aim

The purpose of this study is to investigate the relationship between childhood obesity and breastfeeding. The main premise of the research is that increasing the duration of breastfeeding reduces the development of childhood obesity.

Method

The research was conducted from November 2018 to March 2019 in kindergartens in 4 Municipalities of Southern Athens. A questionnaire structured in 2 parts was used to collect the data. The first part included the demographic and somatometric characteristics of the child and the woman and the second part included questions about breastfeeding and pregnancy. The questionnaires were given to the parents in the kindergarten, the parents were informed about research, and the data were recorded by the parents and returned after 1 week. The data were processed with spss.

Sample

The sample was 674 women and children up to 2–5 years old.

Statistical analysis

The characteristics of the sample were recorded using descriptive statistics. The effect of the duration of breastfeeding on the BMI of children in the 1st and 2nd year of age was also examined through inductive statistics. The chi-square independence test was used for statistical analysis. The statistical function used was that of Fisher, while the Monte Carlo simulation was used to increase the reliability of the control when the hypotheses governing it did not apply (no cell with zero frequency and at most 20% of cells with values below 5). To perform the test, it was necessary to find the Z scores of the variables concerning the BMI for the first and second year of life. Based on these values, the following categorization was made: for values below –2 the children were categorized as cachectic, from –2 to 1 they were categorized having normal weight, from 1 to 2 they were categorized having the risk of being overweight, from 2 – 3 they were categorized as overweight and more than 3 were categorized as obese [7].

In addition, (accounting) (multiple linear regression with independent variables were performed as follows: Alcohol, Smoking, Exercise, Diabetes Pregnancy, Exclusive Breastfeeding, Childbirth Challenge, Type of childbirth (caesarean section, pediatric incontinence or not), normal delivery prenatal, financial situation, weight during pregnancy (BMI1 trimester, BMI2 trimester, BMI3 trimester), BMI mother before pregnancy, BMI father, Mother age during pregnancy, Age father and Duration of breastfeeding. Dependent variables were the children's BMI for the 1st and 2nd year of age. The best backward method (LR) was used to find the optimal model, while there was no problem of multi-linearity between the independent variables. In addition, the hypothesis of independence between the independent variables is met [8].

Results

94% of mothers are Greek, 3.4% of Albanian and the remaining 2.6 are of different nationalities. 36.3% of mothers have university education, 20.0% IEK, 19.9% TEI, 16.9% high school graduates, 3% postgraduate education, 2.1% primary school, 1.2 % college, 0.4% private school and 0.1% primary education. 73.1% gave birth in a private hospital in Athens and the Region, of which 72.6% in Athens. 25.3% in a public hospital and of these 24.5% in Athens, the remaining percentage were born abroad and 0.5% at home. The average age of the mothers during the research is 36.91 (TA = 4.51) years. The youngest mother is 24 years old and the oldest is 56 years old. Even the average age of mothers during pregnancy is 33.93 (TA = 4.52) years. The youngest mother during pregnancy is 20 years old and the oldest is 52 years old. According to the BMI, 72.8% of women have normal weight, 12.7% of women are overweight, 7.5% of women are underweight and 7% of women are

obese. 50.6% of children are boys and 49.4% girls. The average age of children is 3.39 (TA = 1.01) years. The youngest is 0.10 years old and the oldest is 4,7 years old. Regarding the average weight of children at birth, it is 3.4 (TA = 0.489) kg. The smallest weight is 2.300 kg and the largest is 4.880 kg. Also, the average weight of children in the first year is 9.75 (TA = 1.21) kg. The smallest weight is 7,950 kg and the largest is 13.70 kg. In addition, the average weight of children in the second year is 12.58 (TA = 1.56) kg. The smallest weight is 9,200 kg and the largest is 18,700 kg.

In terms of breastfeeding duration, 40.2% of women breastfed from 1 - 6 months (almost half of them (120) breastfed only in the first month), 31.9% from 6 - 12 months, 13.4 % from 12 - 18 months, 6% from 18 - 24 months and the remaining 8.5% over 24 months. 55.4% of women have exclusively breastfed. In the first year of life, 84.4% of children have normal weight, 11.8% are in the limit at overweight, 2% of children are overweight, 1.2% cachectic and 0.7% are obese. In the second year of life 81.8% of children have normal weight, 13.7% of children are in the limit of overweight, 3% are overweight, 1.1% cachectic and 0.5% are obese. The breastfeeding and BMI relationship of children for the first year of life is shown in (Table 1).

Table 1: Breastfeeding and BMI (Z scores) of children for the 1st year of life.

			Duration. Breastfeeding 1		
			1–6 μήνες	6 +	Total
ZScore 1st year	Cachectic	N	0	7	7
		%	0,0%	1,8%	1,2%
	Normal weight	N	177	325	502
		%	83,5%	84,9%	84,4%
	To the limit of becoming overweight	N	28	42	70
		%	13,2%	11,0%	11,8%
	Overweight	N	4	8	12
		%	1,9%	2,1%	2,0%
	Obese	N	3	1	4
		%	1,4%	0,3%	0,7%
Total		N	212	383	595
		%	100,0%	100,0%	100,0%
Fisher's exact test : 7,101		**p:**	0.118	**CI** (99%):	0.110–0.127

Based on the data of table 3, during the statistical analysis, it is observed that there is no statistically significant relationship between the duration of breastfeeding and the BMI for the 1st year of life (Fisher's exact test = 7.101, p = .118, CI (99%):. 110-. 127). Breastfeeding relationship and BMI (Z scores) of children for the 2nd year is described in (Table 2).

It is observed that there is no statistically significant relationship between the duration of breastfeeding and the BMI for the 2nd year (Fisher's exact test = 4,542, p = .207, CI (99%): 197 -.217).

The results of the accounting regression are presented in Table 3 with the dependent variable BMI (zscore, 1 = Obesity or overweight or at the limits to be overweight, 0 = normal weight) for the 2nd year of children and independent variables the following: Alcohol, Smoking, Exercise, Exclusive breastfeeding, Epidural, Childbirth challenge, Type of birth (caesarean section or not, normal

delivery or not), Gender of the child, Birth sequence of the child before birth, Financial situation, Weight during pregnancy, BMI2, BMI1 trimester BMI of the month), BMI of the mother before pregnancy, BMI of the father, Age of the mother during the pregnancy, Age of the father and Duration of breastfeeding (0 = 0 – 6 months, 1 = 6+ months). The backward (LR) method was used to find the optimal model. The regression was statistically significant Cox & Snell R Square = .463, Nagelkerke R square = .621, Hosmer and Lemeshow Test, X2 (7) = 4,833, p = 0.680). It is observed that the BMI of the 1st trimester of pregnancy (b = –0.54, p = 0.00) and the duration of breastfeeding (B = –1.021, p = .045) have a negative effect on weight gain (marginally overweight or overweight or obese). Children who have been breastfed for more than 6 months are less likely to be overweight, obese or obese than those who have been breastfed for less than 6 months. Even for a BMI increase unit in the first trimester, children are more likely to have a normal weight (Table 3).

Table 2: Breastfeeding relationship and BMI (Z scores) of children for the 2nd year.

			Duration. Breastfeeding		
			1–6 μήνες	6 +	Total
Z Score 2nd year	Cachectic	N	4	2	6
		%	1,9%	0,6%	1,1%
	Normal weight	N	163	304	467
		%	78,4%	83,7%	81,8%
	To the limit of becoming overweight	N	34	44	78
		%	16,3%	12,1%	13,7%
	Overweight or Obese	N	7	13	20
		%	3,4%	3,6%	3,5%
Total		N	208	363	571
		%	100,0%	100,0%	100,0%
Fisher's exact test : 4,542		**p:**	0.207	CI (99%):	0.335–0.349

Table 3: Accounting linear regression of the BMI for the 2nd year of children.

Variables in the Equation

	B	S.E. (Typica error)	Wald(1)	Odds ratio (95% CI)
BMI 1st trimester	–.054	.014	14.276**	948 [.922, .974]
Breastfeeding duration	–1.021	.478	4.562*	360 [.141, .919]
****p<.01, *p<.05**				

Discussion

Breastfeeding is considered a protective factor in the prevention of childhood obesity. Many studies have shown the protective effect of breastfeeding on the prevention of childhood obesity and especially the longer a child breastfeeds, the more protected it is from childhood obesity [6, 9–18]. Especially, as part of the International Study on Asthma and Childhood Allergies (ISAAC), two studies were conducted between September 1995 and December 1996 in Germany. The analysis population includes 1256 children in Dresden and 1333 children in

Munich aged 9–10. The increasing duration (exclusive breastfeeding) has reduced the percentage of overweight children. The prevalence of overweight was significantly higher in children who had never breastfed than in those who had breastfed (16.4% / 9.9%, 24.3% / 15.2%). Also, breastfed babies for more than 1 year (OR 0.41, 95% CI 0.18 - 0.90) were statistically significantly less likely to be overweight [10]. Another study 1999 by von Kries et al in southern Bavaria, Germany, in a sample of 134,577 children in a 1997 health examination before entering school showed that breastfeeding had a protective effect on childhood obesity. In breastfed infants for at least 6 months or more, the risk of being overweight or obese decreased by> 30% and> 40%, respectively [9].

Armstrong et al, 2002, in a study of a group of children in Scotland who born in 1995 or 1996, with a sample size of 32,200 children aged 39–42 months, found that the prevalence of obesity was significantly lower among breastfed infants compared to not breastfed infants. The end result was that breastfeeding causes a small reduction in the risk of childhood obesity [11]. Also a research 2017 that include data from a sample of 19,517 children born in 2000, where data were collected at the ages of 3, 5 and 7 years for each child found that breastfeeding for longer periods of time reduces BMI to a greater extent for both partial and exclusive breastfeeding, but the results are greater when breastfeeding is prolonged and exclusive. The results become greater as children get older. Although breastfeeding can cause a significant reduction in BMI, the results look small. However, these small differences in childhood are likely to lead to greater differences in adulthood [16].

Other studies have shown that the effect of breastfeeding on obesity prevention is not statistically significant. There are indications that it reduces the percentage of children who are at risk of being overweight, but it does not affect the percentage of children who are overweight or obese [19–21]. The present study based on chi-square independence test found that there was no statistically significant relationship between the duration of breastfeeding and childhood obesity at the age of the first year and second year. Although there is no statistically significant relationship in infants at the age of first year, the percentage of infants who have normal weight is higher (84.9% / 83.5%) while the percentage of infants who are at the limit to be overweight (11 % / 13.2%) and obese (0.3% / 1.4%) are smaller in breastfed infants over 6 months than in breastfed infants less than 6 months. Also, although in the 2nd year there is no statistically significant relationship between the duration of breastfeeding and the obesity of the child, the percentage of children who have a normal weight is higher in breastfed babies over 6 months. (83.7% / 78.4%), while the percentage of children. who are at the limit of being overweight (12.1% / 16.3%) and overweight or obese (3.6% / 3.4%) is lower. in breastfed babies over 6 months. In contrast, in the accounting regression, the increase in the BMI of the first trimester by 1 unit and the duration of breastfeeding for more than 6 months are statistically significant (** p <.01, * p <.05) with a decrease in the percentage of children who are at the limit of excessive weight, overweight and obesity at the age of 2 years.

Conclusion

Breastfeeding duration more than 6 months helps reduce children who are overweight or obese at the age of 2 years based on accounting linear regression. In contrast, chi-square independence testing, although breastfeeding for more than 6 months results in a lower percentage of children being overweight or obese, is not statistically significant. Based on the above findings and that breastfeeding is the best way to eat for an infant, the goal is for all women to be able to breastfeed their child more than 6 months and through this strategy to prevent children of obesity and improve childhood development.

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