

Revisión

Effect of maternal obesity on lactation: systematic review

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Abstract

Objective: The short duration or lack of breastfeeding has been associated with maternal obesity. The purpose of this study was to systematically review prospective studies that assessed the effect of maternal obesity on lactation.

Methods: A search of studies was conducted in Pubmed, these included prospective studies on maternal obesity and initiation, intention and duration of breastfeeding: 653 articles were found, only seven were prospective studies. After adding other studies found by hand, a total of nine studies were analyzed.

Results: Three out of four papers observed a higher risk for delay lactogenesis among obese mothers, odds ratio ranging from 1.02 to 1.10. The study assessing the initiation of lactation showed that non-obese mothers initiated lactation sooner, OR: 0.39 (95% CI: 0.25-0.62). The overall risk for cessation of breastfeeding showed that obese mothers had higher risks of early cessation, HR: 1.50 (CI 95% 1.11-2.04). In one study it was observed that obese mothers were not more likely to never breastfeed, OR = 1.56 (95% CI: 0.97-1.50).

Conclusions: This review shows that in prospective studies, obese mothers are more likely to have delayed lactogenesis and reduced lactation. Therefore, weight control and breastfeeding promotion should be reinforced before and during pregnancy. In overweight and obese mothers, breastfeeding should be closely monitored after birth.

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Key words: *Maternal obesity. Lactogenesis. Breastfeed.*

Introduction

Obesity is a public health problem worldwide that demands important attention.^{1,4} It is considered a risk

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EFECTO DE LA OBESIDAD MATERNA SOBRE LA LACTANCIA: REVISIÓN SISTEMÁTICA

Resumen

Objetivo: La falta de lactancia o su corta duración ha sido asociada con la obesidad materna. El propósito de este estudio fue realizar una revisión sistemática de estudios prospectivos que estudiaron el efecto de la obesidad materna sobre la lactancia.

Métodos: Se realizó una búsqueda en Pubmed, se incluyeron estudios prospectivos del efecto de la obesidad materna sobre la iniciación, la intención y la duración de la lactancia: se encontraron 653 artículos, y siete fueron estudios prospectivos. Después de agregar otros estudios seleccionados a mano, se analizaron nueve estudios.

Resultados: Tres de cuatro estudios observaron un mayor riesgo de retraso de la lactogénesis en madres obesas, OR: 1,02 a 1,10. El estudio que analizó la iniciación de la lactancia describió que las madres no obesas iniciaron la lactancia más temprano, OR: 0,39 (95% CI: 0,25-0,62). El riesgo de terminación temprana de la lactancia fue mayor en madres obesas, HR: 1,50 (CI 95% 1,11-2,04). En un estudio se observó que las madres obesas no tenían más probabilidades de no lactar, OR = 1,56 (95% CI: 0,97-1,50).

Conclusiones: Esta revisión realizada en estudios prospectivos indica que, es más probable que las madres obesas tengan lactogénesis atrasada o un periodo corto de lactancia. Por lo tanto, el control de peso y la promoción de la lactancia deben reforzarse antes y durante el embarazo. En madres con sobrepeso y obesidad, la lactancia debe de ser promovida y supervisada después de nacimiento.

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Palabras clave: *Obesidad materna. Lactogenesis. Lactancia.*

factor for the development of multiple chronic diseases such as hypertension, insulin resistance, diabetes and hyperlipidemia.⁵ Additionally, obesity has been associated with an increased risk for death.⁶

A recent study showed that the prevalence of obesity among pregnant women was 28.9%, a trend that continues to rise.⁷ Obesity during pregnancy has been associated with a number of complications during and after pregnancy, including gestational diabetes, preeclampsia, birth defects, and increased risk for thromboembolism and shoulder dystocia.^{8,9} Furthermore, it has been suggested that maternal obesity could predispose the unborn child to a higher risk for coronary artery disease later in life.¹⁰

Conjointly, several studies have shown that maternal obesity has a negative effect on the duration of breastfeeding and delayed lactogenesis.¹¹⁻¹³ Rutishauser & Carlin reported a 50% risk of early termination of breastfeeding amongst mothers with BMI > 26 kg/m².¹¹

A recent systematic review¹⁴ analyzed the effects of maternal obesity on duration of breastfeeding, initiation and intention to breastfed. However, this systematic review incorporated prospective, retrospective, and other types of publications. Since prospective studies could identify a cause-effect association, the purpose of this study was to systematically review and evaluate only prospective studies that assessed the effect of maternal obesity on lactation.

Materials and methods

A systematic review was conducted from articles registered in Pubmed with the following search data: “obesity,” “maternal obesity,” “lactation” and “breastfeeding,” and published in English. For the purpose of this review, we included only prospective studies up to June 2010. Research studies were also identified from the reference lists of other articles, and the authors’ literature collection was hand-searched. Six hundred and fifty-three articles were found, only 14 of which were considered relevant.

After removing duplicates, eight articles remained and three additional papers that were duplicates from previous studies were also eliminated. Four studies reported in other papers were also included. After careful selection, we excluded all studies based on data from

previous trials, a total of nine studies remained relevant and they were analyzed in this systematic review.

Quality evaluation

The prospective studies were evaluated according to the following criteria: 1. Type of measurement (objective vs subjective) of delayed lactogenesis. 2. Measurement of duration of lactation. 3. Objective or reported weight and height for the calculation of BMI. 4. Use of Analysis of Relative Risk Ratio (RR), Odds Ratio (OR), or Hazard Ratio (HR). Each criterion was assigned zero points if it was not described and/or measured subjectively; one point was given if the criterion was described and measured objectively. The highest score a study could potentially achieve was four points, those studies with such score were considered of great quality.

Results

Most studies utilized the WHO definition of obesity: underweight < 18.50 kg/m², normal range 18.50-24.99 kg/m², overweight ≥ 25.00 kg/m², and obese ≥ 30.00 kg/m².¹⁵ A few studies used the United States Institute of Medicine definition of obesity: underweight/normal weight BMI < 26.1 kg/m², overweight BMI 26.1-29.0 kg/m², obese BMI > 29.0 kg/m².¹⁶

Table I shows the association between obesity and lactogenesis. The OR reported ranged from 1.1 to 6.1.¹⁷⁻²⁰ One study measured prolactin concentrations immedi-

Table I
Prospective studies on the association of obesity and lactogenesis

Reference	N	Age (years)	Follow-up (days)	Criteria	Results	QS
Chapman & Pérez-Escamilla USA. 2000	57	31.3 ± 4.3	3	Ob (at least 2 out of 3 of the following): BMI ≥ 30 kg/m ² ; Subscapular folding ≥ 33.7 o ≥ 85%ila; Heavy/Ob morphology Starting point of milk transfer: ≥ 60 h with ≥ 9.2 g/l session.	Delayed lactogenesis: ≥ 60 h pp Ob = OR 6.14 (95% CI: 1.10-37.41, p = 0.05) Maternal perception of milk transference ≥ 72 h pp: Ob = OR 1.97 (95% CI: 0.29, 13.41, p = 0.49)	4
Dewey, et al. USA. 2003	280	NA	7	Ob/overweight = > 27 kg/m ²	Delayed lactogenesis (72 h) Ob = RR: 2.11 (95% CI: 1.07-3.22, p = 0.03) Delayed Lactogenesis (7 days) Ob = RR: 2.58 (95% CI: 1.07-5.22, p = 0.035)	3
Hilson, et al. USA. 2004	151	19-45	5	Normal weight 26 kg/m ² (RG) Overweight > 26 kg/m ² Ob > 30 kg/m ²	Delayed Lactogenesis Ob = OR: 1.1 (95% CI: 1.0-1.2, p = 0.07)	2
**Rasmussen, et al. USA. 2004	34	NA	7	Normal weight: < 26 kg/m ² (RG) Overweight/Ob: ≥ 26 kg/m ²	Prolactin concentration after lactation/ response to suckling: Normal weight = 215.2 / 26.0 ng/ml Overweight/Ob = 182.9/10.3 ng/ml (p < 0.0001)	1
Nommsen-Rivers et al. USA. 2010	405	NA	7	Underweight or normal: < 25 kg/m ² (RG) Overweight: 25.0-29.9 kg/m ² Ob: > 30 kg/m ²	Delayed lactogenesis: Overweight = OR: 1.84 (95% CI: 1.07-3.16, p = 0.0001) Ob = OR: 2.21 (95% CI: 1.24-3.94, p = 0.0001)	4

Table II
Effect of maternal obesity on duration of lactation

Reference	N	Age (years)	Follow-up (days)	Criteria	Results	QS
Rutishauser & Carlin. Australia. 1992	739	~25	~14 days	Normal weight: < 26 kg/m ² (RG) Overweight/Ob: > 26 kg/m ²	Cessation of breastfeeding Overweight/Ob: Hazard ratio: 1.50 (CI 95% 1.11, 2.04, p=0.01)	4
Oddy, et al. Australia. 2006	1,803	NA	36	Normal weight: < 25 kg/m ² (RG) Overweight: 25 a ≤ 30 kg/m ² Ob: > 30 kg/m ²	Never breastfed Overweight: OR = 1.19 (95% CI: 0.81-1.74, p=0.366) Ob: OR = 1.56 (95% CI: 0.97-1.5, p=0.68) Breastfeeding < 2 months Overweight: OR = 1.37 (95% CI: 1.06-1.78, p=0.017) Ob: OR = 1.98 (95% CI: 1.41-2.78, p=<0.0005) Breastfeeding < 4 months Overweight: OR = 1.37 (95% CI: 1.07-1.75, p=0.012) Ob: OR = 1.97 (95% CI: 1.40-2.77, p=<0.0005) Breastfeeding < 6 months Overweight: OR = 1.31 (95% CI: 1.02-1.69, p=0.033) Ob: OR = 1.68 (95% CI: 1.18-2.38, p=0.004)	2
**Scott, et al. Australia. 2006	587	NA	13	Normal weight: < 25 kg/m ² (RG) Overweight: 25-29.9 kg/m ² Ob: > 30 kg/m ²	Women who lactated at 7 days/11/3/6/12 months: Normal weight: 91.8 ± 2.8/80.1 ± 4.1/65.2 ± 4.9/49.0 ± 5.2/20.7 ± 4.2 Overweight: 89.3 ± 5.9/82.4 ± 7.2/65.5 ± 9.0/48.3 ± 9.5/18.7 ± 7.4 Ob: 85.9 ± 7.4/72.7 ± 9.4/49.4 ± 10.6/35.7 ± 10.1/15.6 ± 7.7	4
Baker et al. Denmark. 2007	37,459	18-45	12	Underweight: < 18.5 kg/m ² ; Normal weight: 18.5-24.9 kg/m ² (RG); Overweight 25.0-29.9 kg/m ² , Ob class I 30.0-34.9 kg/m ² , Ob class II 35.0-39.9 kg/m ² , Ob class III > 40.0 kg/m ²	Relative risk of breastfeeding termination (of ABF) Overweight: RR = 1.12 (95% CI: 1.09-1.16) Ob I: RR = 1.24 (95% CI: 1.18-1.31) Ob II: RR = 1.37 (95% CI: 1.25-1.50) Ob III: RR = 1.39 (95% CI: 1.19-1.63)	3

N = Population size; Ob = Obesity; BMI = Body Mass Index; ABF = Any Breast Feeding; RG = Reference Group; NA = Not Available; PP = Postpartum; CI = Confidence Interval; RR = Risk Ratio; OR = Odds Ratio; QS = Quality Score; ** No OR or RR reported.

ately after lactation and after suckling. The normal weight mother had a higher concentration of prolactin in both circumstances.²¹ Another study evaluating delayed lactogenesis in obese mothers at 72 hrs. postpartum and seven days postpartum found that obese women had an OR of 2.11 and 2.58 respectively.¹⁹ Table II presents the association between obesity and duration of lactation. All the studies revealed that obese mothers have a shorter period of lactation than normal weight mothers. The study conducted by Oddy et al.,¹² concluded that obese mothers who never breastfed had 1.56 odds of never breastfeeding, 1.98 odds of breastfeeding for less than two months, 1.97 odds of breastfeeding for less than four months and 1.68 odds of breastfeeding for less than six months.¹² The study conducted by Baker et al.,²² determined that the relative risk of early termination of lactation ranged from 1.12 for overweight mothers to 1.39 for type III obese women.

Discussion

Delayed lactogenesis

In this review we observed a consistent pattern of delayed lactogenesis in mothers with overweight or obe-

sity. Although the results are consistent with those found in previous reviews¹⁴ and in studies conducted on obese women with diabetes,²³ this study adds to the literature by only including prospective studies and showing that the highest quality score studies demonstrate a higher risk of delayed lactogenesis among women with obesity.

The results could be explained by the lower prolactin concentration showed in obese mothers at rest and after suckling.²¹ Progesterone withdrawal, which occurs postpartum, is one of the factors responsible in preparing the mammary gland.^{24,25} Progesterone is stored in adipose tissue leading to a constant hormonal level that albeit very low might also be responsible for inhibiting lactogenesis.^{26,27} Another factor which could indirectly cause a perceived delay in lactogenesis could be associated with anatomical characteristics such as adipose tissue between ducts that prevents proper milk flow.¹⁹ The effects of psychological or physical problems of obese mothers regarding lactation need to be explored.

Duration of lactation

This review showed a consistent pattern of reduced lactation among mothers with overweight or

obesity. The four prospective studies, including the two with the highest qualitative scores, show that obese mothers breastfed for a shorter period of time when compared to non-obese mothers.¹² Obesity poses several socio-cultural aspects that have been observed and associated with shorter lactation periods,^{8,12,13,17,27} It has been suggested that obese women might be part of social groups that are linked with higher risk of shorter lactation time,²⁸ and they also have negative attitudes towards breastfeeding.²⁹ This may be due to problems with self-image³⁰ and with being uncomfortable with breastfeeding in public.³¹ Additionally, post-partum depression is more common among obese mothers, which is also associated with reduced lactation.

When comparing these results with the findings of Amir et al., we observed the mix of various types of studies included in their tables, which could potentially hinder or bias the results stated therein. Yet, the prospective studies that they analyzed show that there are statistically significant findings, suggesting a link between a higher BMI and lower duration of breastfeeding and a delay in lactogenesis.

In conclusion, this review shows that, in prospective studies, maternal obesity is consistently associated to delayed lactogenesis and reduced lactation and thus, reinforcing the fact that weight control before, during, and after pregnancy should be an objective of prenatal control. Additionally, these results also indicate the importance of emphasizing the promotion of breastfeeding among obese women during pregnancy.

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