



How Important is Gestational Diabetes for Breastfeeding Results?

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Abstract

Objective: To evaluate the research that investigates the breastfeeding status of postpartum women with Gestational diabetes (GDM).

Methods: This literature review was created by scanning studies between 1990-2011 "gestational diabetes and breastfeeding" in Medline, Cochran and Pub-Med databases. It was not found any Turkish study.

Results: Research were examining the relationship between gestational diabetes, breastfeeding and they were published between 2004-2011. Five studies were examined. The 40% of the studies were prospective, 40% retrospective cohort study and 20% had intervention - control design. The effect of gestational diabetes on breastfeeding status, breastfeeding duration and first formula feeding time was examined in 20% of studies and it was found that these periods are shorter in gestational diabetes women than healthy pregnant women and formula feeding time began earlier in this mothers. Type 1, Type 2 diabetes breastfeeding results were compared with gestational diabetes mothers' results in 40% of the studies although the results were better for gestational diabetes mothers, the level of breastfeeding was not desired. In addition, 20% of studies compared effect of bottle-feeding and breastfeeding of the gestational diabetes mothers' newborns blood glucose level and this level was determined to be higher in breastfeeding newborns compared with bottle-feed.

Conclusion: The limited studies reported the effect of gestational diabetes to breastfeeding but there is need of larger studies with comprehensive samples. The nurses should give special support and training to these special groups.

Keywords: Gestational diabetes, breastfeeding, literature review.

Gestasyonel diyabet emzirme sonuçları için ne kadar önemli?

Amaç: Gestasyonel diyabet mellitus'u (GDM) olan kadınların postpartum dönemdeki emzirme durumlarını inceleyen çalışmaların derlenmesidir.

Yöntem: Bu literatür incelemesinin evrenini "gestational diabetes and breastfeeding" anahtar kelimelerini kullanılarak Medline, Cochran ve Pub-Med veri tabanlarından 1990-2011 yılları arasındaki çalışmalar taranarak oluşturulmuştur. Türkçe herhangi bir çalışmaya rastlanmamıştır.

Bulgular: Emzirmeyle gestasyonel diyabet arasındaki ilişkiyi inceleyen araştırmalar 2004-2011 tarihleri arasında yayınlanmış olup, beş çalışma incelenmiştir. Çalışmaların %40'ı prospektif, %40'ı retrospektif kohort çalışması, %20'si deney kontrol çalışması dizaynındadır. Gestasyonel diyabetin emzirme durumuna, süresine ve mamaya başlama zamanına etkisini inceleyen çalışmaların %20'sinde gestasyonel diyabette bu sürelerin sağlıklı gebelere göre daha kısa olduğu ve mamaya daha erken başlandığı belirlenmiştir. Çalışmaların %40'ında Tip 1, Tip 2 diyabeti olan annelerle gestasyonel diyabeti olan annelerin emzirme sonuçları karşılaştırılmıştır. İncelenen çalışmalarda gestasyonel diyabet açısından daha iyi sonuçlar elde edilmesine rağmen, emzirmenin istenilen düzeyde olmadığı belirlenmiştir. Ayrıca çalışmaların %20'sinde, gestasyonel diyabetli anneden doğan yeni doğanın beslenme şeklinin kan şekeri düzeyine etkisi incelenmiştir ve emzirilen yenidoğanların mamayla beslenenlere göre daha yüksek bir kan şekeri profiline sahip olduğu belirlenmiştir.

Sonuç: Sınırlı sayıda çalışmada gestasyonel diyabetin emzirmeyi olumsuz etkilediği tespit edilmiştir, kapsamlı ve örneklemi daha büyük çalışmalara gereksinim vardır. Hemşirelerin bu özel gruplara özel destek ve eğitim vermesi gerekmektedir.

Anahtar Sözcükler: Gestasyonel diyabet, emzirme, literatür incelemesi.

Introduction

Breastfeeding is important issue for the health of mother and infant, but some risks in pregnancy like gestational diabetes (GDM) is thought to affect it. Gestational diabetes (GDM) is impaired glucose intolerance.^[1-4] According to the American Diabetes Association (ADA, 2004) the incidence of diabetes in pregnancy is 7%, and Turkish Diabetes Foundation reported this ratio as 3%.^[5,6] Womens with GDM usually prefer breastfeeding but clinical research indicates that this mothers experience problems related to breastfeeding.^[7-9] Literature reports that lactogenesis 2 (process of milk secretion after birth within 30 to 40 hours) in women with diabetes was delayed nearly 2 hours, and this condition is stated to increase the likelihood of babies' formula intake.^[3,10-17] Exposure is thought to be due late start of lactation and higher risk of hypoglycemia in the newborn.

There is imbalance in the amount of insulin necessary for start of lactation and glucose balance in GDM. Unbalanced amount of insulin is negative for beginning of lactation (lactogenesis1) and more (lactogenesis 2). For start of the lactogenesis 1, insulin and hydrocortisone, as well as prolactin is required. For the start of lactogenesis 2 adequacy of prolactin, growth hormone, insulin and cortisol are important. Milk production occurs in alveolar and myoepithelial cells of the breast lobes. Alveolar cells are responsible of the construction of milk, myoepithelial cells are responsible for secretion of milk through the sinuses. There are insulin receptors on the surface of alveolar cells. In order to make enough milk there must be present insulin in insulin receptors, some problems such as hyperglycemia, were insulin resistance is developed, can negatively affected lactogenesis. At the same time in case of hyperglycemia, norepinephrine is secreted. Norepinephrine, increases the peripheral vascular resistance, so blood flow is reduced to the insulin-sensitive tissues. As a result of reduction in blood flow to lobes the production of milk is adversely affected.^[11-15]

Diabetic mothers during pregnancy are exposed to high levels of glucose and this is risk for hypoglycemia in the newborn. Newborn blood sugar during pregnancy is parallel to the mother's

blood sugar, so a high level of insulin is secreted in newborn. The construction of the high level of insulin will continue after the birth. This situation increases the risk of neonatal hypoglycemia. Hypoglycemic infants sucking can be weak and powerless.^[10-12,14,15] As a result, the effect of insulin imbalance on lactogenesis and hypoglycemia may affect breastfeeding in GDM.

This literature review was conducted to analyze the effect of gestational diabetes on breastfeeding. For minimizing problems related to breastfeeding, early first breastfeed and fully breastfeeding should be provided. This is very important responsibility of health personnel that affect the health of the community. Therefore, some situations such as gestational diabetes can affect breastfeeding, and especially nurses should identify the risk situations, needs of this mothers and provide appropriate support. Identifying problems in this area will provide nurses' guidance for their intervention.

Methods

Search Strategy

Relevant articles were found using Medline, Cochran and Pub-Med databases by "gestational diabetes and breastfeeding" keywords. The footnote chasing technique proposed by Bates (1989) was applied to review the reference lists of the retrieved articles to find articles missed in the search of the online databases. For Turkish papers google academic, national journals and national thesis center were screened. There was no any Turkish study that evaluated the effect of gestational diabetes on breastfeeding. The studies published between 2004 and 2011, have been included in review. For this study, the 27 study has been reached. These five studies met the inclusion criteria of review (Figure 1).

Data Extraction

For each retrieved study, the data on the authors, the publication year, the study sample, the sample size, the research design, and related key findings were extracted for further synthesis and comparison. The retrieved data are listed in Table 1.

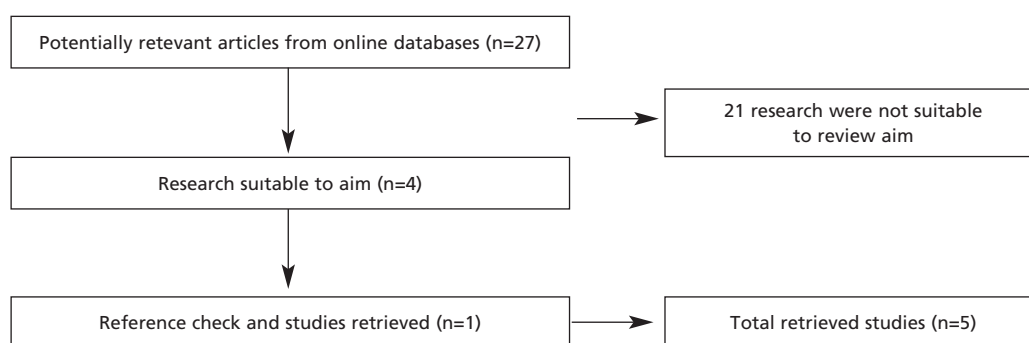


Figure 1. Data searching and retrieval.

Characteristics of the Studies

Among related researches, five studies published in between 1993 and 2009 examined the relationship between breastfeeding and gestational dia-

betes (Table 1). Only breastfeeding results of GDM and the data related with blood glucose of newborn were summarized for the purpose of literature examination.

Table 1. Retrieved studies on effect of gestational diabetes mellitus (GDM) on breastfeeding.

Author/ Publish year	Place	Aim	Participants	Design/ Method	Results
Hummel et al. (2008)	Germany	To determine the breastfeeding habits and the factors that affect this habits in mothers with GDM	257 mothers with GDM and 527 healthy mothers	Prospective	It was found that babies of mothers with GDM were breastfed less than babies of healthy mothers, and full or partial breast-feeding times were shorter. It was identified that the factors affecting breast-feeding in mothers with GDM were BMI and having insulin treatment.
Foster et al. (2009)	Australia	To determine the effect of antenatal milk expressing of breastfeeding results in mothers with GDM	43 mothers in intervention group, 50 mothers in control group	Control trial	In the experiment group; - Rate of breastfeeding in the first 24 hours, - Rate of breastfeeding until being discharged from the hospital were found higher compared to control group, - and the rate of nursing baby with formula in the first 24 hours and until being discharged from the hospital were found lower compared to control group.
Soltani et al. (2009)	England	To identify breastfeeding behavior in a group of women with diabetes and to determine factors that may influence breastfeeding rates in this population.	192 mothers with GDM 43 mothers 1 and with DM Type	Retrospective-cohort	It was observed that mothers with GDM were more successful in starting breastfeeding than mothers with Type 1 and Type 2 diabetes but breastfeeding conditions were not statistically different.
Simons et al. (2004)	New Zealand	To describe the uptake of breast feeding in mothers with either Type 2 diabetes or gestational diabetes (GDM).	373 mothers with GDM and 30 mothers with Type 2 diabetes	Retrospective	Rate of achieving the first breastfeeding or rate of breastfeeding when being discharged was lower in mothers with Type 2 diabetes compared to mothers with GDM. However, it was indicated that the first breastfeeding rates in GDM were not at a desired level (68%).
Chertok ve et al. (2009)	Israel	To examine the effect of early breastfeeding and type of nutrition used for the first feed (human milk or formula) on glucose levels in infants born to women with gestational diabetes.	84 newborns of mothers with GDM	Prospective	It was found that babies who were fed by breast-milk in their first feeding had significantly lower risk of hypoglycemia than babies who were fed by formula in their first feeding (p=0.002).

Results

The effect of GDM on early postpartum breastfeeding;

Four of the studies reviewed the effect of GDM to first feeding, feeding status at hospital discharge and postpartum breastfeeding until the sixth month. One of these four studies compare the results of GDM with healthy mothers, and the other one is the effect of different intervention performed in GDM mothers to breastfeeding results. In the other two study, breastfeeding results of GDM, type 1 and 2 diabetes effect on breastfeeding were compared.

Hummel et al. in 2008 reported that 86% of healthy mothers babies, and 75% of GDM mothers babies breastfeed ($p < 0.0001$).^[17] Healthy mothers performed full breastfeeding (only breastfeeding) for 17 week, and mothers with GDM survived this situation for nine weeks ($p < 0.0001$). The average duration of any breastfeeding was 26 weeks for healthy and, 16 weeks for mothers with GDM ($p < 0.0001$). Full and any breastfeeding was shorter in women with insulin treatment than those in diet controlled group ($p < 0.01$). Total duration of breastfeeding in insulin treated group was averagely 10 week and 20 weeks in diet controlled group 20 week ($p < 0.0001$).

Forster et al. compared the postpartum breastfeeding results of 43 GDM mothers who did milking ntenatally with 50 GDM mothers' who did not make any action.^[10] Women in intervention group were trained how to express milk from 34-36th weeks of gestation until delivery and they were encouraged to do this twice daily for approximately 10 minutes. They were also instructed to measure their blood glucose levels after the first three episodes of expressing, to ensure that expressing was not causing hypoglycaemia. Women were asked to bring their frozen colostrum with them when they were admitted for birth. It was found in the evaluation after delivery that 40.1% of babies in the experimental group received any formula in the first 24 hours, this rate was 56.1% in control group. Similarly, during their hospital stay 62.08% of infants in experimental group and, 73% in control group received formula. At the same time only breastfeeding in the first 24 hours (59.5%), and breast-feeding at least once

(97.6%) was significantly higher for experimental group (89.0%). In addition, blood sugar was evaluated more often in control group.

Soltani et al. in 2009 asked 43 Type 1 or Type 2 diabetes and 192 GDM mothers to answer a retrospective questionnaire.^[9] The selected sample was diagnosed with diabetes related to Scotland Guideline Network (2001) and Diabetes UK (2001) diagnostic criteria. It was send 54-item questionnaire by mail related to duration of breastfeeding and socio-demographic characteristics. Also mothers BMI, newborn birth weight, Apgar 'gestational age and mode of delivery were evaluated from the hospital records. The research results were evaluated in two stages. In the first stage the effect of different diabetes types on breastfeeding was examined, in the second stage were assesed the factors that affect breastfeeding at different postpartum period. The GDM mothers (95.5%) showed more effort on breastfeeding initiation than the other groups (66.7% Medicine 1, type 2 80%) ($p = 0.03$). At birth, breastfeeding in the postpartum 2nd, 4th and 6th weeks the difference was statistically insignificant but breastfeeding status in type 1 diabetes was in the lowest rate, and in GDM mothers' highest. Related to factors that affect breastfeeding in the six time periods type of diabetes was found the most decisive factor for breastfeeding. There was no difference in terms of socio-demographic characteristics and breastfeeding status, but mothers with type 2 diabetes had higher BMI than mothers with type 1 diabetes and GDM but this difference was not statistically significant. The rate of breastfeeding mothers with a high BMI were significantly lower. Postpartum first feed was found to be another determinant for breastfeeding at the 1. 2. and 6 week. The mothers that breastfeed immediately after birth were more likely to breastfeed at postpartum 6 week. The more births were found to be related with better breastfeeding results. Also mothers with higher socio-economic status do breastfeeding more than mothers with low socio-economic status at postpartum 6th month.

Simmons et al. (2004) performed a study to evaluate the status of breastfeeding in mothers with Type 2 diabetes and GDM.^[8] In this study, mothers in both groups, were followed antenatally by diabetes expert midwives in their homes

and they received information about life style, treatment and the diabetes and breastfeeding relationship. In addition, months were also followed in the clinic. Unless there was any another need (cesarean delivery, neonatal hypoglycemia) they were discharged within two days. At the first feed 68% of GDM mothers and 41% of Type 2 diabetes mothers' breastfeeding their babies ($p=0.011$), at discharge 84% of GDM mothers' babies and, only 69% mothers with type 2 diabetes were sucking ($p=0.039$).

The status of hypoglycemia in newborns of gestational diabetes has been examined in two studies on the effect of breastfeeding status: Chertok et al. in 2009, in the shape of their study of 257 mothers with GDM examined the effect of first feeding on babies blood sugar.^[18] The sample was first grouped by culture and then by type of diabetic treatment to examine significant variations. Among the 84 infants in the study, 44 were breastfed in the delivery room and 40 infants did not receive early breastfeeding. The average time of first breastfeeding occurred within the first 1.5 hours; for those breastfed in delivery room, the average time was first half an hour and for those not breastfed in delivery room was 2.6 hour. There were similar characteristics between maternal-infant dyads who breastfed in the delivery room compared to those who had not breastfed with regards to maternal age, maternal education, parity, infant gestational age, birth weight and haematocrit levels. Among 84 infant only 76 had their glucose level tested. The results showed that the mean glucose level was significantly higher for infants who were breastfed in the delivery room compared to those who were not breastfed ($p=0.03$). For the first feeding within 3 h postpartum for the 67 infants who had their blood glucose levels tested, 43 infants were breastfed (including those breastfed in the delivery room) and 24 infants were Formula fed. A significantly lower proportion of infants who were breastfed had borderline hypoglycaemia compared to those who received formula for their first feeding.

Simmons et al. in 2004 reported that hypoglycemia developed in 11.6% of % of GDM mothers' infants and, in 24% type 2 diabetes mothers' infants.^[8]

Discussion

The effect of GDM on early postpartum breastfeeding;

It was found in the studies examined that GDM is a situation affecting breastfeeding. The fact that only one study compared the breastfeeding results of healthy mothers with GDM reveals the need for re-examination. Hummel et al. (2008) reported that high breastfeeding rates, average duration of full breastfeeding and the total duration of breastfeeding reveals the effect of GDM on breastfeeding.^[17] This result reflects that mothers' with GDM need more breastfeeding support. Determining the factors causing these results in mothers with gestational diabetes and taking concrete steps for these reasons will increase the success of breastfeeding. Also treatment type in GDM it was found to be important indicator for breastfeeding. More breastfeeding problems were detected in mothers whose diabetes was regulated by insulin treatment. This result shows that treatment type should be evaluated when determining risk status and measurements in GDM.

In addition with this, Forster et al. reported that antenatal milk expression positively affects breastfeeding results and lactogenesis 1 in GDM mothers.^[10] In order to make this approach effective and to get positive result, it should be performed on time and by the approval of doctor because milking may stimulate oxytocin secretion and initiate delivery.

Breastfeeding results in the type of diabetes were determined to be important too. It was reported that mothers with type 1 diabetes in particular have a greater risk, but also mothers with GDM experience breastfeeding problems. High BMI was related with lower rate of breastfeeding. In the same way, especially first feeding was found to be determinative for breastfeeding results in the 1st, 2nd and 6th week, so encouraging the first feeding is very important subject for breastfeeding nurse. Therefore, pregnant women with diabetes, nevertheless with high BMI need more support intensive efforts and advice on breastfeeding. In clinical application, especially babies of diabetic mothers are fed with formula rapidly due to hypoglycemia risk. Instead, breastfeeding nurses should be supported for breastfeeding risky groups; if baby does not accept breastfeeding, mother milk

should be milked and given to babies instead of feeding them with formula.

Simmons et al. in 2004 reported in their studies where breastfeeding of mothers with type 2 diabetes and GDM were compared that status of GDM was better than mothers with Type 2 diabetes in terms of first breastfeeding, first breastfeeding time, breastfeeding at hospital discharge and development of hypoglycemia in newborn.^[8] However, despite this information, 32% of the GDM did not perform first breastfeeding and 16% of them not breastfeed at discharge. Related to results we can say that mothers with all types of diabetes should get specific breastfeeding support related to their condition.

The effect GDM mothers breast-feeding status on newborn blood sugar; Chertok et al. in 2009 emphasized the importance of breastfeeding immediately after birth.^[18] Breastfeeding is health protective behavior and should be started in the early period, for performing milk secretion and for preventing breastfeeding problems that may arise. In literature, it is reported that if newborn is not breastfeeding, the possibility of developing type 2 diabetes for mother and baby is higher in contrast with breastfeeding newborn. It is stated in this research that feeding baby with formula does not increase blood sugar as well as breast milk. Therefore, if babies are feed with formula the hypoglycemia trend is increases, and due to hypoglycemia newborn sucking is decreases, and it is considered that this affects breastfeeding negatively as becoming a loop.

Conclusion

As a result of the literature review it was concluded that;

- Gestational diabetes in postpartum women can negatively affect the results of breastfeeding,
- The treatment way of GDM (insulin/diet) is important in terms of results,
- Mother's BMI is also a determinant for breastfeeding,
- GDM mothers breastfeeding is better than the Type 1 and 2-mothers
- Breastfeeding increases babies blood sugar better than formula feeding

Due to a limited number of studies, for achieving more results well designed clearly, large-sample studies are needed. We hope that this literature review will be guide for planning the researches related to this issue.

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