Readiness for way oral, breastfeeding and gestational diabetes mellitus: a case-control study

Prontidão para via oral, aleitamento materno e diabetes mellitus gestacional: estudo caso-controle

Maria Teresa Bezerra Gomes[1] , Raquel Coube de Carvalho Yamamoto[2] , Taísa Ribeiro de Souza Oliveira[1]

ABSTRACT

Purpose: to verify the readiness for oral feeding and breastfeeding in newborns of mothers diagnosed with gestational diabetes mellitus (GDM). **Methods:** observational, analytical, quantitative case-control study. For the evaluation of non-nutritive sucking, the PROFAS protocol was used and for the evaluation of performance at the mother's breast, the protocol of Speech Therapy - Breastfeeding. The sample was stratified into two groups, the experimental group, composed of newborns of mothers diagnosed with GDM, and the control group, with newborns of healthy mothers. For statistical analysis, the Mann-Whitney, Shapiro Wilk and Student's t tests were used. **Results:** the total sample consisted of 46 newborns, 21 from the experimental group and 25 from the control group. P<0.05 was observed in the comparison between the groups in the variables: oscillation in the state of consciousness, global hypotonia, weak search reflex, less than five suctions per pause in the assessment of non-nutritive sucking, holding on to the breast, falling asleep after starting suction and mother-infant positioning. **Conclusion:** newborns of mothers diagnosed with GDM had greater difficulty in readiness for oral feeding and in the practice of breastfeeding in the first 72 hours of life, compared to children of healthy mothers.

Keywords: Diabetes gestational; Breast feeding; Sucking behavior; Fetal macrosomia; Hypoglycemia

RESUMO

Objetivo: verificar a prontidão para via oral e aleitamento materno em recém-nascidos de mães diagnosticadas com diabetes *mellitus* gestacional (DMG). **Métodos:** estudo observacional, analítico, quantitativo, do tipo caso-controle. Para avaliação da sucção não nutritiva, foi utilizado o Protocolo de Prontidão do Prematuro para Início da Alimentação por Via Oral - POFRAS e, para avaliação do desempenho em seio materno, o Protocolo de Acompanhamento Fonoaudiológico – Aleitamento Materno. A amostra foi estratificada em dois grupos, sendo o grupo experimental composto por recém-nascidos de mães diagnosticadas com DMG e o grupo-controle, por recém-nascidos de mães hígidas. Para a análise estatística, foram utilizados os testes Mann-Whitney, Shapiro Wilk e t de Student. **Resultados:** a amostra total foi composta por 46 recém-nascidos, sendo 21 do grupo experimental e 25 do grupo-controle. Observou-se p<0,05 na comparação entre os grupos nas seguintes variáveis: oscilação do estado de consciência, hipotonia global, reflexo de procura débil, menos de cinco sucções por pausa na avaliação da sucção não nutritiva, pega em seio, adormecimento após iniciar sucção e posicionamento mãe-bebê. **Conclusão:** recém-nascidos de mães diagnosticadas com DMG apresentaram maior dificuldade na prontidão para via oral e na prática do aleitamento materno nas primeiras 72 horas de vida, comparados aos filhos de mães hígidas.

Palavras-chave: Diabetes gestacional; Aleitamento materno; Comportamento de sucção; Macrossomia fetal; Hipoglicemia

INTRODUCTION

Gestational diabetes mellitus (GDM) is a metabolic alteration, detected at the beginning or during pregnancy, characterized by an increase in glycemia, causing maternal hyperglycemia, which may disappear or persist after childbirth[1]. In a pregnancy affected by GDM, the fetus will be exposed to high levels of glucose, increasing fetal insulin production, which can lead to fetal distress, premature birth, hyperbilirubinemia, hypoglycemia, and possible future feeding difficulties[2].

Newborns (NB) with hypoglycemia tend to be more agitated, present tremors and hyperexcitability in the first days of life, and may also present symptoms such as hypotonia, lethargy, and weak sucking[3]. The NB's oral reflexes, such as sucking and swallowing, coordinated with breathing, when present and adequate, are predisposing factors for efficient oral feeding[4].

The use of supplements, such as milk formula, is commonly associated with conditions linked to hypoglycemia, as noted in cases of macrosomic NBs and children of diabetic mothers[5]. The inadequate supply of this complement can interfere with the oral motor pattern, leading the NB to present specific difficulties in oral function, impairing suction and, consequently, the success of breastfeeding[6].

Few studies focus on the analysis of feeding and breastfeeding performance of NBs of mothers diagnosed with GDM. Thus, studies that address this theme are necessary. Therefore, the objective of the present study was to verify the readiness for the oral route in newborns of mothers diagnosed with gestational diabetes mellitus and compare them with newborns of healthy mothers. Therefore, the objective of the present study was to verify the readiness for the oral route in newborns of mothers diagnosed with gestational diabetes mellitus and compare them with newborns of healthy mothers.

METHODS

This is an observational, analytical, quantitative, case-control study. The collection was carried out from May to December 2021 in a maternity hospital. The study was approved by the Research Ethics Committee of *Hospital Geral Roberto Santos - HGRS/BA*, according to ordinance No. 4,726,014. All guardians agreed to participate in the study and signed the Free and Informed Consent Form (FICF). Some maternal data were collected from medical records, such as age, number of prenatal consultations, guidance on breastfeeding in these consultations, breastfeeding in the first hour of the NB's life, whether or not the patient had a medical diagnosis of GDM, type of delivery, number of pregnancies, previous experiences in breastfeeding, and treatments for GDM. Data regarding gestational age (GA), birth weight (BW), gender, medical diagnoses, complications during childbirth, and APGAR score were collected from the NB's medical records.

As inclusion criteria for the study, mothers aged 18 years old and over, hospitalized in a rooming-in unit of the maternity, with stable conditions and weaning recommendation by the medical team, whose babies were born at term, with stable conditions and less than 72 hours of life, were selected. The research also considered the maternal desire to breastfeed and the agreement to participate in the research, by signing the FICF. Exclusion criteria were NBs who had perinatal infections, complications during childbirth and in the neonatal period, diagnoses of neurological and cardiac impairment, prematurity, suspected or diagnosed genetic syndrome, head and neck malformations, APGAR score below 7 in the first and in the fifth minute, altered lingual frenulum and babies whose mothers were unable to breastfeed due to HIV and/or HTLV diagnosis, as well as those who did not wish to breastfeed for personal reasons.

After eligibility to participate in the research, the sample was divided into two groups: the control group (CG), composed of children of mothers without a diagnosis of current GDM or in previous pregnancies, and the experimental group (EG), composed of children of mothers diagnosed with GDM in the current pregnancy. As a way to control possible selection bias and confounding factors, only children with birth weight above 2500g and considered full-term newborns, with a gestation period of more than 37 weeks, were included in both groups.

For the assessment of non-nutritive sucking, the Preterm Oral Feeding Readiness Scale - POFRAS[7] was used. To evaluate the nutritional sucking in the mother's breast, the Speech-Language Pathology Monitoring Protocol - Breastfeeding[8] was used[9]. Even if it is still under validation, it is extremely important and covers several relevant points for the accomplishment of this research.

Although the POFRAS[7] was developed for preterm infants, it was used to analyze the parameters of non-nutritive sucking, observing oral reflexes, aspects such as movement and cupping of the tongue, jaw movement, suction strength and the number of suctions per pause, pace keeping, alertness, and signs of stress. In the Speech-Language Pathology Monitoring Protocol – Breastfeeding[8], the following variables were analyzed: the NB's grip, sucking pattern, jaw movement, coordination between sucking, swallowing, and breathing, whether there was a need to wake the NB, and mother-to-child positioning.

The evaluation was carried out by the researchers in charge who were trained to recognize the mentioned aspects. The NB was evaluated in the first 72 hours, in the accommodations of the aforementioned hospital, in a common crib, in a semi-reclined position, supported by the researchers, before breastfeeding, considering that this moment is the best state of alert for the NB. If the NB was in deep sleep before breastfeeding, the researcher would wake him up with tactile and auditory stimuli, until obtaining a state of alertness favorable to the assessment (alert and semi-alert). For the evaluation of the maternal breast, the mother was asked to position the NB in the usual way.

At the end of the evaluations, all mothers received guidance on breastfeeding, aiming to contribute to its success. When difficulties of the mother-baby dyad in breastfeeding and/or oral dysfunctions in the NB were identified in the research, the Speech Therapy team and the other components of the multi-professional team of the unit were contacted to signal the difficulties presented by the dyad, so that the mother and the NB received the necessary support during hospitalization. This contributed to an early intervention based on the changes presented, aiming at the best performance of the NB in the mother's breast.

In descriptive statistics, categorical data were summarized using absolute and relative frequency, mean and standard deviation. To analyze the association between the variables, the SPSS Statistics software version 21.0 was used. For the analysis of quantitative variables, the Mann-Whitney test and the Shapiro-Wilk test were used. And for the analysis of quantitative variables, $p < 0.05$ was considered.

RESULTS

The total sample consisted of 46 NBs. After stratification between the groups, 21 NBs composed the experimental group (EG) and 25 NBs the control group (CG). In Table 1, general information is described, specifying CG and EG, regarding maternal and NB data.

The mean number of prenatal consultations was 8.32 (±2.7) for the CG and 7.24 (±3.8) for the EG. Two mothers (10%) from the EG did not have any prenatal follow-up appointments. Guidelines regarding breastfeeding during prenatal care were given to 11 (44%) mothers in the CG and 4 (19%) in the EG.

Regarding the maternal data of the experimental group, those related to the treatment for GDM were collected. There was a greater predominance of dietary treatment, followed by pharmacological treatment, such as insulin. In the EG, 14 (67%) mothers had previously breastfed their children. However, in the CG, the majority, or 18 (72%) mothers had no contact with breastfeeding and were in their first pregnancy.

Table 2 shows the results of the association between the control group and the experimental group regarding readiness for oral administration. Most variables showed statistical significance between the groups, considering $p < 0.05$.

Table 3 presents the results of the comparison between the control group and the experimental group concerning the variables observed in the evaluation of the NBs in mothers' breasts. It was noticed that most of the variables showed statistical significance.

DISCUSSION

According to the World Health Organization (WHO), the diagnosis of GDM should be considered a global priority, as it is a major public health problem, with a prevalence of 1% to 37.7% and a world average of 16.2% in 2015[10]. Also in 2015, Brazil ranked fourth in the world ranking of countries with the highest rate of adults diagnosed with diabetes mellitus, including GDM[11].

Studies point to the influence of maternal age on GDM, considering advanced age as a risk factor for an unfavorable outcome[12]. Although mothers under the age of 18 were not included in this research, the high maternal age in the EG was evidenced, when compared to the CG. It is important to highlight that other risk factors for GDM must be considered in the tracking and screening of pregnant women who are 35 or older, including overweight, obesity or excessive weight gain in the current pregnancy, individual and family history (first-degree) of gestational diabetes, obstetric history of repeated miscarriages, malformations, fetal or neonatal death, and macrosomia, among others[13].

Cesarean delivery corresponds to highly complex surgery and Brazil is one of the countries with the highest rate of cesarean sections in the world[14]. A study[15] points to the predisposition of mothers with GDM to perform this type of delivery, corresponding to the findings of the EG, in which a high occurrence of cesarean deliveries was verified. In the same group, it was noticed that the majority did not breastfeed in the first hour of life. Among the possible factors, we can highlight the high complexity of the cesarean section, the effect of anesthesia, and maternal positioning in the postoperative period, which may be related to the low rate of breastfeeding in the first hour of life in this population[16].

Some studies indicate that GDM may be related to macrosomia and premature birth, in addition to other factors[17,18]. Even though premature babies were not included in the research, there was a high frequency of full-term babies in the EG, which may be associated with the fact that all mothers had undergone treatment for GDM.

A study[19] that associated the diagnosis of GDM with fetal gender found a greater propensity for its development in pregnancies with male fetuses, while pregnancies with female fetuses were more associated with the progression of GDM to type 2 diabetes mellitus. Similar data were found in the present study, observing a greater predominance of males when compared to females, in the EG.

For adequate treatment of GDM, regular follow-up during prenatal care is necessary. It was noticed that the average number of prenatal consultations, despite being in the normal range, was still relatively low. During the research, it was found that some mothers from the EG reported not having performed prenatal care because of later discovery of pregnancy when hospitalized for control and monitoring of diabetes.

To reverse hyperglycemia and reduce the risks of maternal and fetal health problems, the most commonly used treatments to control GDM are glucose monitoring, dietary counseling, and pharmacology or insulin[17]. In this study, the most used treatment to control GDM was regulated diet and insulin, or both associated. It is known that the adequate treatment of GDM provides a reduction in the risks of complications during pregnancy and after childbirth.

Some possible neonatal complications found in children of mothers with GDM are asphyxia and hypoglycemia[20]. Hypoglycemia represents a drop in blood glucose, which can result in muscle fatigue, drowsiness, and other symptoms[21]. In the analyzed variables of the POFRAS protocol[8], it was observed that most babies in the EG showed changes during

Table 1. General characteristics of maternal and newborn data

Variables	Control group No=25	Experimental group No=21
Maternal data		
Mother's age*	26.4 (7.1)	31.9 (6.8)
Type of delivery		
Normal	13 (52)	5 (20)
Cesarean	12 (48)	16 (64)
Breastfeeding in the 1st hour of life		
Yes	15 (60)	7 (28)
No	10 (40)	14 (56)
Newborn Data		
Birth weight*	3287.92 (482.3)	3582.95 (703.9)
Gestational age		
≥ 37 weeks	1 (4)	7 (33.3)
≥ 38 weeks up to 39 weeks	12 (48)	12 (57.1)
≥ 40 weeks	12 (48)	2 (9.5)
Gender		
Female	13 (52)	9 (42.9)
Male	12 (48)	12 (57.1)

Note: No. = sample size; ≥ = greater than or equal to

*Values expressed as mean and standard deviation; other data are expressed No. (%) for the Frequency

Table 2. Comparison between the control group and experimental group in oral readiness

Variables		Control group No. (%)	Experimental group No. (%)	p-value
Total number of newborns		25 (100)	21 (100)	
Searching reflex	Present	25 (100)	14 (66.7)	.002*
	Weak	0 (0)	6 (28.6)	
	Absent	0 (0)	1 (4.7)	
Sucking reflex	Present	25 (100)	17 (80.9)	.024*
	Weak	0 (0)	4 (19.1)	
Biting reflex	Present	16 (64)	5 (23.8)	.007*
	Absent	9 (36)	16 (76.2)	
Tongue movement	Adequate	25(100)	19 (90.5)	.119
	Altered	0 (0)	2 (9.5)	
Tongue cupping	Present	25(100)	18 (85.7)	.053
	Absent	0 (0)	3 (14.2)	
Jaw movement	Adequate	25(100)	19 (90.5)	.119
	Altered	0 (0)	2 (9.5)	
Suction strength	Strong	24 (96)	16 (76.2)	.048*
	Weak	1 (4)	4 (19.1)	
	Absent	0 (0)	1 (4.7)	
Suctions per pause	5 to 8	20 (80)	4 (19.1)	.000*
	>8	1 (16)	4 (19.1)	
	<5	4 (4)	13 (61.8)	
Rhythm maintenance	Rítmico	24 (96)	12 (57.1)	.002*
	Arrítmico	1 (4)	9 (42.9)	
Maintaining alertness	Yes	20 (80)	5 (23.8)	.001*
	Partial	4 (16)	14 (66.7)	
	No	1 (4)	2 (9.5)	
Stress signals	Yes	3 (12)	12 (57.1)	.001*
	No	22 (88)	9 (42.9)	

Note: No. = sample size; % = percentage; values expressed in absolute and relative frequency *p-value < 0.05. Mann-Whitney Test

Table 3. Comparison between data from newborns in the control group and the experimental group in the speech-language evaluation of breastfeeding during nutritive sucking

Variables	Control group No. (%)	Experimental group No. (%)	p-value
Total number of mother-infant dyads	25 (100)	21 (100)	
NB's grip			
Effective	20 (80)	8 (38.1)	.002*
Does not hold	5 (20)	13 (61.9)	
Suction pattern			
Effective suction	18 (72)	5 (24)	.001*
Sucks and then falls asleep	6 (24)	12 (57)	
Does not suck	1 (4)	1 (5)	
Sucks with long pauses and soon falls asleep	0 (0)	3 (14)	
Coordinated jaw movements			
Yes	25 (100)	20 (96)	.274
No	0 (0)	1 (4)	
Suction/swallowing/breathing coordination			
Yes	25 (100)	21 (100)	1.000
There was a need to wake up the NB			
Yes	2 (8)	15 (71,4)	.000*
No	23 (92)	6 (28,6)	
Mother-NB positioning			
Belly with belly and head of the NB elevated in relation to the body	24 (96)	11 (52)	.001*
Belly with belly and head of the NB aligned with the body	1 (4)	10 (48)	

Note: NB = newborn; No. = sample size; % = percentage; values expressed in absolute and relative frequency *p-value < 0.05. Mann-Whitney Test

the assessment of non-nutritive and nutritious sucking. Such alterations may be justified due to maternal GDM. When compared with the group of NBs of mothers without this diagnosis, a better performance in the functions related to the skills necessary for suction was found.

For the proper establishment of breastfeeding, the NB needs to have a good oral motor pattern, which indicates oral readiness for breastfeeding. The correct functioning of the oral reflexes concerns the search reflex to grab the mother's breast, as well as the suction reflex to maintain latching and adequate milk extraction[22]. If the baby presents changes in oral reflexes, there may be alterations in the sucking pattern, as observed in the cases of NBs who had weak suction strength.

Gestational Diabetes Mellitus and the complications associated with it can impact the health of the NB[2]. In this research, it was found that, in the EG, the majority presented smaller groups of non-nutritive sucking, arrhythmicity in sucking, and signs of stress during the evaluation, which may be related to a greater pattern of sleepiness and signs of muscle fatigue. Furthermore, it was noted that, in the CG, all NBs had strong suction strength. Without a correctly established sucking pattern, the baby may have difficulty maintaining the grip, which would generate effort, fatigue, signs of stress, and difficulty in maintaining alertness, which was also observed during this research, when it was necessary to perform stimuli tactile, to favor the maintenance of alert state in the EG during the nutritive sucking in the mother's breast.

Some studies[18,23] point out that hypoglycemia can occur in the first two hours after birth, persisting for up to 72 hours, or for a week, which can impact the newborn's suction and lead to weak suction and even future feeding difficulties[24]. This information confirms the findings regarding the sucking pattern of the NBs in the EG, especially regarding the lower performance related to the searching, sucking, and biting reflexes, group of suctions per pause, strength, and maintenance of the sucking rhythm and alertness, besides showing more signs of stress.

The assessment of nutritious sucking was performed within the first 72 hours postpartum. It was noted that the EG presented greater difficulty in latching onto the maternal breast and did not maintain an alert state, falling asleep soon after starting to suck on the maternal breast. These characteristics were different from those observed in the CG, which shows that the maternal diagnosis of GDM could have influenced the EG's non-nutritive sucking pattern, as well as the low behavioral state.

To improve the grip of the NB of the EG during nutritive sucking in the maternal breast, it was necessary a speech therapist intervention. The professional was able to work with the difficulties in the management of maternal breastfeeding and to help the mother to favor successful breastfeeding. All mothers in the study, even those without difficulties, were instructed on the benefits and management of breastfeeding. For mothers with breastfeeding difficulties, after the evaluation, assistance and adaptation of the alterations were carried out. Also, the multidisciplinary team of the referred hospital was signaled to carry out a follow-up of the dyad during hospitalization.

The literature points to the tendency of mothers with GDM to introduce milk formula in the first days of life, as well as to carry out early weaning[17,22]. However, there is no consensus that such factors may be associated with the difficulty that this population may have during breastfeeding.

This research verified that the mothers evaluated 48 hours after the delivery presented alterations in the condition of the breasts, whether due to breast engorgement or pain. The EG was mostly composed of multiple pregnancy mothers, who had previously experienced breastfeeding. However, it was noticed that even the mothers who had previous contact with breastfeeding, had difficulties in the mother-baby positioning during breastfeeding. The difficulties found in the breastfeeding process may be directly related to the inferior performance of the NB's oral motor skills during nutritious sucking, as well as to their low state of alertness.

Thus, it is necessary to carry out more studies on the subject, since the present research showed difficulties in sampling when the inclusion and exclusion criteria were applied. Another challenge was the continuity of the outpatient segment for speech therapy follow-up of these patients to prevent eating difficulties and orofacial myofunctional disorders at an early stage.

CONCLUSION

Newborns of mothers diagnosed with gestational diabetes mellitus showed greater difficulty in readiness for the oral route and in the practice of breastfeeding in the first 72 hours of life when compared to children of healthy mothers.

ACKNOWLEDGEMENTS

REFERENCES

1. American Diabetes Association. 2. Classification and diagnosis of diabetes: standards of medical care in diabetes—2021. Diabetes Care. 2021;44(Suppl 1):S15-33. http://dx.doi.org/10.2337/dc21-S002. PMid:33298413.

2. Stewart A, Malhotra A. Gestational diabetes and the neonate: challenges and solutions. Res Rep Neonatol. 2015;5:31-9. http://dx.doi.org/10.2147/rrn.s30971.

3. Duarte BNA, Ramos CAMC, Oliveira FRC, Gomes LE, Queiroz MP, Fonte PB, et al. Hipoglicemia neonatal resultante da hiperglicemia materna. Rev Cad Medicina [Internet]. 2019 [cited 2022 Nov 22];2(3):94-100. Available from: https://www.unifeso.edu.br/revista/index.php/cadernosdemedicinaunifeso/articl e/viewFile/1645/772

4. Sanches MTC. Clinical management of oral disorders in breastfeeding. J Pediatr. 2004;80(Suppl 5):S155-62. http://dx.doi.org/10.1590/S0021-75572004000700007. PMid:15583766.

5. Ledo BC, Góes FGB, Santos AST, Pereira-Ávila FMV, Silva ACSS, Bastos MPC. Fatores associados ao uso de complemento lácteo entre recém-nascidos no ambiente hospitalar. Rev Enferm UERJ. 2020;28:e51503. http://dx.doi.org/10.12957/reuerj.2020.51503.

6. França EC, Sousa CB, Aragão LC, Costa LR. Electromyographic analysis of masseter muscle in newborns during suction in breast, bottle or cup feeding. BMC Pregnancy Childbirth. 2014;14(1):154. http://dx.doi.org/10.1186/1471-2393-14-154. PMid:24885762.

7. Fujinaga CI, Scochi CGS, Santos CB, Zamberlan NE, Leite AM. Validação do conteúdo de um instrumento para avaliação da prontidão do prematuro para início da alimentação oral. Rev Bras Saúde

Mater Infant. 2008;8(4):391-9. http://dx.doi.org/10.1590/S1519-38292008000400004.

8. Pivante CM, Medeiros AMC. Intervenções fonoaudiológicas no aleitamento materno junto às mães de paridade zero. Mundo Saúde. 2006;30(1):87-95. http://dx.doi.org/10.15343/0104-7809.200630.1.10.

9. Medeiros AMC, Nascimento HS, Santos MKO, Barreto IDC, Jesus EMS. Análise do conteúdo e aparência do protocolo de acompanhamento fonoaudiológico - aleitamento materno. Audiol Commun Res. 2018;23:e1921. http://dx.doi.org/10.1590/2317-6431-2017-1921.

10. Hod M, Kapur A, Sacks DA, Hadar E, Agarwal M, Renzo GC, et al. The International Federation of Gynecology and Obstetrics (FIGO) Initiative on gestational diabetes mellitus: a pragmatic guide for diagnosis, management, and care. Int J Gynaecol Obstet. 2015;131(Suppl 3):S173-211. http://dx.doi.org/10.1016/S0020-7292(15)30033-3.

11. International Diabetes Federation. IDF diabetes atlas. Brussels: International Diabetes Federation; 2015 [cited 2022 Nov 22]. Diabetes: a global emergency; p. 12-17. Available from: https://diabetesatlas.org/upload/resources/previous/files/7/IDF%20Diabetes%20Atlas%207th.pdf

12. Johns EC, Denison FC, Norman JE, Reynolds RM. Gestational diabetes mellitus: mechanisms, treatment, and complications. Trends Endocrinol Metab. 2018;29(11):743-54. http://dx.doi.org/10.1016/j.tem.2018.09.004. PMid:30297319.

13. Brasil. Ministério da Saúde. Secretaria de Atenção à Saúde. Departamento de Ações Programáticas Estratégicas. Gestação de alto risco: manual técnico. Brasilia: Ministério da Saúde; 2012 [cited 2022 Nov 22]. Diabetes gestacional; p. 183-184. Available from: https://bvsms.saude.gov.br/bvs/publicacoes/manual_tecnico_gestacao_alto_risco.pdf

14. Knobel R, Lopes TJP, Menezes MO, Andreucci CB, Gieburowski JT, Takemoto MLS. Cesarean-section rates in Brazil from 2014 to 2016: cross- sectional analysis using the Robson Classification. Rev Bras Ginecol Obstet. 2020;42(9):522-8. http://dx.doi.org/10.1055/s-0040-1712134. PMid:32559791.

15. Nguyen PTH, Pham NM, Chu KT, Van Duong D, Van Do D. Gestational diabetes and breastfeeding outcomes: a systematic review. Asia Pac J Public Health. 2019;31(3):183-98. http://dx.doi.org/10.1177/1010539519833497. PMid:30832484.

16. Silva JLP, Linhares FMP, Barros AA, Souza AG, Alves DS, Andrade PON. Fatores associados ao aleitamento materno na primeira hora de vida em um hospital amigo da criança. Texto Contexto Enferm. 2018;27(4):e4190017. http://dx.doi.org/10.1590/0104-07072018004190017.

17. Johns EC, Denison FC, Norman JE, Reynolds RM. Gestational diabetes mellitus: mechanisms, treatment, and complications. Trends Endocrinol Metab. 2018;29(11):743-54. http://dx.doi.org/10.1016/j.tem.2018.09.004. PMid:30297319.

18. Estacia C, Souza FC, Tisott TM. Diabetes mellitus neonatal: relato de caso. Bol Cient Pediatr [Internet]. 2015 [cited 2022 Nov 22];4(1):22-4. Available from: https://www.sprs.com.br/sprs2013/bancoimg/150915221204bcped_v4_n1_a6.pdf

19. Retnakaran R, Shah BR. Fetal sex and the natural history of maternal risk of diabetes during and after pregnancy. J Clin Endocrinol Metab. 2015;100(7):2574-80. http://dx.doi.org/10.1210/jc.2015-1763. PMid:25993641.

20. Alejandro EU, Mamerto TP, Chung G, Villavieja A, Gaus NL, Morgan E, et al. Gestational diabetes mellitus: a harbinger of the vicious cycle of diabetes. Int J Mol Sci. 2020;21(14):5003. http://dx.doi.org/10.3390/ijms21145003. PMid:32679915.

21. Sweet CB, Grayson S, Polak M. Management strategies for neonatal hypoglycemia. J Pediatr Pharmacol Ther. 2013;18(3):199-208. http://dx.doi.org/10.5863/1551-6776-18.3.199. PMid:24052783.

22. Mosele PG, Santos JF, Godoi VC, Costa FM, Toni PM, Fujinaga CI. Instrumento de avaliação da sucção do recém-nascido com vistas à alimentação ao seio materno. Rev CEFAC. 2014;16(5):1548-57. http://dx.doi.org/10.1590/1982-0216201426412.

23. - Bueno EB, Coca KP, Abuchaim ESV, Abrão ACFV, Marcacine KO, Draque CM. Aleitamento materno exclusivo de recém-nascidos de mães diabéticas em alojamento conjunto. Rev Soc Bras Enferm Ped. 2017;17(2):70-5. http://dx.doi.org/10.31508/1676-3793201700009.

24. Pereira LFM, Menezes RVD, Correa TR, Braga VC, Mesquita GA, Pires VCL, et al. Pathophysiology and prevention of neonatal hypoglycemia: literature review. Braz J Health Rev. 2021;4(2):5852-65. http://dx.doi.org/10.34119/bjhrv4n2-148.