

RESEARCH

Complications in pregnancy and delivery associated with the health of the newborn

Complicaciones en el embarazo y parto asociadas con la salud del recién nacido

Complicações na gravidez e no parto associadas à saúde do recém-nascido

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Abstract

Introduction: Maternal and infant morbidity and mortality rates continue to rise despite the strategies implemented to mitigate this public health issue. **Objective:** Determine the association of obstetric complications during pregnancy and type of delivery with newborn complications in a primary care unit in the State of Puebla. **Methodology:** Prospective, observational and descriptive cohort design. A total of 261 pregnant women were interviewed and data from 90 mother-child dyads were analyzed. Birth certificate and records were consulted to collect data, after informed consent. Study conducted in accordance with the Regulations of the General Health Law on Health Research and approval of an ethics committee. Descriptive statistics with measures of central tendency and relative risk test were used. **Results:** 66.7% of the women reported 1 to 3 check-ups during their pregnancy and in 51.1% the delivery was by cesarean section. The most frequent complication in each quarter was urinary tract infection with 26.7%. Furthermore, 48.9% of the newborns had respiratory problems evaluated with the Silverman-Anderson test. Finally, a significant association with $p < 0.001$ was found between recurrent urinary tract infections during pregnancy and respiratory difficulty in newborns. **Conclusion:** Newborns exposed to urinary tract infections during pregnancy have a higher risk of respiratory difficulty at birth.

Key words: Pregnancy complications; Obstetric Delivery; Gestational age; Newborn (DeCS).

Resumen

Introducción: Los índices de morbilidad y mortalidad materno-infantil continúan aumentando a pesar de las estrategias implementadas para mitigar este problema de salud pública. **Objetivo:** Determinar la asociación de complicaciones obstétricas durante el embarazo y el tipo de parto con las complicaciones del recién nacido en una unidad de primer nivel de atención del Estado de Puebla. **Metodología:** Diseño de cohorte prospectivo, observacional y descriptivo. Se entrevistaron a 261 mujeres embarazadas y se analizaron datos de 90 diadas -Madre e hijo. Se consultó el certificado de nacimiento y expedientes para recopilar datos, previo consentimiento informado. Estudio realizado conforme al Reglamento de la Ley General de Salud en materia de Investigación para la salud y aprobación de un comité de ética. Se utilizó estadística descriptiva con medidas de tendencia central y prueba de Riesgo Relativo. **Resultados:** Un 66.7 % de las mujeres reportó de 1 a 3 revisiones durante su embarazo y en 51.1 % el parto fue vía cesárea. La complicación más frecuente en cada trimestre fue la infección de vías urinarias con 26.7 %. Por otra parte, el 48.9 % de los recién nacidos presentó problemas respiratorios evaluados con prueba de Silverman-Anderson. Se encontró asociación estadística significativa con $p < 0.001$ entre infecciones recurrentes de vías urinarias durante el embarazo y dificultad respiratoria en los recién nacidos. **Conclusión:** Los recién nacidos expuestos a las infecciones de vías urinarias durante el embarazo tienen más probabilidad de riesgo de presentar dificultad respiratoria al nacer.

Palabras clave: Complicaciones del Embarazo; Parto Obstétrico; Edad gestacional; Recién Nacido (DeCS).



Abstrato

Introdução: As taxas de morbidade e mortalidade materno-infantil continuam a aumentar apesar das estratégias implementadas para mitigar este problema de saúde pública. **Objetivo:** Determinar a associação das complicações obstétricas durante a gravidez e o tipo de parto com as complicações do recém-nascido numa unidade de cuidados primários no Estado de Puebla. **Metodologia:** Desenho de coorte prospectivo, observacional e descritivo. Foram entrevistadas 261 mulheres grávidas e analisados os dados de 90 díades mãe-filho. A certidão de nascimento e os registos foram consultados para a recolha de dados, após consentimento informado. Estudo realizado de acordo com o Regulamento da Lei Geral de Saúde sobre Investigação em Saúde e aprovação em comissão de ética. Foram utilizadas estatísticas descritivas e medidas de tendência central, bem como o teste de Risco Relativo. Estudo realizado em conformidade com o Regulamento da Lei Geral da Saúde sobre Investigação em Saúde e aprovação de um comité de ética. **Resultados:** As infecções urinárias foram as complicações mais frequentes em cada trimestre da gravidez 26,7%. Além disso, 48,9% dos recém-nascidos apresentaram problemas respiratórios avaliados pelo teste de Silverman-Anderson. Finalmente, foi encontrada uma associação significativa $p < 0,001$ entre infecções recorrentes do trato urinário durante a gravidez e dificuldade respiratória nos recém-nascidos. **Conclusão:** Os recém-nascidos expostos a infecções do trato urinário durante a gravidez têm maior probabilidade de apresentar dificuldade respiratória ao nascer.

Palavras-chave: Complicações na gravidez; Parto Obstétrico; Idade gestacional; Recém-Nascido (DeCS).

Introduction

Perinatal complications are a public health problem; one in 72 newborns (NB) worldwide is born lifeless ⁽¹⁾. It is estimated that, by 2030, another 20 million newborns will die if adequate interventions in health promotion and perinatal education are not implemented. Maternal death rates are especially high in low-income countries ^(2,3). During 2020 in Mexico, the main fetal deaths occurred during pregnancy, followed by childbirth ⁽⁴⁾.

In the state of Puebla, Mexico, the prevalence of maternal mortality ratio was 5.9, a figure close to national statistics ⁽⁵⁾. It is recognized that the main causes of these deaths are hypertensive diseases (preeclampsia and eclampsia), hemorrhages, sepsis and infections after childbirth, complications in childbirth, unsafe abortions, edema, proteinuria, diseases of the respiratory system and obstetric trauma ⁽⁶⁻⁸⁾.



Recent evidence has shown that obstetric complications associated with high probability of infant morbidity and mortality have been low birth weight and respiratory distress syndrome ^(9,12). In the literature, general complications are reported throughout the pregnancy, or they are included separately, that is, the presence of preeclampsia is evaluated with neurological development ⁽¹³⁾ or gestational diabetes with respiratory distress ⁽¹⁴⁾. Also, there is little literature on the identification of obstetric complications identified by quarter in cohort studies. Often, the reporting of numbers of obstetric complications has been addressed in developed countries or in white women; however, the highest rates of maternal-fetal morbidity and mortality are found in low-income countries ⁽¹⁵⁾, and the prevalence of complications may vary according to geographic areas, for example, the prevalence of urinary tract infections (UTI) ⁽¹⁶⁾. There is little literature on prospective cohort design studies in rural areas addressed at the first level of care. The level of evidence of cohort studies is considered essential to follow the pregnancy process and identify the quarter where the complication occurs. It is even suggested to specify in which quarter the complication occurred and whether the time of diagnosis influences the probability of risk of the child presenting short-term complications ⁽¹⁷⁾.

Although it is true that national regulations establish that health institutions must strengthen the skills, abilities and knowledge of nursing personnel and technical or traditional midwives on the identification of complications during pregnancy, childbirth and puerperium; in addition to promoting and providing mechanisms in order to facilitate the support of the pregnant woman ^(18,19), but, to a large extent, the health professional ignores the complications that occur from the first quarter and focuses on in the attention to the consequences produced by the complications that occurred during pregnancy, situation seen in the second and third level care hospitals.



To contribute to the aforementioned, it is important to explore what type of obstetric complications are most frequent in each quarter of pregnancy and what type of complications compromise the health of the NB.

It is well known that it is not acceptable that maternal-fetal mortality rates continue to rise, identifying the types of complications associated with health risk in the NB is crucial to provide follow-up or individualized care in the pregnant woman, because once the resident mothers from rural areas have been diagnosed or are at risk of presenting the complication, they do not have sufficient knowledge to change their behavior and tend to follow the advice of family or non-professional people such as midwives ⁽²⁰⁾.

Therefore, the question of this research arises: What is the association of obstetric complications during pregnancy and the type of delivery with complications of the NB in a first-level care unit in the State of Puebla? Although in Mexico, maternal death rates are reported weekly in the National Epidemiological Surveillance System ^(8,9), complications from the first quarter associated with the risk of consequences for the child remain ambiguous. The purpose of the study was to determine the association of obstetric complications during pregnancy and type of delivery with complications of the NB in a primary care unit.

Methodology

The design was a prospective, observational cohort. The sample size was estimated at a confidence level of 95 %, median effect size of 0.3, and statistical power of 90 %, resulting in 420 pregnant women. In the selection of participants, 261 pregnant women were initially recruited. However, those with incomplete data or those who did not return to the health center due to the SARS-CoV-2 pandemic were not considered. Finally, 90 participants were included for the analysis of the study.



The gestational age of the NB was established as dependent variables, that is, preterm (less than 37 weeks), term (37-41 weeks) and post term (42 weeks or more) according to the Ballard method; adaptation to extra uterine life evaluated by the Apgar test: no depression (7 to 10 points), moderate depression (4 to 6 points), and severe depression (3 points or less); and the Silverman-Anderson assessment to evaluate respiratory distress at birth: with respiratory distress (3 to 5 points) and without respiratory distress (< 3 points) ⁽¹²⁾.

Obstetric complications such as preeclampsia, gestational diabetes, high blood pressure, obesity, overweight, anemia, UTI, vaginal infection, sexually transmitted infection and threatened miscarriage, as well as the type of physiological and surgical delivery such as cesarean section were considered as independent variables. The response options were dichotomous, since the presence and absence of the complication was placed on the form ⁽¹⁸⁾.

The data collection process was performed in two health centers in the same municipality in the state of Puebla, during the period from 2019 to 2020. Women who are taken care of in these institutions for prenatal care were invited to participate in the study. Initially, a personal interview was conducted with the participant to collect personal data (name, age, marital status, and occupation). Subsequently, the clinical records of the participants who had their prenatal care at their health center in the first quarter were reviewed and then followed up in the second and third quarters of pregnancy to identify obstetric complications diagnosed by the doctor. The data was reported using a form. Finally, to assess the health of the NB, the mother was expected to go to a well-child consultation or to the vaccination area to obtain information about the birth of the child, in case of not concurring with the mother in the postnatal consultation, the pregnant woman's control card was requested from the health personnel.

The study was conducted on an ethical basis of the Regulations of the General Health Law on Health Research ⁽²²⁾. Pursuant to article 29, authorization was obtained from the directors of the



institutions. To comply with article 20, 21 and 22, the participants signed an informed consent with a prior explanation of the study. Regarding article 17, the study was considered to have minimal risk. This study had approval from the University Ethics Committee with folio number: 082-ENF, following the bases of article 14.

Data analysis was performed using Statistical Package for the Social Science (SPSS) version 18. Descriptive statistics were used, with frequencies and percentages for qualitative variables; and for numerical variables, both measures of central tendency and dispersion were used. Data on maternal and birth complications were entered into contingency tables and the size of the association was estimated using the relative risk (RR) and 95 % confidence interval (CI) of the relative risk (RR)^(23,24). RR values greater than 1 were considered as a risk factor and less than 1 as a protective factor⁽²⁵⁾. To analyze the significant association, the two-sided p value of Fisher's exact test was used.

Results

The average age of the participants was 24.4 (SD=5.7), 27.8 % had a partner, 72.2 % were housewife. Regarding prenatal control, 66.7 % only reported 1 to 3 check-ups during their pregnancy and 51.1% delivered via cesarean section, (Table 1).

Table 1. Sociodemographic and clinical characteristics of the participants, 2020 (n=90)

Characteristic	f	%
Marital status		
Common-law marriage	56	62.2
Married	25	27.8
Single	9	10
Occupation		
Home	65	72.2
Paid work	20	22.2
Student	4	4.4
Prenatal checkup		
1-5 checkups	60	66.7
6-9 checkups	30	33.3
Type of delivery		
Caesarean section	46	51.1
	44	48.9

Source: Self-development



The most frequent complications during the first trimester of pregnancy were: threatened miscarriage (37.8 %), UTI (26.7 %), overweight (16.7 %), and obesity (15.6 %). Among the most frequent complications during the second quarter of pregnancy were: UTI (44.4 %) and threatened miscarriage (18.9 %). The most frequent complications during the third quarter of pregnancy were: UTI (44.4 %) and threat of preterm labor (16.7 %), (Table 2).

Table 2. Common obstetric complications by quarter of pregnancy. 2020 (n=90)

First quarter	Second quarter	Third quarter
Threatened miscarriage	UTI	UTI
UTI*	Threatened miscarriage	Threat of preterm birth
Overweight		
Obesity		

Source: Self-development. * UTI= Urinary tract infections

Table 3 shows that according to the Apgar test the majority of NBs did not present alterations in adaptation to extra uterine life (98.9 %); however, a significant percentage showed respiratory difficulties (48.9 %).

Table 3. Clinical characteristics of the newborn, 2020. (n=90)

Clinical characteristics of the newborn	f	%
Sex		
Female	47	52.2
Male	43	47.8
Gestational age according to the Ballard method		
Preterm	47	52.2
Term	43	47.8
Apgar rating		
No depression: 7 to 10 points	89	98.9
Moderate depression: 4 to 6 points	1	1.1
Silverman Anderson Rating		
No respiratory distress	46	51.1
With respiratory distress	44	48.9

Source: Self-development

The association between obstetric complications and NB complications, according to the type of delivery and gestational age, there was no significant statistical association (RR= .920; 95 % CI [0.61-1.36], p= .833).



Regarding the association between complications in each quarter of pregnancy with the APGAR test, no significant statistical association was found, given that the majority of NBs obtained a score of 7 to 10 points (98.9 %).

According to the Silverman-Anderson assessment, it was found that the associated complications during the first quarter were: UTI (RR= 1.935; 95 % CI [1.357-2.761], p=.002) and threatened miscarriage (RR= 0.296; 95 % CI [0.149-0.585], p<.001). During the second quarter of pregnancy, the associated complication was UTI (RR= 2.132; 95 % CI [1.138-3.281], p<.001).

During the third quarter, the associated complications were arterial hypertension (RR= 0.178; 95 % CI [0.027-1.153], p=.007), obesity (RR= 0.349; 95 % CI [0.124-0.978], p=.011), and UTI (RR= 1.944; 95 % CI [1.276-2.964], p=.002).

Discussion

The objective of this study was to determine the association between obstetric complications during pregnancy and childbirth, and NB complications in a primary care unit. It was seen that the majority of pregnant women were overweight, threat of miscarriage, threat of premature birth, and had recurrent UTIs during all quarters of pregnancy, similar findings with other studies ⁽²⁶⁻²⁷⁾. By reinforcing prophylaxis from the first quarter of pregnancy and providing adequate information to pregnant women about the prevention and management of these obstetric complications, the incidence of maternal and infant morbidity and mortality could be reduced.

A high prevalence of overweight was seen during the first quarter of pregnancy, matching data reported in northern Mexico ⁽²⁸⁾. Although in this study it was not identified as one of the most frequent obstetric complications in all quarters, it is essential to implement actions to prevent and control excess gestational weight, because it can contribute to other complications and have negative effects on the health of the NB ^(26,27).



UTIs occurred more frequently in the three quarters of pregnancy. This complication has been shown to be recurrent throughout pregnancy⁽²⁸⁻³⁰⁾, matching data reported in similar studies from Peru and Ecuador^(26,30). Prevention and adequate control of these infections are crucial to avoid serious complications such as premature birth, low birth weight and neonatal sepsis, thus promoting a healthy and safe pregnancy^(28,31-35).

In addition to UTIs being reported more frequently in this study, newborns exposed to this complication have a greater risk of presenting respiratory difficulties at birth. Thus, the health professional must know the history of UTI that the mother presented at the time of birth, this would help to provide immediate quality care to the NB. Also, it is necessary to treat UTI during pregnancy, to avoid short-term complications such as fetal growth restriction⁽²⁸⁾ and long-term complications such as respiratory problems in the offspring⁽³⁶⁾.

The threat of abortion is a complication that occurred in both the first and second quarter of pregnancy, data similar to what was reported in a previous study⁽³²⁾. It is worth mentioning that the complications presented during pregnancy are associated with neonatal complications, which generate respiratory difficulty in the newborn, infectious processes, gestational age and low birth weight⁽³³⁻³⁵⁾.

In this study, there was no significant statistical association between pregnancy complications and the APGAR score, given that the majority of RNs reported adequate scores. Preeclampsia can trigger premature births, low birth weight and low Apgar⁽³⁷⁻³⁸⁾. According to the Silverman-Anderson assessment, the risk factor among obstetric complications was UTI, meaning that there is a greater probability that the newborn will present respiratory difficulty at birth if the mother presents recurrent UTIs during pregnancy. UTI can trigger neonatal death⁽³⁹⁾, as well as low birth weight, uterine growth restriction, placental abruption, and low APGAR score^(40,41).



It is known through scientific evidence that complications in pregnancy are related to the Silverman-Anderson and APGAR assessment scales. This research only found a significant statistical association of pregnancy complications with the Silverman-Anderson assessment.

Generally speaking, the lack of health education of pregnant women significantly affects the course of their pregnancy. Most women are unaware of the warning signs and symptoms, their current health status, as well as the progress and evolution of their pregnancy. Therefore, it is recommended to implement a perinatal card, booklet or basic guide for the pregnant woman that includes the entire clinical history, obstetric risk factors and the detailed evolution of each quarter of pregnancy. Therefore, keeping a unique and detailed clinical record of the RN is crucial to ensure adequate monitoring of their health. These recommendations are essential functions of the nursing professional at the first level of care. Furthermore, encouraging the promotion and prevention of maternal health not only improves the health outcomes of mothers and newborns, but also contributes to the fulfillment of the specific goals established in the Specific Action Program for Sexual and Reproductive Health ⁽¹⁹⁾.

Some limitations were identified within the study, including limited researcher access to the health center during the data collection period due to the SARS-CoV-2 pandemic, and incomplete clinical records for both mother and child.

There was also variation in the diagnostic criteria for complications during pregnancy, given that the confirmatory diagnoses in the file were assessed by different physicians and specialists, which could lead to misclassification bias of complications by quarter. For future studies, it is necessary to guarantee the clinical homogeneity of obstetric complications and measure and include confounding factors based on the sociodemographic characteristics and pathological history of the mother.



Another limitation of the study was the dropout rate, given that during follow-up more than half of the initial sample size was lost, which damaged the expected frequencies in the cross tables, it is recommended to continue with this study with a larger sample size, and follow up through home visits. Home visits are considered a health care tool exercised by the nursing professional for health purposes, but also for research.

It is recommended to reduce the interval between each prenatal consultation and provide follow-up, guidance, education and training, ideally involving both parents. Various topics that may affect the health of the mother and child must be addressed, such as the identification of warning signs and symptoms during pregnancy, nutrition, daily routine, exercise, personal hygiene, family planning, breastfeeding, preventive medicine, among others.

Finally, continuous education is recommended for health personnel to provide adequate and quality health services, and at the same time carry out a rigorous audit of the personnel involved in gestational care to identify weaknesses in primary care and execute improvement programs aimed at providing adequate perinatal health. Furthermore, it is advisable to follow up the research in rural areas and expand the sample size.

Conclusions

A significant association was found between the presence of UTI and respiratory distress in NBs. These findings underscore the importance of timely detection and treatment of UTIs during pregnancy to mitigate the risk of serious neonatal complications.

Most complications in the mother-child dyad during pregnancy and childbirth are avoidable if health personnel guarantee prevention, diagnosis and timely treatment. The nursing professional is considered a key element when carrying out prenatal care and as first contact personnel at the first level of care, they can contribute to the comprehensive care of the pregnant woman; from raising



awareness about the importance of prenatal care to home visits for the detection, control and monitoring of obstetric complications.

Conflict of interests

The authors state that there was no conflict of interest.

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