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ORIGINAL ARTICLE

Labor induction in women with pre-eclampsia: maternal and neonatal outcomes

Indução de parto em mulheres com pré-eclâmpsia: desfechos maternos e neonatais

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ABSTRACT

Objective: To identify the process of labor induction and maternal and neonatal outcomes in women with preeclampsia assisted in a philanthropic hospital with 100% care by the Unified Health System (UHS) in Belo Horizonte, Minas Gerais, Brazil. **Methods:** This is a cross-sectional and retrospective study. Data were collected from 222 records between January 2016 and June 2017. Measures of absolute and relative frequency were calculated using SPSS software version 23. **Results:** Of the total, 43% of women were in the age group between 20 and 29 years old, 62.6% declared themselves brown and 68% were primiparous. The main classification found was pre-eclampsia (PE) with severity criteria (63.5%). The induction time of 12 to 24 hours was the most recurrent (36.9%) and the most used cervical ripening method was vaginal misoprostol (92.8%). Induction was successful for 59% of women, with induction failure being the main indication for cesarean section (59.3%). The most serious complications in the postpartum period were hemorrhage (9.5%), seizure (1.4%) and maternal death from stroke (AVC) and postpartum hemorrhage (0.5%). Regarding neonatal results, 98.6% of newborns had an Apgar value ≥7 in the 5'minute; and of these, only one required admission to the neonatal intensive care unit. **Conclusion:** The choice of inducing labor in this group of pregnant women is presented as a valuable intervention in order to minimize the short, medium and long-term maternal risks associated with the cesarean section.

Keywords: Pre-Eclampsia; Labor, Induced; Pregnancy, High-Risk; Infant, Newborn.

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RESUMO

Objetivo: Identificar o processo de indução de parto e os desfechos maternos e neonatais em mulheres com pré-eclâmpsia assistidas em um hospital filantrópico com atendimento 100% pelo Sistema Único de Saúde (SUS) em Belo Horizonte, Minas Gerais, Brasil. **Métodos:** Trata-se de um estudo transversal e retrospectivo. Os dados foram coletados a partir de 222 prontuários entre janeiro de 2016 a junho de 2017. Calculou-se medidas de frequência absoluta e relativa mediante o software SPSS versão 23. **Resultados:** Do total, 43% das mulheres encontraram-se na faixa etária entre 20 e 29 anos, 62,6% se autodeclararam pardas e 68% foram primíparas. A principal classificação encontrada foi pré-eclâmpsia (PE) com critério de gravidade (63,5%). O tempo da indução de 12 a 24 horas foi o mais recorrente (36,9%) e o método de amadurecimento cervical mais utilizado foi o misoprostol vaginal (92,8%). A indução foi bem-sucedida para 59% das mulheres sendo a principal indicação de cesariana a falha de indução (59,3%). As complicações mais graves no pós-parto foram hemorragia (9,5%), convulsão (1,4%) e uma morte materna por acidente vascular cerebral (AVC) e hemorragia pós-parto (0,5%). Em relação aos resultados neonatais, 98,6% dos recém-nascidos apresentaram um valor de Apgar ≥7 no 5º minuto; e, destes, apenas um necessitou de admissão na unidade de terapia intensiva neonatal. **Conclusão:** A escolha pela indução do parto nesse grupo de gestantes se apresenta como uma valiosa intervenção a fim de minimizar os riscos maternos a curto, médio e longo prazo associados à realização da cesariana.

Palavras-chave: Pré-eclâmpsia; Trabalho de parto induzido; Gravidez de alto risco, Recém-nascido.

Introduction

According to the 2015 United Nations report, hypertensive diseases during pregnancy were one of the most prevalent complications causing preventable maternal deaths[1] and were identified as the second cause of maternal deaths worldwide, accounting for 14% of them, all deaths of women of childbearing age between 2003 and 2009[2]. In Brazil, between 1996 and 2018, the Mortality Information System (SIM) recorded 38,919 maternal deaths, with hypertension being the main direct cause of these deaths[3].

Preeclampsia (PE) is a hypertensive disorder specific to the puerperal pregnancy cycle with systemic repercussions, which can occur from the 20th week of gestation[4]. It is characterized by increased blood pressure levels (systolic blood pressure ≥140mmHg and/or diastolic blood pressure ≥90mmHg) accompanied by proteinuria (proteinuria equal to or above 300 mg in 24 hours or protein/creatinine ratio and blood sample of at least 0.3). In the clinical picture without proteinuria, the diagnosis is based, in addition to the appearance of hypertension, on the presence of at least one of the following clinical signs: thrombocytopenia (platelets <100,000/mm^3), renal failure (serum creatinine concentrations greater than 1.1mg /dL or a doubling of serum creatinine concentration in the absence of other kidney disease), hepatic failure: elevated blood concentrations of hepatic transaminases to twice normal), pulmonary edema, or new-onset headache unresponsive to medication and not explained by diagnostics alternative or visual symptoms. Even in the absence of proteinuria, the presence of one of these criteria already supports the diagnosis of PE with severity criteria[5]. Due to its multisystem nature, PE can progress to severe conditions such as eclampsia, hemorrhagic stroke, HELLP syndrome (***H**emolisys, **E**levated **L**iver functions tests e **L**ow **P**latelet counts*) and death[6].

Considering that the only option to interrupt the PE process is to terminate the pregnancy, the conduct to be adopted must balance the risks of premature birth for the fetus and the risk of deterioration of the clinical status of the mother and fetus in case of continuation of pregnancy. According to the American College of Obstetricians and Gynecologists (AGOG)[5] continuous observation is appropriate for a woman with a premature fetus, with

a gestational age (GA) below 37 weeks if she has PE without severe features, without premature rupture of membranes and bleeding vaginal delivery and with fetal well-being assured, while the termination of pregnancy is recommended when the pregnancy reaches 37 weeks or in case of deterioration of the clinical picture of the fetus or the above mentioned conditions are installed or the fetus. In cases of PE with severe features at less than 34 weeks' gestation and a favorable fetal condition, expectant management may be considered using strict selection criteria in settings with adequate resources for maternal and neonatal care. Although the use of corticosteroids for fetal pulmonary maturation is indicated in pregnancies below 34 weeks, it should not delay the termination of pregnancy in case of risk of immediate deterioration of maternal or fetal conditions.

From the indication of interruption, the mode of delivery is considered according to obstetric criteria, taking into account each case and the probability of PE progression. In the decision to induce labor, maternal parity, previous mode of delivery, gestational age, PE classification and maternal and fetal health status should be evaluated[7].

Labor induction consists of stimulating the beginning of contractions in a woman who is not in labor, so that she progresses to vaginal delivery within a period between 24 and 48 h after the beginning of the process[8]. The method to be used to initiate labor induction depends on the degree of cervical maturity, which can be assessed by the Bishop Index[9], which includes items such as height of presentation, cervical dilatation, effacement, cervix consistency and position, thus establishing the prediction of successful induction of labor. Among the methods capable of modifying the uterine cervix, prostaglandin analogue drugs, such as misoprostol administered orally or vaginally, or mechanical processes, such as the Foley probe, known as the Krause method, stand out[10].

After preparing the cervix, the woman may go into labor or need the use of oxytocin or amniotomy or both to stimulate strong, regular and frequent contractions capable of causing progressive changes in the cervix[11].

Considering the severity of the disease and the importance of induction to enable a vaginal delivery, this study aims to identify the process of induction of labor and the maternal and neonatal outcomes in women with preeclampsia assisted in a philanthropic hospital with 100% care by SUS (UHS) in Belo Horizonte, Minas Gerais, Brazil.

Methods

This is a cross-sectional and retrospective study, carried out at Hospital Sofia Feldman, located in the Northern District of the city of Belo Horizonte - Minas Gerais (MG). This hospital is a Municipal and State reference for high risk and performs an average of 900 deliveries per month[12], and the induction of labor in women with PE is a daily reality of the service.

The sample size calculation was based on the studies by Alanis et al. (2008)[13] and Nassar et al. (1998)[14] with a mean prevalence of induction of labor by PE of 57.4% and 47.4%, respectively. Considering an average prevalence of labor inductions of these two studies, equal to 52.4% (0.524) and an accuracy of 7% (0.07), data collection from 196 medical records was predicted. 10% was also added to the collection due to possible data loss, totaling 216 medical records.

Data collection was carried out between August and December 2017, based on the selected medical records of women undergoing the process of secondary induction to PE, between 2016 and 2017. From the universe of pregnant women diagnosed with PE in this period, all pregnant women who were at least 18 years old, hospitalized with a live fetus, gestation over 24 weeks and medical indication of induction of labor were included in the study. From the analysis of the record book of patients admitted to the unit for high-risk pregnant women, 280 medical records were collected. Of these, 58 were excluded after consulting the medical records, as they did not meet the inclusion criteria, resulting in 222 medical records.

The protocol for assistance to pregnant women with PE, which was in effect at the institution at the time of collection, does not differ substantially from the ACOG guidelines[5]. Diagnostic criteria for PE were considered: blood pressure elevation equal to or greater than 140/90mmHg in pregnancies greater than 20 weeks accompanied by proteinuria greater than or equal to 300mg in 24 hours or protein/creatinine ratio ≥0.3mg/dL. In the absence of proteinuria, the protocol placed the following symptoms as diagnostic criteria, in addition to increased blood pressure: headache, visual disturbances, abdominal pain, thrombocytopenia below 100,000, oliguria below 500ml/day or 25ml/hour, serum creatinine above 1.2mg/dl; presence of schizocytes in peripheral blood smear, presence of intrauterine growth restriction and/or oligohydramnios, coagulopathy and increased liver enzymes[15].

As for the Labor Induction protocol[11] used at Sofia Feldman during the collection, the analysis and summation of the items present in the Bishop's Index were used as an assessment of cervical maturity (Chart 1), and in cases of unfavorable cervix (index of Bishop ≤6) cervical ripening should be performed prior to induction of labor using misoprostol or Krause's method. Misoprostol is administered in a dosage of 25mcg (vaginally) or 50mcg (orally). For both routes, administration is prescribed every 4/4 hours up to a maximum of 6 doses or cervix with Bishop score ≥ 6 or active phase of labor.

For induction using the Kraus method, a No. 18 Foley catheter is inserted between the cephalic pole and the internal orifice. 30 to 60 ml of sterile water are injected into the probe balloon for fixation. The catheter can be kept under traction and should be left in place until it loosens spontaneously or for a maximum of 24 hours.

Chart 1. Assessment of the condition of the cervix (Bishop's Index, 1964)[9].

Punctuation	0	1	2	3
Presentation height	- 3	- 2	- 1/0	+ 1/+ 2
Cervical dilatation (cm)	0	1-2	3-4	> 5
Erasure (%)	0 - 30	40 - 50	60 - 70	80
Consistency cervical	Firm	Medium	Softened	-
Position cervical	Later	Medium	Previous	-

Oxytocin is indicated when the Bishop index reaches a score equal to 6 and the dosage is increased and administered via an infusion pump until regular and effective contractions are installed. Amniotomy is always indicated when there is dilatation and a favorable position of the cervix to initiate or strengthen the induction process. Induction failure is considered when a cervical score ≥6 is not reached after 6 doses of misoprostol or after 24 hours of insertion of a Foley tube and, in patients who are using oxytocin and after rupture of the membranes, when there is no pattern of effective contractile action that promotes progressive cervical dilatation after maximum doses of oxytocin. In case of failure of induction, the team must leave for operative delivery. More details, whose exposition here extrapolates the objective of the study, can be seen in the hospital protocol[11].

For data collection, a form developed by the researchers was used, which included the following variables: maternal age, race/color, parity, gestational age at the time of induction of labor, dosage of misoprostol used, maximum volume of oxytocin infusion per hour, time elapsed from the beginning of induction to birth, Apgar score at the first and fifth minutes of birth, birth weight, PE classification, presence of fetal alterations, cervical ripening method, use of oxytocin, use of anesthesia, of delivery, type of vaginal delivery, indication for assisted vaginal delivery, intrapartum complications, postpartum complications, admission of the newborn to the neonatal unit with Apgar below 7 in the fifth minute.

Then, the data were entered into the database built with the Statistical Package for the Social Sciences - SPSS program (IBM 23.0) and later statistical analyses were performed using measures of absolute and relative frequency of the variables. The research was carried out after approval of the project by the Research Ethics Committee of Hospital Sofia Feldman/Fundação de Assistência Integral à Saúde, according to the number of the Embodied Opinion 2,164,770.

Results

In this study, it was possible to observe that most of the women were between 20 and 29 years old. In addition, predominantly self-declared brown women were submitted to childbirth care, followed by black and white women, respectively. Of the 222 women surveyed, 68% were primiparous and 52.7% had a full-term pregnancy. It is noteworthy the high frequency of women diagnosed with PE with severity criteria (63.5%) and the high prevalence of newborns (NB) without changes in fetal vitality before induction (77.9%). Among the serious complications, diagnosed before induction, HELLP syndrome is mentioned in 5.4% of the parturients, in addition to one case of eclampsia and another of eclampsia associated with HELLP syndrome, both included in the "others" category (Table 1).

Table 1. Obstetric profile of women before the process of inducing labor due to PE (n=222).

Variable	n(%)
Parity	
Primiparous	151(68)
Multiparous	71(32)
IG at the beginning of induction	
28w - 31w6d	4(1,8)
32w - 36w6d	101(45,5)
≥37w	117(52,7)
PE classification	
PE without severity criteria	34(15,3)
PE with severity criterion	141(63,5)
PE superimposed on HAC	33(14,9)
HELLP syndrome	12(5,4)
Others	2(0,9)
Presence of changes in fetal vitality	
No	173(77,9)
Restricted intrauterine growth (RIG)	16(7,2)
Doppler change	10(4,5)
Oligohydramnios	7(3,2)
More than one fetal change	16(7,3)

Source: Research database.

As shown in Table 2, it was found that among the inductions, 82 (36.9%) lasted between 12 and 24 hours. Regarding the artificial rupture of membranes, this was performed in 133 (59.9%) women, highlighting that 74.4% of them evolved to delivery within 12 hours. As for the cervical ripening method, misoprostol was the most used (95.5%). It was also observed that 110 (45.2%) women needed the use of oxytocin and only 43 (19.4%) parturients required pharmacological analgesia.

Table 2. Characterization of the labor induction process in women with PE.

Variable	n(%)
Time elapsed from the start of induction to birth (n 222)	
≤12 hours	43(19,4)
>12 - 24 hours	82(36,9)
>24 - 36 hours	77(34,7)
>36 - 48 hours	18(8,1)
>48 hours	2(0,9)
Realizationofamniotomy (n=222)	
Yes	133(59,9)
Spontaneou srupture of membranes	29(13,1)
Admitted with a bag	60(27)
Time elapsed from amniotomy to birth (n=133)	
<12 hours	99(74,4)
≥12 hours	34(25,6)
Cervical ripening method (n=222)	
No	9(4,1)
Misoprostol	211(95,5)
Krause method	2(1)
Use of oxytocin (n=221)	
No	121(54,8)
Yes	110(45,2)
Use of pharmacological methods of pain relief (n=222)	
No	179(80,6)
Nitrous oxide	3(1,4)
Epidural analgesia	36(16,2)
Nitrous oxide and epidural analgesia	4(1,8)

Source: Research database.

Induction resulted in vaginal delivery for 59% of the women and only 7.8% required the application of forceps. It was noted that failure to induce labor (59.3%) was the main indication for cesarean section followed by non-reassuring fetal status (27.5%). Regarding complications during induction and in the puerperium, 54.4% and 57.7% of the women, respectively, did not present any problems. The most common complication was the increase in blood pressure to values greater than or equal to 160 and/or 110mmHg, 23% during induction and 25.2% in the puerperium. Intercurrences classified as "other" included: headache accompanied by dyspnea and palpitations, nausea and vomiting and epigastralgia, and postpartum isolated neurological symptoms, hemorrhage not classified as postpartum hemorrhage, severe anemia, placental retention, acute renal failure, phlebitis, stroke and postpartum infection (Table 3).

Table 3. Characterization of maternal outcomes in terms of type of delivery and complications during induction and in the puerperium.

Variables	n(%)
Type of delivery	
Vaginal delivery	130(59)
Cesarean	91(41)
Cesarean indication (n=91)	
Inductionfailure	54(59,3)
Non-reassuring fetal state	25(27,5)
Others	12(13,2)
Type of vaginal delivery (n=131)	
Spontaneous	126(92,4)
Forceps	5(7,8)
Complications in the puerperium (n=222)	
Absent	121(54,5)
BP≥160 and/or 110mmHg	51(23)
Neurological/visual symptoms	19(8,6)
BP≥160 and/or 110mmHg + Neurological and /or visual symptoms and/or hepatic	27(12,2)
Others	4(1,8)
Intercorrências no puerpério (n=222)	
Absent	128(57,7)
Postpartum hemorrhage (PPH)	21(9,5)
BP≥160 e/ou 110 mmHg	56(25,2)
BP≥160 and/or 110mm Hg + Neurological and /or visual symptoms and/or hepatic	4(1,8)
Seizure crisis	3(1,4)
Maternal death	1(0,5)
Others	9(4,1)

*BP: Blood pressure; mmHg: Millimeter of Mercury;
*BP≥160 and/or 110mmHg: Severe arterial hypertension
Source: Research database.

84.2% of the newborns had an Apgar score ≥7 at the 5th minute and 35.2% were admitted to a neonatal unit, with respiratory distress (33.8%) being the main cause of admission. Among the causes of admission to a neonatal unit, cases categorized as "others" included treatment of congenital syphilis, maternal transfer to the Intensive Care Unit (ICU), neonatal sepsis. None of them were related to the maternal diagnosis or the process of inducing labor (Table 4).

Table 4. Neonatal outcomes of newborns of women undergoing labor induction due to PE.

Variables	n(%)
Apgar Index 1' (n=222)	
<7	35(15,8)
≥7	187(84,2)
Apgar Index 5' (n=222)	
<7	3(1,4)
≥7	219(98,6)
NB admitted to neonatology during hospitalization (n=222)	
No	144(64,9)
Neonatal Intensive Care Unit (NICU)	35(15,8)
Intermediate Care Unit	43(19,4)
Causes of admission to neonatology (n=77)	
Respiratory distress	26(33,8)
Weight gain tracking	20(26)
Hypoglycemia	6(7,8)
Prematurity	9(11,7)
Phototherapy	7(9,1)
Others	9(11,7)
Birth weight suitability classification (n=221)	
Suitable for gestational age (AGA)	176(79,7)
Small for gestational age (SGA)	40(18)
Large for gestational age (LGA)	5(2,3)

Source: Research database.

DISCUSSION

Regarding the profile of the women who participated in the research, the most frequent self-declared color was brown, following the pattern found in different studies that evaluate pregnant women in the country, as well as the prevalence of women aged between 20 and 29 years[16,17]. These data are important, as they show us to which public the guidelines and clarifications on PE should be directed, both in the prenatal period and in the intrapartum and postpartum period.

As for parity, it was observed that most women were primiparous. Although this study only carried out a descriptive analysis of the results without establishing risk criteria or associations of variables with a comparison group, it is noteworthy that, in the literature, one of the main theories related to the etiopathogenesis of PE associates the occurrence of this syndrome with greater frequency in primiparous women because these women are exposed to chorionic villi for the first time[17,18].

In this study there was a high percentage of women diagnosed with PE with signs of severity. It is noteworthy that adequate care to prevent PE from worsening is an important detail and depends on both the quality of prenatal care and the quality of hospital care. According to the WHO analysis on maternal mortality in the world, the fact that hypertensive syndromes of pregnancy are the main cause of maternal death in Latin America is associated with both inadequate management and the non-use or inappropriate use of magnesium sulfate, lack of clinical protocols and other essential elements for the control of this clinical condition[2,19].

Regarding the use of misoprostol, most women in the study (95.5%) needed to use it as a method of cervical ripening, less than half (45.2%) of the sample used oxytocin to conduct labor and the majority (36.9%) progressed to delivery between 12 and 24 hours after the start of induction. In the study by Silva et al. (2017)[20], it was possible to find a successful induction after the use of misoprostol in 69% of the women, and in 59% the use of oxytocin was necessary. A Bishop score between 4 and 5 and previous vaginal delivery were factors associated with this success. In that same study, the time between the beginning of induction and birth was 20 hours for 60% of the women. Another study carried out with women undergoing labor induction at the Department of Obstetrics and Gynecology of the General Hospital of Xanthi, Greece, found that the use of misoprostol alone, as a single or double vaginal dose, is more effective than dinoprostone alone in induction of delivery without the administration of oxytocin. In addition, the time interval from induction to delivery was significantly shorter with the use of misoprostol[21].

The Labor Induction Protocol[11] followed by Sofia Feldman Hospital regarding the use of misoprostol is similar to protocols used by other hospitals nationwide, whose dosage is equal to 25µg vaginally for cervical ripening, with administration intervals ranging from 4 to 6 hours until the cervix reaches a Bishop score ≥6 within 24 hours[22-24].

It should be noted that there is no full consensus in the literature regarding the number of doses, application interval, or the total duration of treatment with misoprostol in inducing labor with live fetuses. According to the High-Risk Pregnancy Manual[25] of the Health Ministry, the current trend is for misoprostol to be administered at a dose of 25µg, every 4 hours, for a maximum of 24 hours, and it should be interrupted in case of uterine contractions that characterize the labor. As for oxytocin, its use should only be started 6 hours after the last dose of misoprostol. The Manual also highlights that the concomitant use of misoprostol and oxytocin is not recommended, as it increases the risk of tachysystole, increased intensity of uterine contractions and uterine rupture, and compromised fetal vitality[25].

The duration of care until the definitive resolution of PE, which is delivery and removal of placental tissue, is an important factor for a good outcome in these cases.

Obviously, induction is a process that can be time-consuming, even more so in cases of unfavorable cervix that demand repetitive doses of misoprostol. When starting induction, one must be sure that the delay in resolution will not increase the risk to the woman or the fetus. Therefore, strict surveillance is essential. Measures such as: verification of vital signs, measurement of diuresis, monitoring of symptoms related to the imminence of eclampsia and performance of laboratory tests, should be established for maternal and fetal monitoring[7].

Regarding the mode of birth, vaginal delivery occurred in 59.3% of the women, with induction failure being the main reason for cesarean section indication. In the literature, there is a prevalence that varies between 53.5% and 73.2% of this type of delivery in women with PE[14,26,27]. It is noteworthy that the presence of PE seems to configure a risk factor for induction failure; even so, among women with this disease who undergo this procedure, most progress to vaginal delivery[26].

The failure of the induction process in the present Hospital, as well as in others in the country, is characterized by the absence of contractions within 24 to 48 hours of the beginning of the induction. Faced with the diagnosis of failure of induction, the team can opt for another induction method, for repeating the method or for cesarean section in cases of priority and urgency to terminate the pregnancy[16,22-24].

It is noteworthy that avoiding a cesarean section without the real indications is an important goal in obstetric care, since the surgery can compromise the woman's reproductive future. Studies show that there is a positive association between this surgery and an increased risk of performing emergency hysterectomy due to the occurrence of PPH, anesthetic complications, occurrence of uterine rupture in future deliveries in women who attempt vaginal delivery, placental implantation disorders in future pregnancies, such as placenta previa, placental accreta and vasa previa, bladder injury and infections[20,27,28].

The Ministry of Health[25] recommends that, in cases of PE with signs of severity, the safest route should be provided for both mother and baby. Although cesarean section in this scenario has been frequently practiced by health professionals, the vaginal delivery route is preferable, as already mentioned, with the intention of not adding potential surgical risks. In this way, induction of labor can be practiced if fetal vitality is preserved and the maternal situation allows it.

The induction of labor as the first choice in the management of women with PE, especially in primiparous women, can be a valuable approach to reducing morbidity and mortality associated with cesarean section in the short, medium and long term. However, there is no scientific evidence from randomized clinical trials with a strong degree of recommendations on elective cesarean section versus induction of labor for women with severe preeclampsia[29], which leads to the importance of developing more studies with good quality to guide the decision on the route of childbirth.

Regarding the indications for cesarean section in this study, 27.5% were caused by the non-reassuring fetal state. However, only three newborns (1.4%) had an Apgar value lower than 7 in the 5th minute. Saving the NB from the worsening of the non-reassuring fetal state is the objective of performing a cesarean section in this case. After the insertion of continuous fetal monitoring in care, with the objective of reducing morbidity and mortality related to neonatal asphyxia, cesarean section rates progressively increased over the years[30]. In the hospital studied, fetal surveillance during induction includes frequent cardiotocography, which may have led to an increase in the cesarean section rate due to such a diagnosis.

As for the most frequent complications during the induction process and in the puerperium, the increase in blood pressure and PPH stand out. PE and other hypertensive disorders are important risk factors associated with PPH due to vasoconstriction and consequent increase in blood vessel pressure. The labor induction process itself, as well as the use of magnesium sulfate are also considered risk factors for triggering this complication[4]. In addition, even when it is not life-threatening, this complication has physical and emotional consequences for postpartum women, such as: orthostatic hypotension, anemia, fatigue, which leads to impaired newborn care, increased risk for postpartum depression, acute symptoms of anxiety such as fear of dying, including in future pregnancies, delay in starting breastfeeding or difficulty in maintaining it[31].

Regarding the maternal death observed in the study after induction, it was found that it was a postpartum woman diagnosed with PE with severity criteria who evolved with hemorrhagic stroke and PPH, evidencing the severity of the pathology and its possible disastrous consequences. Regarding the occurrence, there is a weakness in the induction process that may be related to the longer duration for the resolution of the pathology and a possible failure in the process of monitoring signs of complication. Therefore, it is important to emphasize strict maternal surveillance during the induction process, which is an essential factor for the early identification of complications, favoring the correct approach and treatment of diseases in order to avoid catastrophic outcomes[7]. A multicenter study with 27 reference maternity hospitals throughout Brazil found 42 maternal deaths among 6706 women diagnosed with hypertensive syndrome and 118 cases of near miss or life-threatening clinical conditions. In this study, hemorrhage was associated with the occurrence of near miss and maternal death. The authors identified that in more than half of the severe cases there was a delay in adequate care, evidencing failures in the regulation of beds, lack of beds for the treatment of complex cases and errors in treatment by professionals[32].

As for the neonatal results of the NBs of women who underwent the process of induction of labor, only three (1.4%) received an Apgar score <7 at the fifth minute and there was no neonatal death recorded related to the process of induction of labor itself. It should be considered that early termination of pregnancy may be necessary in PE and unfavorable neonatal outcomes may be related to gestational age[17].

Most hospitalizations that occurred in the NICU were due to respiratory distress, a fact that, according to the literature, is directly associated with prematurity[33]. Pulmonary maturity is directly related to gestational age and the lungs of a preterm NB have several characteristics that facilitate the occurrence of lesions. It is also noteworthy that, in addition to being associated with respiratory instability of prematurity, PE is also directly related to the increased risk of respiratory distress syndrome, newborn tachypnea and apnea, even in full-term newborns[33].

The study has considerable limitations, as it provides only descriptive data from only one hospital. Even so, it can contribute to the development of other studies with the same theme at the national level and support the decision-making of care providers in relation to the mode of delivery for Brazilian women diagnosed with PE. More studies with correlation between variables should be carried out to respond to the gaps that a descriptive study will leave.

Conclusion

It is noteworthy that in our study, PE is accompanied by several complications, which demonstrates the severity of the disease and the need for a quality approach in obstetric care.

The rate of vaginal delivery after induction in this study is very favorable. Still considering the neonatal results, induction in women with PE proved to be an effective measure to avoid cesarean section, especially in primiparous women. The choice of inducing labor in this group of pregnant women is presented as a valuable intervention in order to minimize the short, medium and long-term maternal risks associated with performing a cesarean section.

However, it is essential that the care team ensures efficient maternal and neonatal surveillance and is ready to implement measures capable of saving the mother and newborn as soon as any changes are identified.

Authors Contribution

Conceptualization, Investigation, Methodology, Visualization&Writing – review&editing: Tailanne Xavier dos Santos; Carolina Amaral Oliveira Rodrigues; Edson Borges de Souza; Álvaro Luiz Lage Alves; Dalton Dittz Júnior; SibylleEmilie Vogt. Project administration, Supervision & Writing – original draft: Tailanne Xavier dos Santos; Sibylle Emilie Vogt. Validation & Software: Not applicable. Resources & Funding acquisition: Not applicable. Data curation & Formal Analysis: Tailanne Xavier dos Santos; Carolina Amaral Oliveira Rodrigues; Edson Borges de Souza; Álvaro LuizLageAlves; Dalton DittzJúnior; Sibylle Emilie Vogt.

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