Original Article

Association between hypertensive disorders and postpartum hemorrhage

Associação entre síndromes hipertensivas e hemorragia pós-parto

Asociación entre las síndromes hipertensivas y hemorragia posparto

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ABSTRACT

Objective: To investigate the association between hypertensive disorders and postpartum hemorrhage (PPH), by measuring the hemoglobin (Hb) and hematocrits (Ht) levels among women attending a university hospital in the Sao Paulo countryside.

Method: Epidemiological, cross-sectional study, conducted with 100 primiparous, in the period between August and December 2012. Hemoglobin and hematocrit dosages were tested upon admission of the mother and 48 hours after delivery. Values ≥ 10% drop in the hematocrit numbers when compared to those shown in admission, were considered as HPP. HPP was considered the dependent variable and the independent variables were socioeconomic, pathological, prenatal care, admission, delivery and assistance. Univariate and bivariate statistics were used, with 5% significance level.

Results: The hypertensive disorders were the most commonly occurring disorders; there was the presence of positive correlation between the fall in Ht and Hb levels and there was no association found between hypertensive disorders and HPP.

Conclusions: Primiparous not suffering from hypertensive disorders were more likely to present PPH.

Keywords: Postpartum hemorrhage. Pregnancy-induced hypertension. HELLP syndrome. Eclampsia. Pre eclampsia. Hypertension. Millennium Development Goals.

RESUMO

Objetivo: Investigar a associação entre síndromes hipertensivas e hemorragia pós-parto (HPP) através da mensuração do nível de hemoglobina (Hb) e hematócrito (Ht) em mulheres atendidas em um hospital universitário do interior paulista.

Métodos: Estudo epidemiológico, seccional, realizado com 100 primíparas, no período entre agosto e dezembro de 2012. Realizaram-se dosagens de hemoglobina e hematócrito na admissão da parturiente e 48 horas pós-parto. Consideraram-se como HPP valores ≥ queda de 10% do valor do hematócrito da admissão. A HPP foi considerada variável dependente, e as variáveis independentes consideradas foram as socioeconômicas, patológicas, assistência pré-natal, admissão, parto e assistência. Utilizaram-se análises estatísticas uni e bivariadas, com nível de significância de 5%.

Resultados: As síndromes hipertensivas foram as doenças mais frequentes; houve presença de correlação positiva entre a queda nos níveis de Ht e Hb e não se identificou uma associação entre síndromes hipertensivas e HPP.

Conclusões: Primíparas portadoras de síndromes hipertensivas não apresentaram maior probabilidade de HPP.

Palavras-chave: Hemorragia pós-parto. Hipertensão induzida pela gravidez. Síndrome HELLP. Eclampsia. Pré-eclâmpsia. Hipertensão. Objetivos de Desenvolvimento do Milênio.

RESUMEN

Objetivos: Investigar la asociación entre síndromes hipertensivas y hemorragia posparto (HHP), midiendo el nivel de hemoglobina y hematocrito entre mujeres que acuden a un hospital universitario de una provincia en el interior de São Paulo.

Métodos: Estudio epidemiologico, seccional o en corte, realizado con 100 primiparas, en el período comprendido entre agosto y diciembre de 2012. Fue realizado dosis de hemoglobina y hematocrito, en la admisión y 48 horas después del parto. Consideró como (HPP) valores / la caída del 10% del valor de lo hematocrito de la admisión. (HPP) fue considerada variable dependiente y socioeconómicas, patológicas, asistencia prenatal, admisión, parto y evolución y asistencia, independientes. Se utilizaron estadísticas univariadas y bivariadas, con nivel de significación del 5%.

Resultados: Síndromes hipertensivas fueron la enfermedad más frecuente; hubo presencia de correlación positiva entre la caída en los niveles del Ht y Hb y no encontraron una asociación entre las síndromes hipertensivas y HPP.

Conclusiones: primíparas con síndromes hipertensivas no fueron más propensas a PPH.

Palabras clave: Hemorragia posparto. Hipertensión inducida en el embarazo. Síndrome HELLP. Eclampsia. Preeclampsia. Hipertensión. Objetivos de Desarrollo del Milenio.

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INTRODUCTION

Maternal mortality remains a serious problem in several countries, including Brazil. Reducing maternal mortality in 75% by 2015, as set out in the Millennium Development Goals – specifically, the fifth goal that aims to improve maternal health – is far from being achieved, especially in Brazil, because although progress is notable, the annual rate of decline also falls short of being considered ideal, reaching less than half of what is needed. To achieve this, a decline of 5.5% per year would be required, but the annual decline reached so far was 3.1%[1]. Despite the significant reduction, there is still room for improvement to fully meet the objective of the millennium[1].

Maternal death can be defined as: **"**The death of a woman during pregnancy or within 42 days of the termination of a pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by pregnancy or by measures taken in relation to it, but not due to accidental or incidental causes"[2].

Among the main causes of maternal death are: postpartum hemorrhage (PPH); infections; hypertensive disorders and unsafe abortions [1].

In analyzing the data from the Information Technology Department of the Unified Health System – DATASUS – from 1996 to 2012, 28 713 maternal deaths were identified, with hypertensive disorders being the lead cause of death in the country, and, in third, HPP [3].

We also know that, despite regional and international differences in the main causes of maternal death, bleeding, still, is the leading cause in many countries. It is estimated that 25% to 35% of these deaths are caused by PPH [4-6]. In Brazil, it accounts for over 41% of maternal deaths. It is a fact that in face of a a maternal death, many professionals do not classify HPP a *cause of death*, but when going through the history described in the medical records of pregnant women, it is clear that this is a classic case of PPH [6].

HPP is traditionally defined as a blood loss ≥ 500 ml for vaginal delivery, and of over 1,000 ml in cesarean sections and / or bleeding requiring transfusion[4-5,7]. American Conference of Obstetricians and Gynecologists (ACOG) warns against the 10% drop in the laboring woman's hematocrit levels compared to testing done at the time of admission in the maternity ward, in which case the health professional may be facing a PPH condition condition[7].

The literature suggests that some relational factors could contribute to the increased risk and vulnerability of women to develop HPP, but the findings are still questionable and the research on the topic is scarce. Among the risk factors, there are the hypertensive disorders, which can be classified as gestational hypertension, preeclampsia, eclampsia, chronic hypertension and Hellp syndrome[8-9].

Based on this information, the importance of a study to identify the association between hypertensive disorders and HPP is clear, since they are the main causes of maternal deaths. This study aims to join efforts in the development of research that offers subsidies to clarify the issue, contribute to evidence which are scarce both in national and international literature, and promote improvements in the quality of care provided to women's health, seeking favorable results to reach the fifth Millennium Development goal.

The objective of this study was to investigate the association between hypertensive disorders and postpartum hemorrhage (PPH), by measuring the level of hemoglobin and hematocrit between women treated at a university hospital in the northwestern region of São Paulo (São Paulo).

METHODS

This is an epidemiological study of sectional/cross-sectional study, originated in the thesis "Analysis of haematic loss during the process of parturition" [10].

Since a PPH condition can not be predicted, and little is known about the prevalence of PPH and its risk factors, we opted for this type of study. In cross-sectional studies (cross), the exposure and the participant's health condition are determined simultaneously. Thus, its fundamental characteristic is that it is not possible to know whether exposure precedes or is a consequence of the health related disease/condition. Although this outline can be considered weak as a determining factor of cause-effect type associations, it is appropriate to identify people and characteristics that can undergo prevention measures and generate hypotheses of disease causes[11].

The study was conducted in an obstetric unit of a teaching hospital in the countryside. The study sample consisted of woman, who gave birth to live newborns as single pregnancy outcomes, regardless of the delivery method and interventions during the prenatal care, delivery and postpartum. The choice of a sample consisting only of primiparous occurred while attempting to ensure sample homogeneity and reduce the possible effects of parity in the results, since some studies show that women who had more than three pregnancies are at increased risk of PPH [12-13].

The sample was determined to ensure a maximum error of 10% between the estimated prevalence of PPH and prevalence in the population, with a 95% confidence interval, consisting of a minimum "n" of 68 primiparous.

However, the data collection was carried out with 100 primiparous, in the period between August and December of 2012, overcoming the number proposed in the sample calculation.

The exclusion criteria was constituted by; multiparity; previous pregnancies that resulted in abortions and/or repeated miscarriages; abortions; fetal deaths and stillbirths, and suffering from bleeding disorders and/or hematological malignancies (excluding the occurrence of anemia during pregnancy).

For the data collection in this study, we used a specific instrument, which has been tested through a pilot study. The sources of information used for filling were: prenatal card and printed and electronic medical records of pregnant women. Hemoglobin and hematocrit dosages were tested upon admission of the mother and 48 hours after delivery. It is noteworthy that the reported tests were part of routine/clinical protocol and were not analyzed solely for the purpose of this study. In addition, it is important to note that all analyzes were performed by the same laboratory, an intitution that is accredited since 2009, and reviewed annually.

After checking the indexes, the hematic loss was calculated by subtracting the value of postpartum hematocrit value from that found at the time of admission. HPP was considered when there was a decrease greater or equal to a 10% of the hematocrit values when compared to those at the time of admission, as in the definition established by ACOG[7]. The occurrence of HHP was considered the dependent variable (response) of the study, and the presence of hypertensive disorders in pregnancy, the independent variable.

For data analysis, the double-entry technique was adopted (typing), with subsequent validation, using the *Microsoft Excel*® program. The statistical analysis used the program *Statistical Package for Social Sciences* (version 20). Data were analyzed by simple descriptive statistics (frequence, mean and standard deviation) and contingency table, through which we calculated the *odds ratio* in order to identify a possible association between hypertensive disorders and HPP.

The study was reviewed and approved by the Ethics Committee on Human Research of the University Hospital of Ribeirão Preto Medical School, University of São Paulo (CEP HCRP and FMRP – USP), HCRP Case No 4172/201. It is noteworthy that all the participants signed the Free and Informed Consent Form when they agreed to participate in the study. This agreement was recorded upon admission to the health service for the outcome of pregnancy (birth).

RESULTS

As for the characterization of the sample, the age of the participants ranged from 13 to 38 years, with a mean of 22.97 ± 5.67 years, with 18% being adolescents and 5% considered elderly patients (age greater than 35 years); 65% had no steady partner; 51% had completed high school and 76% of them are white. Regarding the situation in the labor market, 60% of women were not engaged in remunerated activity.

It was found that most patients (71%) had at least one disease and 29% had no change but were sent to the institution because they live in the catchment area of the hospital complex. Hypertensive disorders were the most frequent pathologies (26%), followed by anemia (10%), diabetes (8%), and HPV (8%).

All participants underwent at least one prenatal visit and with the number ranging between 1 and 24, with an average of 8.69 ± 3.94 consultations; 64% of pregnancies were full term when admitted to the institution for resolution of pregnancy; 6% were post-term and 30% were premature. The labor resulted in vaginal delivery for 62% of cases, and 38% cesarean deliveries.

The use of additional oxytocin in therapeutic doses for the control of bleeding and uterine tonus was the intervention most commonly performed in the immediate postpartum (20%), indicating that there were complications related to the tonus and/or bleeding. A hemoglobin level <9 mg/dl (48 hours postpartum) was also a frequent result (20%), and in addition, 14% of women had recorded episodes of fainting and the need for supplementation with ferrous sulfate. However, a low curettage (1%) and blood transfusion (3%) level was identified in the sample. The level of hematocrit (Ht) 48 hours after delivery ranged from 19 to 48%, averaging 31.66 ± 5.18%.

When the group of women who had arterial hypertension (n = 26) was analyzed, the findings were: nine cases of gestational hypertension; eight of pre-eclampsia; three of chronic hypertension; three hypertensive disorders of unknown etiology; two threats of eclampsia and a Hellp syndrome case.

Of the 26 women who had hypertensive disorders, 15% were teenagers, 4% were elderly primigravidae and had an average age of 22.07 ± 5.6 years; 73% had no steady partner; 46% had completed high school; 69% of them are white and most were not employed (42%).

The women in this group performed 2-16 prenatal visits, averaging 9.15 ± 3.67; none of them had diabetes; 8% had HPV infections with multiple and active lesions; 27% were anemic at the time of hospital admission and

77% were taking antihypertensive drugs for blood pressure control.

In relation to gestational age, 65% were admitted to the term of pregnancy; 31% were in preterm labor and 4% of pregnancies were post-term.

Half of the cases (50%) were finalized by cesarean section and the other half by vaginal delivery. Among the indications for cesarean section, decompensation of tension levels (38%), fetal distress (23%) and induction failure (15%) were more prevalent. In cesarean sections, 31% developed HPP, and in vaginal deliveries, 23% had PPH (and in 66% of these births, episiotomies were performed).

The mean Ht drop was 6.03 ± 5.5 ranging from -8 to 17%. Among the procedures performed to extinguish the PPH condition the prescription of ferrous sulfate in the top conventional dose (100%) and additional oxytocin (29%) was more frequent. In only one case was an Ergot derivation adminsitered intramuscularly (14%) to control tone and/or bleeding and blood transfusion was carried out (14%) because the patient had major bleeding accompanied by severe hypotension. Every woman who fell from the top Ht 10% presented levels of Hb <9 mg / dl, 43% and had faintings and paled mucous membranes.

It was demonstrated that of the 100 women evaluated, 16 were down 10% from the postpartum hematocrit when compared to their admission levels. Thus, a 16% prevalence of HPP is considered, according to the ACOG criteria. HPP occurred in 27% of cases of hypertensive syndromes, as shown in Table 1.

Table 2 shows estimates of the hematocrit and hemoglobin levels measured upon admission of all patients (n = 100) and 48 hours after delivery, and the respective averages for the 95% confidence interval (CI 95%).

The decreases in levels of Ht and Hb, occurred between the admission of the woman in labor and the postpartum period (48 hours postpartum), adding evidence to a correlation coefficient of 0.89, showing a positive correlation between the two variables, as shown in Figure 1. It was thereby thereby that for the 10% decrease of Ht, the decrease of Hb was 2.99 mg / dl.

From the results, the odds ratio of occurrence of HPP in women who had hypertensive disorders was calculated. Hypertensive disorders showed an *odds ratio* equal to 2.66 (CI = 0.9 to 8.1), with p = 0.112. Thus, there was no significant association between the occurrence of hypertensive disorders and HPP in the sample.

DISCUSSION

Regarding the frequency of hypertensive disorders, it was observed that the content found in the study (26% in a sample of 100 primiparous) was extremely high when compared to a population study involving more than 112,000 pregnant women and detected the change in only 5% of the sample[14]. By analyzing the classification

Table 1 – postpartum hemorrhage occurred (decrease of 10% Ht) and hypertensive disorders. Ribeirão Preto, São Paulo, Brasil, 2012

Hypertensive syndromes	Decrease in 10% of Ht (HPP)		Total
	Yes	No	
Yes	7	19	26
No	9	65	74
Total	16	84	100

Source: Survey data, 2012.

Table 2 – Estimates of hematocrit levels and hemoglobin measured at baseline and 48h after deliveryfor CI 95%. Ribeirão Preto, São Paulo, Brasil, 2012

Moment	Hematocrit			Hemoglobin		
	Average	CI=95%		Average	CI=95%	
Admission	36.5	35.8	37.1	11.9	11.7	12.1
48h after delivery	31.7	30.6	32.7	10.4	10.1	10.7

Source: Survey data, 2012

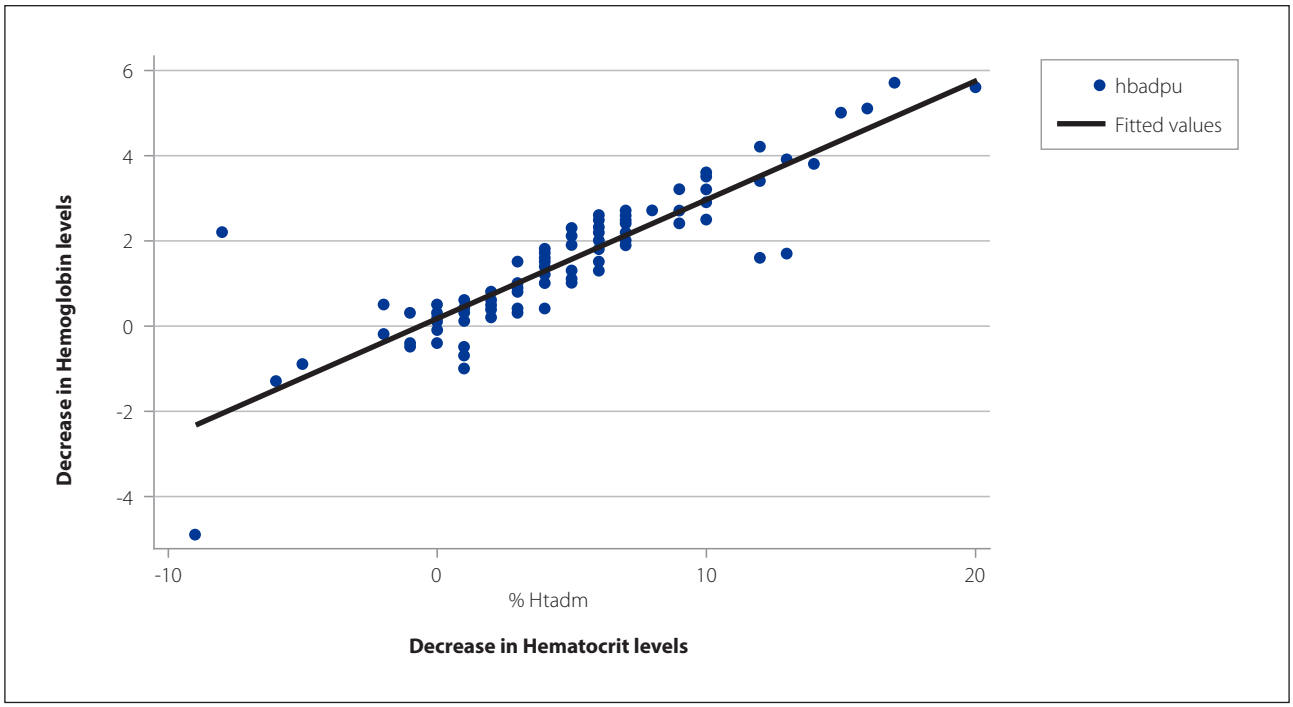

Figure 1 – Relationship between the drops in hematocrit (Ht) and hemoglobin (Hb) levels in the period between admission and the postpartum period (48 hours postpartum)

Source: Survey data, 2012.

of hypertensive disorders, there are only the gestational hypertension index presents similarities, where a frequency of 34.6% in this survey, and 31.4% in the study described was obtained, respectively. As for pre-eclampsia, eclampsia, chronic hypertension, the values presented were largely different from the present study to the other [14], with the following percentages: eclampsia (7.7% and 0.9%) pre- eclampsia (30.8% and 15.1%) and chronic hypertension (11.5% and 6%).

The age of the study participants ranged from 13 to 38, and of these, 18% were adolescents and 5% were older than 35 years; when the group of hypertensive women was evaluated, 15% were teenagers and 4% older first pregnancy. Age did not represent a significant difference in hematic loss. Some studies have shown a relationship between hypertensive disorders and maternal age, with women aged above 30.

Women with lower education proved to be more likely to develop some form of hypertensive syndrome[14], and middle-class women presented preeclampsia (45.2%) and HPP (45.5%)[9] the most.

In contrast to the data found in the literature, half of the participants of this study had an educational level that went beyonnd high school.

Although one study found that race/ethnicity influences the occurrence of hypertensive disorders, with regional variable rates, it does not indicate the relationship between this result and the occurrence of HPP [14].

Most participants declared themselves white, both in the total sample (76%) and in the group of hypertensive women (69%), and no association of color with the occurrence of hypertensive syndrome and/or HPP in this sample was found.

In only one study found was there no mention to placental abruption (DPP) as a complication of hypertensive disorders [9].

However, other studies showed the association of hypertensive disorders with DPP and the consequent increase in HPP rates.

In one study, it was found that 15.9% of pregnant women with Hellp syndrome presented DPP, which was associated with disseminated intravascular coagulation, and of these, 6.8% had PPH [16].

Another study emphasized that the DPP is an intermediate variable to HPP, due to the increased risk of uterine weakness[15].

It is understandable, therefore, that studies have associated DPP with hypertensive disorders, and the pressure

increase behaved as a risk factor for bleeding (9.14 to 16). None of the cases of hypertension identified in this study was of DPP.

Half of the cases of hypertensive disorders in pregnancy (50%) were finalized by cesarean section and the other half by vaginal delivery; 31% of caesarean sections evolved with HPP and, of the vaginal deliveries, 23% presented HPP (and, in 66% of these births, an episiotomy was performed).

A study shows that cesarean section can lead to higher prevalence of PPH [14]; while another says there is an association of vaginal births with HPP and an increase of the incidence of eclampsia [9].

Therefore, it is observed that the data are controversial and that there is need for further studies to elucidate the theme.

A population-based study found that, in the United States, HPP accounted for more than half of the cases of severe or serious morbidity, ie severe cases almost evolved to death.

Hypertensive disorders were the second most frequent cause of severity.

However, there were no relations established between risk factors, for the severe cases had different characteristics [17].

A cohort study of women diagnosed with gestational hypertension or mild preeclampsia, conducted in 38 Dutch hospitals showed that the HPP rate in this group ranged from 4 to 22% (mean 10.4%).

The authors investigated the influence of some variables during pregnancy, during labor/delivery that could be used as risk predictors for HPP.

Results showed that it is necessary to evaluate all influence variables during pregnancy and during labor and delivery to predict and intervene in this group of women and, most importantly, to distinguish the predictors to then calibrate them properly (pressure values and reliable hematic loss) [18].

In a retrospective study, the authors found that hypertensive disorders were presented as a risk factor for the occurrence of HPP.

It was found that pre-eclampsia is one of the major complications in pregnancy, affecting about 19% of the women studied, and for them, the HPP index was 13.4% [19].

In another study that analyzed the admission of women in intensive care units, attention is drawn upon the high rate (40%) of cases related to hypertensive complications, who did or not have HPP [20].

It is therefore understood that, although the relationship between HPP and hypertensive disorders is unclear, the latter is a serious condition and when associated, can develop with a bad prognosis due to the severity of the conditions.

CONCLUSIONS

Regarding the objectives of the study, it was concluded that primiparous woman not suffering from hypertensive disorders were more likely to have HPP, though, it has found high rates of hypertensive disorders in the study sample when compared to other population studies.

It is noteworthy that, although the relationship between HPP and hypertensive disordersis unclear, both are serious complications that if not treated concurrently, can develop to a bad prognosis due to the severity of the conditions.

In this scenario, the nurse plays an essential role in the care of women during pregnancy and childbirth, in the effectiveness of promoting maternal health, vaginal delivery assistance, monitoring of prenatal visits, requests for laboratory tests, prescription drugs that are in line with the institutional protocols, evaluation of risk ratings, intervention on possible complications, and finally, a comprehensive care by ensuring access to quality health in a safe manner.

As limitations, the study points out that, although there are discussions about diagnosis and treatment for HPP, in general,a lack of studies that address their risk factors and preventive and control measures can be observed.

Similarly, there are few studies that show the relationship between HPP and hypertensive disorders, and its pathophysiology, a characteristic that can be considered a limitation for promoting the discussion of this study.

Another limitation relates to the sample, since primiparous women were only included so that the results would not be a generalized to the population of pregnant women.

It is suggested that case-control studies be carried out to determine possible risk factors and investigate the relationship between parity and HPP, and hypertensive disorders and HPP.

In turn, the fact that only primperous woman were included in this study and that features and relevant risk factors for the detection and prevention of PPH frames were identified, can allow effective monitoring in future pregnancies of these same women through cohort studies.

It is noteworthy that since HPP and hypertensive disorders are the leading causes of maternal mortality and, in view of the Millennium Development Goals and the lack of studies on the subject, it is believed that investigations like this are important, because they can improve the understanding of maternal morbidity and mortality and contribute to the improvement of care in pregnancy and childbirth.

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