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Universidade de Fortaleza  
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de Sousa Araújo Santos, Zélia Maria; Frota Carneiro, Rithianne; Bezerra da Silva Junior,  
Geraldo; da Silva Feitoza Palácio, Janaína; Cândido do Nascimento, Jennara  
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IN NORTHEASTERN BRAZIL- EPIDEMIOLOGICAL PROFILE

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# SPECIFIC HYPERTENSIVE DISORDERS OF PREGNANCY IN A TERTIARY HOSPITAL IN NORTHEASTERN BRAZIL- EPIDEMIOLOGICAL PROFILE

*Doença hipertensiva específica da gravidez em um hospital terciário do nordeste brasileiro-perfil epidemiológico*

*Trastorno hipertensivo del embarazo en un hospital terciario del noreste brasileño- perfil epidemiológico*

Original Article

## ABSTRACT

**Objective:** To describe the epidemiological profile of women admitted to a tertiary hospital in Northeastern Brazil with Hypertensive Disorders of Pregnancy (HDP). **Methods:** A retrospective cross-sectional study was carried out at the *Hospital Geral César Cals* (César Cals General Hospital), a tertiary care center of the *Sistema Único de Saúde - SUS* (Brazil's National Health System) in Fortaleza, Ceará, Brazil. The study included 1,865 pregnant women admitted with HDP from January 2006 to December 2013 regardless of age, education, marital status, place of birth, place of residence and outcome (discharge, death and ongoing pregnancy). **Results:** Pregnant women were predominantly aged 17-35 years (n=1484, 79.6%), mixed-race (n=1464, 78.5%), single (n= 775, 41.6%), housewives (n=1269, 68.0%), lived in Fortaleza (n=1198, 64.3%) and had complete elementary education (n=766, 41%). Overweight (n= 1408, 75.4%), first pregnancy (n=827, 44.3%) and multiparity (n=686, 36.7%) were the main risk factors for HDP. Regarding fetal status, 30.9% (n=576) were preterm. The main HDP complications were: HELLP syndrome (n=60, 3.2%), bleeding disorders (n=15, 0.8%) and acute respiratory failure (n=13, 0.6%). **Conclusion:** The pregnant women assessed presented risk factors for HDP, reinforcing the idea that the health status and the disease and health process are directly influenced by socioeconomic and demographic characteristics of the population.

**Descriptors:** Pregnancy; Hypertension; Pregnancy-Induced Hypertension; Epidemiology.

## RESUMO

**Objetivo:** Descrever o perfil epidemiológico das mulheres internadas em um hospital terciário do nordeste brasileiro com síndromes hipertensivas da gestação (SHG). **Métodos:** Realizou-se estudo transversal retrospectivo no Hospital Geral César Cals (HGCC), hospital terciário do Sistema Único de Saúde (SUS) em Fortaleza, Ceará, Brasil, com 1865 grávidas diagnosticadas com SHG internadas no período de janeiro de 2006 a dezembro de 2013, independente da idade, escolaridade, estado civil, nascimento, origem e desfecho (alta, morte e gravidez em andamento). **Resultados:** Houve predominância de mulheres na faixa etária entre 17-35 anos (n=1484, 79,6%), pardas (n=1464, 78,5%), solteiras (n= 775, 41,6%), donas-de-casa (n=1269, 68,0%), residentes em Fortaleza (n=1198, 64,3%) e com ensino fundamental completo (n=766, 41%). Excesso de peso (n= 1408, 75,4%), primeira gravidez (n=827, 44,3%) e multiparidade (n=686, 36,7%) foram os principais fatores de risco para SHG. Com relação ao estado do feto, 30,9% (n=576) eram prematuros. As principais complicações da SHG foram: síndrome HELLP (n=60, 3,2%), distúrbios hemorrágicos (n=15, 0,8%) e insuficiência respiratória aguda (n=13, 0,6%). **Conclusão:** As mulheres grávidas investigadas apresentaram fatores de risco para desenvolvimento da SHG, reforçando a ideia de que o nível de saúde e o processo de saúde e doença são diretamente influenciados por características demográficas e socioeconômicas da população.

**Descritores:** Gravidez; Hipertensão; Hipertensão Induzida pela Gravidez; Epidemiologia.

Zélia Maria de Sousa Araújo Santos<sup>(1)</sup>  
Rithianne Frota Carneiro<sup>(1,2)</sup>  
Geraldo Bezerra da Silva Junior<sup>(1)</sup>  
Janaína da Silva Feitoza Palácio<sup>(3)</sup>  
Jennara Cândido do Nascimento<sup>(4)</sup>

1) University of Fortaleza (*Universidade de Fortaleza - UNIFOR*) - Fortaleza (CE) - Brazil

2) DeVry/Fanor College (*Faculdade DeVry/FANOR*) - Fortaleza (CE) - Brazil

3) Municipal Government of Fortaleza (*Prefeitura Municipal de Fortaleza*) - Fortaleza (CE) - Brazil

4) Estácio University Center of Ceará (*Centro Universitário Estácio do Ceará*) - Fortaleza (CE) - Brazil

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## RESUMEN

**Objetivo:** Describir el perfil epidemiológico de mujeres admitidas en un hospital terciario del Noreste de Brasil con Trastorno Hipertensivo del Embarazo (THE). **Métodos:** Estudio transversal retrospectivo realizado en el Hospital General César Cals que es un centro de cuidado terciario del Sistema Único de Salud - SUS (Sistema de Salud Nacional Brasileño) de Fortaleza, Ceará, Brasil. El estudio incluyó 1.865 mujeres embarazadas admitidas con THE entre enero de 2006 y diciembre de 2013 sin tener en cuenta la edad, la educación, el estado civil, el lugar de nacimiento, el domicilio y el resultado del embarazo (alta, muerte y en seguimiento). **Resultados:** Las mujeres embarazadas tenían predominantemente entre 17-35 años ( $n=1.484$ ; 79,6%), mestizas ( $n=1.464$ ; 78,5%), solteras ( $n=775$ ; 41,6%), amas de casa ( $n=1.269$ ; 68,0%), con domicilio en Fortaleza ( $n=1.198$ ; 64,3%) y tenían educación básica completa ( $n=766$ ; 41%). El sobrepeso ( $n=1.408$ ; 75,4%), el primer embarazo ( $n=827$ ; 44,3%) y la multiparidad ( $n=686$ ; 36,7%) fueron los principales factores de riesgo para THE. Respecto al estado del feto, el 30,9% ( $n=576$ ) eran prematuros. Las principales complicaciones de la THE fueron: la síndrome HELLP ( $n=60$ ; 3,2%), los disturbios de la pérdida de sangre ( $n=15$ ; 0,8%) y la insuficiencia respiratoria aguda ( $n=13$ ; 0,6%). **Conclusión:** Las mujeres embarazadas evaluadas presentaron factores de riesgo para la THE lo que refuerza la idea que el estado de salud y el proceso de salud y enfermedad sufren directamente la influencia de las características socioeconómicas y demográficas de la población.

**Descriptores:** Embarazo; Hipertensión; Hipertensión Inducida en el Embarazo; Epidemiología.

## INTRODUCTION

Hypertensive Disorders of Pregnancy (HDP) occur when systolic blood pressure is greater than 140mmHg and diastolic blood pressure is above 90mmHg. HDP can be classified as preeclampsia (PE), eclampsia (EC), PE superimposed on chronic hypertension, and gestational hypertension<sup>(1)</sup>. PE is characterized by hypertension and proteinuria ( $> 300\text{mg}/24\text{h}$ ) after the 20<sup>th</sup> week of pregnancy in previously normotensive women<sup>(1)</sup>. The etiology of HDP is not fully understood, but some risk factors are known. Primigravidity, multiparity, multiple pregnancy, previous history or family history of PE and EC, hypertension in previous pregnancies, among other factors, are associated with HDP<sup>(2-4)</sup>.

A total of 263 maternal deaths were confirmed in the period from 2010 to 2013; of these, 82 (31.2%) occurred due to HDP and 77 (29.3 %) for other direct obstetric causes such as complications during labor and postpartum – for instance, antepartum and postpartum hemorrhage or puerperal infections<sup>(3)</sup>.

The nurse, as the protagonist of prenatal education, has a fundamental role in health care quality and in the reduction of maternal and neonatal morbidity and mortality. This health worker carries out activities with pregnant women in a highly interactive way through a humanized care. Reducing maternal and neonatal mortality in Brazil is still a challenge for health services and society as a whole<sup>(2)</sup>. The high rates found constitute a violation of Human Rights of Women and Children and a serious Public Health problem<sup>(3)</sup>.

There is a worldwide concern regarding the decrease in maternal mortality rate, as approximately 500,000 women die each year from complications during pregnancy, childbirth and postpartum. The so-called developing countries have the worst rates when compared to developed ones. Africa, Asia and Latin America had the highest rates of maternal mortality<sup>(3)</sup>. The maternal mortality rate is considered a predictor of a country's development level<sup>(2)</sup> and is strongly influenced by socioeconomic status, biological factors, health care services and public health policies aimed at women<sup>(4,5)</sup>.

In Brazil, 2000-2008 data from the *Sistema de Informações sobre Mortalidade - SIM* (Mortality Information System) and from the *Sistema de Informações sobre Nascidos Vivos - SINASC/DATASUS* (Live Birth Information System) showed an average maternal mortality rate of 74.8 deaths per 100,000 live births (LB)<sup>(6)</sup>. In the state of Ceará, Northeastern Brazil, the average maternal mortality rate in the period from 2005-2009 was 74.6 deaths per 100,000 live births, which is similar to the national average. The World Health Organization (WHO) established as acceptable a value of up to 20 deaths per 100,000 live births, a value that is far below the one found in Brazil. In 2009, there were 109 maternal deaths confirmed in the state of Ceará, with a maternal mortality rate of 75.0 per 100,000 live births distributed in a total of 63 (34.2%) municipalities<sup>(6)</sup>. There are few studies on maternal mortality in the Northeast region of Brazil; therefore, it is important to discuss these problems focusing on this region.

The epidemiology of HDP can vary according to the geographical region. Thus, the present study was designed to develop the epidemiological profile of HDP in a metropolitan area of Northeastern Brazil. This study aimed to describe the epidemiological profile of women admitted to a tertiary hospital in Northeastern Brazil with Hypertensive Disorders of Pregnancy (HDP).

## METHODS

A retrospective cross-sectional study was carried out at *Hospital Geral César Cals - HGCC* (César Cals General Hospital), a tertiary care center of the *Sistema Único de Saúde*

- SUS (Brazil's National Health System) in Fortaleza, Ceará, Brazil, that has been dedicated to education and health care for more than 80 years. The HGCC is a high complexity and teaching hospital in the fields of Internal Medicine, Surgery, Gynecology, Obstetrics and Neonatology<sup>(7)</sup>.

The hospital provides services such as: the *Posto de Registro Civil* (Office of Vital Records), where families can get the birth certificates of children born in the hospital free of charge; the *Programa de Internação Domiciliar - PID* (Home Care Program); the Kangaroo care, a technique through which mothers contribute intensively to the recovery of preterm babies by placing the newborn skin-to-skin on the mother's or father's bare chest; the *Casa da Gestante* (the Pregnant Woman's House), where 10 mothers receive special treatment, with medical, welfare, occupational and psychological support; the Bariatric Surgery Center, a service that renews the quality of life of obese people from the state of Ceará; and many others<sup>(7)</sup>.

The numbers of HGCC are impressive. Currently, the hospital has 1,705 employees and carries out about 400 deliveries per month, almost 20,000 examinations, 5,000 outpatient consultations, 350 surgeries and about 1,000 hospitalizations. In all, there are 276 beds, 12 adult ICU beds, 36 beds for medium-risk patients and 21 beds for neonatal intensive care<sup>(7)</sup>.

The HGCC is a major hospital complex linked to the State Health Secretariat and is recognized for its excellence in providing health services for the entire state of Ceará<sup>(7)</sup>.

The study included all pregnant women who were hospitalized in the period from January 2006 to December 2013, totaling 42,023 admissions; of these 1,865 had preeclampsia. Women were chosen regardless of age, education, marital status, place of birth, place of residence and outcome (discharge, death and ongoing pregnancy).

Data were collected during four months from the records of these women and through a questionnaire that was developed based on the current literature. The questionnaire contained sociodemographic variables (age, ethnicity, religion, occupation, place of residence, place of birth, marital status, education level, monthly income, housing conditions, relation to people who live in the same house - live with, socioeconomic status), risk factors for hypertensive syndrome (pregnancy weight, diabetes mellitus, systemic arterial hypertension - SAH, first pregnancy, multiparity, obesity, multiple pregnancy, emotional conflicts, previous history and family history of HDP, diverse paternity), comorbidities, obstetric data (fetal status, prenatal care, type of delivery) and outcome at discharge.

Data were organized in the Statistical Package for the Social Sciences - SPSS (version 19), analyzed based on the

selected literature, and are presented in tables. It should be noted that some factors hindered data collection, such as the lack of a relevant data set, information divergence, use of nonstandard abbreviations, unreadable manuscripts, difficult location and lack of medical records.

The lack of data or inappropriate use of writing may have masked a critical reality, changing the actual dimensions of HDP in our sample. The study protocol was reviewed and approved by Human Research Ethics Committee of the institution where the study took place (Opinion No. 072/2006).

## RESULTS

During the study period, 42,023 patients were admitted to the hospital, and 1,865 (4.4%) were diagnosed with HDP. Patients were mostly pregnant women aged 17-35 years 1,484 (79.6%), mixed-race 1,464 (78.5%), single 775 (41.6%), housewives 1,269 (68.0%), lived in Fortaleza, Ceará 876 (47%) and had primary education 766 (41.0%). Other demographic data are shown in Table I.

Two to four risk factors for HDP were identified among the pregnant women admitted to the hospital; however, the following were more prevalent: overweight 1,408 (75.4%), first pregnancy 827 (44.3%), multiparity 686 (36.7%), obesity 428 (22.9%), low socioeconomic status 317 (17.0%), hypertension (SAH) 295 (15.8%), and age > 35 years 233 (12.4%), as summarized in Table II.

Regarding comorbidities, 60 (3.2%) participants had urinary tract infection, 21 (1.1%) had communicable diseases, 15 (0.8%) had anemia and 13 (0.7%) reported having respiratory disease. In addition, twenty-three (1.2%) participants had sexually transmitted diseases (STD), 13 (0.7%) developed gestational diabetes, and 24 (1.3%) had other diseases (Table III).

Most of the women (n=983, 52.7%) received partial prenatal care (PNC), had one period of hospitalization during pregnancy, and underwent cesarean section (n=1292, 69.3%). Of the 1,645 women (78.2%), 260 (15.8%) underwent vaginal delivery and 1,294 (78.6%) underwent cesarean section; no information was found about the other women (n= 103, 5.5%). The predominant type of delivery was surgical and most newborns were born full term, regardless of the age of mothers.

Based on Table IV, 1,635 (87.5%) women were discharged postpartum, 16 (0.8%) requested hospital discharge and 11 (0.6%) were referred to secondary hospitals of SUS. Regarding fetal status, 849 (45.5%) babies were born full term and 577 (30.9%) were born preterm (Table IV)

According to the records, the major complications of HDP included: HELLP syndrome (n= 60, 5.3%), bleeding

Table I - Distribution of pregnant women according to sociodemographic characteristics. Fortaleza, Ceará, Brazil, 2006-2013. (n=1,865)

Variables	f	%		f	%
<b>Age (years)</b>			<b>Marital status</b>		
<17	115	6.2	Married	644	34.5
17-35	1484	79.6	Single	775	41.6
>35	233	12.5	Separated	14	0.8
No record	33	1.7	Widowed	7	0.4
<b>Ethnicity</b>			Common-law marriage	321	17.2
White	120	6.4	No record	104	5.5
Mixed-race	1464	78.5	<b>Education level</b>		
Black	153	8.2	Illiterate	63	3.4
No record	128	6.9	Functional illiterate	119	6.4
<b>Religion</b>			Primary education	766	41
Catholic	43	2.3	Secondary education	302	16.2
Protestant	3	0.2	Higher education	9	0.5
Other	4	0.2	No record	714	18.3
No record	1815	97.3	<b>Monthly income*</b>		
<b>Occupation</b>			<1	4	0.2
Housewife	1269	68	1-3	12	0.6
Other	378	20.3	>3	6	0.4
No record	218	11.7	No record	1843	98.8
<b>Place of residence</b>			<b>Housing conditions</b>		
Fortaleza	1198	64.3	Rented home	17	1.0
Other cities	644	34.5	Home ownership	46	2.5
No record	23	1.2	Other	10	0.5
<b>Place of birth</b>			No record	1790	96
Fortaleza	876	47	<b>Live with</b>		
Other cities	966	52	Children	3	0.2
No record	23	1.2	Spouse	13	0.7
			Children and spouse	5	0.3
			Other	9	0.5
			No record	1835	98.3

\*current minimum wages in the time of data collection

Table II - Distribution of pregnant women according to the identification of risk factors for hypertensive disorders of pregnancy (HDP). Fortaleza, Ceará, Brazil, 2006-2013. (n=1,865)

Variables	f	%
Overweight	1408	75.4
First pregnancy	827	44.3
Obesity	428	22.9
Multiparity	686	36.7
Low socioeconomic status	317	17
Systemic arterial hypertension	295	15.8
Age > 35 years	233	12.5
Age < 17 years	115	6.2
HDP in previous pregnancy	165	8.8
Black ethnicity	153	8.2
High BP in previous pregnancy	135	7.2
Multiple pregnancy	28	1.5
Diabetes mellitus	22	1.2
Emotional conflicts	14	0.8
Family history of HDP	11	0.6
Diverse paternity	6	0.3

HDP: hypertensive disorders of pregnancy; BP: blood pressure.

Table III - Distribution of pregnant women according to comorbidities diagnosed at admission. Fortaleza, Ceará, Brazil, 2006-2013. n = 1,865

Variables	f	%
<b>Communicable diseases</b>		
Scabies	16	0.8
Tuberculosis	5	0.3
<b>Hematologic disease</b>		
Anemia	15	0.8
<b>Respiratory disease</b>		
Rhinitis	3	0.2
Flu-like symptoms	5	0.3
Asthma	5	0.3
<b>Sexually transmitted disease</b>		
HPV	10	0.5
Syphilis	13	0.7
<b>Endocrine disease</b>		
Gestational diabetes	13	0.7
<b>Autoimmune disease</b>		
Systemic lupus erythematosus	3	0.2
<b>Renal disease</b>		
Urinary tract infection	60	3.2
Pyelonephritis	2	0.1
Renal lithiasis	5	0.3
<b>Other*</b>	24	1.3

HPV: human papillomavirus; \*Epilepsy, glaucoma, intracellular neoplasia, cholecystitis.

Table IV - Distribution of women according to outcomes after hospitalization at *Hospital Geral César Cals – HGCC* (César Cals General Hospital). Fortaleza, Ceará, Brazil, 2006-2013. (n=1,865)

Variables	f	%
<b>Hospital discharge</b>		
Ongoing pregnancy	200	10.7
Postpartum	1,635	87.5
<b>Requested discharge</b>		
Ongoing pregnancy	8	0.4
Postpartum	8	0.4
<b>Death</b>		
Yes	1	0.1
No record	2	0.1
<b>Fetal status</b>		
Stillborn	99	5.3
Preterm	577	30.9
Full-term	849	45.5
Post-term	28	1.5
Ongoing pregnancy (healthy fetus)	219	11.7
Miscarriage	2	0.1
No record	91	1.8
<b>Referral to other hospitals</b>		
Ongoing pregnancy	11	0.6
<b>Complications of HDP</b>		
HELLP syndrome	60	3.2
Stroke	3	0.1
Hemorrhagic disorders	15	0.8
Acute respiratory failure	13	0.6
Deep vein thrombosis	3	0.1
Shock	1	0.1
Encephalopathy	5	0.2
<b>Effects of HDP on pregnancy</b>		
Intrauterine growth restriction	21	1.1
Premature amniorrhexis	4	0.2
Cephalopelvic disproportion	2	0.1

HDP: Human papillomavirus.

disorders (n=15, 0.8%) and acute respiratory failure (n=13, 0.6%). Maternal major complications were intrauterine growth restriction (n=21, 1.1%) and preterm amniorrhexis (n=4, 0.2%).

## DISCUSSION

Hypertensive disorders of pregnancy deserve special attention in the global health scene. Currently, they are the third leading cause of maternal mortality in the world and the first in Brazil<sup>(6)</sup>. These syndromes are one of the main problems affecting women during pregnancy, increasing maternal mortality rates by circa 30-35%, particularly in places with a fragile economy. According to the findings of the present study, the majority of pregnant women had a low

education level (primary education) or were illiterate and their income ranged 1-3 wages, which possibly hindered the achievement of the objectives of prenatal care (PNC).

Nurses play a fundamental role in the care of women with HDP, as they are the health care professionals that mostly deal with patients' education. Identifying the epidemiology of HDP can provide important data to help nurses identify patients at higher risk for HDP; thus, nurses can provide patients with a better prenatal care and education about HDP risks and measures for a better control of blood pressure and early identification of possible complications<sup>(9)</sup>.

Although the Brazilian Ministry of Education (ME) invests in projects and programs aimed at eradicating illiteracy, it is still possible to find a high number of people with poor or no education, and this fact is detrimental to the population in general<sup>(2)</sup>. Thus, one can infer that the health-disease process is influenced by socioeconomic and cultural characteristics that predispose the individual to the occurrence of hypertension and increase cardiovascular risk and the risk of other health problems.

Excess weight is a common public health problem associated with the genesis and complications of cardiovascular diseases. The occurrence of hypertension is significantly influenced by obesity and overweight<sup>(10)</sup>. Regarding the first pregnancy, HDP occurs more frequently among primiparous adolescents, and factors such as the lack of information about pregnancy, embarrassment, unwanted pregnancy and delay in seeking prenatal care (PNC) can increase the risk of health problems<sup>(11)</sup>.

The extremes of age are described as important factors associated with the occurrence of preeclampsia (PE). Age alone should not be considered as an essential factor for the occurrence of PE, as other factors such as parity and the presence of chronic hypertension (CH) can increase the chances of its occurrence and should, therefore, be taken into account<sup>(12,13)</sup>.

The incidence of CH in pregnancy has grown with the increase of pregnancy in older women who have been delaying pregnancy as much as possible because of their professional career. This increase in blood pressure levels can be caused by changes occurring in the woman's body due to low hormone levels, lifestyle and other factors, which over the years contribute to the occurrence of hypertensive disorders during pregnancy.

Regarding pregnancies in women above the age of 30, the most common obstetric complications are: hypertension, intrauterine growth restriction and preterm birth<sup>(14)</sup>. Research<sup>(15)</sup> showed that there is a competition for nutrients between the young mother and the baby because their body continues to grow during pregnancy;

such competition triggers other disorders that will affect pregnancy at different levels. In the present study, 18.6% of the women were at age extremes; of these, 6.2% were under the age of 17.

Heredity in the present study reinforces the assumption that women with a family history of HDP have more chances of having an unfavorable pregnancy. The incidence of PE is significantly higher among daughters born after a preeclamptic pregnancy than those without a family history of such condition<sup>(12)</sup>. Ethnicity has been described by many authors as a factor contributing to the occurrence of HDP. The prevalence and severity of hypertension are higher in blacks and which may be related to ethnic and/or socioeconomic factors, the latter being unfavorable factors because they expose this population to poor nutritional and sanitary conditions that hinder the mechanisms for the prevention of hypertensive disorders<sup>(16)</sup>.

Another important factor, given its impact on the health of both the mother and fetus, is diverse paternity. Maternal exposure to new fetal antigens from another partner has been reported as a predisposing factor for PE. It is an immune reaction caused by the low exposure to sperm and seminal fluid that increases the incidence of PE<sup>(12)</sup>. Emotional conflicts also influence the health of pregnant women. They are situational and transient and result from organic, psychological or social conditions<sup>(15)</sup>. Family problems are more often reported by pregnant women as abrupt changes that will have a negative impact on blood pressure levels. In this regard, the nursing team can help women and their family to find solutions for resolving their conflicts and try to build a healthy environment during pregnancy, not only in terms of clinical/physical problems, but also psychological aspects.

Blood pressure (BP) measurement is an obstetric parameter of utmost importance that is most of times a responsibility of the nursing team. It is based on BP assessment that one can identify risk situations such as HDP - responsible for high rates of maternal and perinatal mortality - and intervene positively. Hypertensive women who get pregnant are at higher risk of developing eclampsia<sup>(17)</sup>. The most prevalent health problems in pregnant women in the present study were systemic arterial hypertension (SAH), urinary tract infection, blood disorders (anemia) and gestational diabetes<sup>(16)</sup>.

It is common for some women to experience urinary tract infection during pregnancy. This is related to the dilation of the renal collecting system and the increased bacterial growth due to changes in urinary composition. Regarding anemia during pregnancy, iron is an essential nutrient since it is a constituent of hemoglobin, myoglobin and several enzymes, and its requirement increases when there is a rapid increase in tissue, such as during pregnancy.

Therefore, good nutritional support is necessary during this period in order to avoid the aggravation of this hematologic disorder<sup>(18)</sup>.

High blood glucose also has a negative impact on pregnancy. Women who develop hyperglycemia are more likely to become diabetic in the future, even when they manage to keep these levels within acceptable ranges during pregnancy<sup>(19)</sup>.

The obstetric data are sensitive to the identification of the risk of HDP. Most of the women were primiparous, had undergone surgical delivery and received partial PNC<sup>(20)</sup>. Parity is a key point in obstetric history, as preeclampsia is considered an attribute of nulliparous or primiparous women. The adoption of cesarean delivery is also described as a risk factor for the occurrence of hypertensive disorders.

Most of the women had at least one period of hospitalization during pregnancy. Associated with this fact, it was observed that PNC also has a strong influence on pregnancy outcome. According to the MOH, pregnant women must have at least six PNC consultations, and the first one should take place in the first trimester of pregnancy. PNC aims to identify key risk factors that may prevent the normal course of pregnancy; therefore, this procedure prevents high-risk pregnancies that may result in unfavorable outcomes<sup>(21,22)</sup>.

The HELLP syndrome was shown in the findings of the present study as a major complication of HDP<sup>(19)</sup>. It is defined as a cascade of changes that will trigger hemolysis, elevated liver enzymes and thrombocytopenia, resulting in a poor prognosis. This syndrome occurs due to changes in maternal liver caused by vasospasm<sup>(23)</sup>. There was a significant increase in cases of HDP in the last years of the study. This increase was significant and may be related to a significant improvement in the recording of hospital occurrences or even the improvement in PNC, with detection and referral of pregnant women with HDP to a reference hospital.

One of the limitations of this study is that it was carried out in only one hospital. Another limitation is the fact that the study used data collected from medical records, which may not have been collected based on the same criteria used in scientific research. Another important limitation is the fact that this is a retrospective study and some data were missing in the medical records; such data could have enriched the results of the study.

## CONCLUSION

The results of the present study showed that pregnant women are at risk of developing HDP, reinforcing the idea that the health status and the disease and health process are

directly influenced by socioeconomic and demographic characteristics of the population.

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**Mailing address:**

Zélia Maria de Sousa Araújo Santos  
Universidade de Fortaleza - UNIFOR  
Programa de Pós-graduação em Saúde Coletiva  
Av. Washington Soares, 1321  
Bairro: Edson Queiroz  
CEP: 60.811-905 - Fortaleza - CE - Brasil  
E-mail: zeliasantos@unifor.br