Review Article

Risk factors and primitive elements in the development of hypertensive syndromes in prenatal care: integrative review

Fatores de risco e elementos primitivos no desenvolvimento de síndromes hipertensivas no pré-natal: revisão integrativa

Factores de riesgo y elementos primitivos en el desarrollo de síndromes hipertensivos en la atención prenatal: revisión integradora

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Abstract

Objective: to identify the risk factors and primitive elements associated with hypertensive syndromes in pregnant women during prenatal care. **Method:** integrative review in the databases: MEDLINE, SCOPUS, WoS, CINAHL, BDENF and LILACS from September to October 2020. The Poronto tool was used to extract the data. **Results:** 47 studies were included, in which 30 interrelated primitive concepts were identified that alert to the needs of pregnant women. The investigations allowed the identification of age from 18 to 50 years, black race, socioeconomic vulnerability, low schooling and low birth weight as sensitive risk factors for identification in primary care. **Conclusion:** the literature presents relevant factors regarding the development of hypertensive syndrome allowing clarifying the primitive elements and risk factors. Moreover, it subsidizes care and points to the development of research that develops instruments aimed at the studied public.
Descriptors: Pregnant Women; Pregnancy-Induced Hypertension; Nursing Process; Prenatal Care; Primary Care Nursing

Resumo

Objetivo: identificar os fatores de risco e elementos primitivos associados às síndromes hipertensivas nas gestantes no pré-natal. **Método:** revisão integrativa nas bases: MEDLINE, SCOPUS, WoS, CINAHL, BDENF e LILACS no período de setembro a outubro de 2020. Para a extração dos dados utilizou-se a ferramenta Poronto. **Resultados:** incluíram-se 47 estudos, nos quais foram identificados 30 conceitos primitivos inter-relacionados que alertam para as necessidades das gestantes. As investigações permitiram identificar idade de 18 a 50 anos, raça negra, vulnerabilidade socioeconômica, baixa escolaridade e o baixo peso ao nascer como

fatores de risco sensíveis de identificação na atenção primária. **Conclusão:** a literatura apresenta fatores pertinentes quanto ao desenvolvimento da síndrome hipertensiva permitindo clarificar os elementos primitivos e fatores de risco. Além do mais, subsidia o cuidado e aponta para o desenvolvimento de pesquisas que desenvolvam instrumentos voltados ao público estudado.
Descritores: Gestantes; Hipertensão Induzida pela Gravidez; Processo de Enfermagem; Cuidado Pré-Natal; Enfermagem de Atenção Primária

Resumen

Objetivo: identificar los factores de riesgo y elementos primitivos asociados a los síndromes hipertensivos en gestantes durante la atención prenatal. **Método:** revisión integradora en las bases de datos: MEDLINE, SCOPUS, WoS, CINAHL, BDENF y LILACS de septiembre a octubre de 2020. Se utilizó la herramienta Poronto para extraer los datos. **Resultados:** Se incluyeron 47 estudios, en los que se identificaron 30 conceptos primitivos interrelacionados que alertan a las necesidades de las gestantes. Las investigaciones permitieron identificar la edad de 18 a 50 años, la raza negra, la vulnerabilidad socioeconómica, la baja escolaridad y el bajo peso al nacer como factores de riesgo sensibles para la identificación en atención primaria. **Conclusión:** la literatura presenta factores relevantes respecto al desarrollo del síndrome hipertensivo permitiendo aclarar los elementos primitivos y factores de riesgo. Además, subvenciona la atención y apunta al desarrollo de investigación que desarrolle instrumentos dirigidos al público estudiado.
Descriptores: Mujeres Embarazadas; Hipertensión Inducida por el Embarazo; Proceso de Enfermería; Atención Prenatal; Enfermería de Atención Primaria

Introduction

High-risk pregnancy comprises the probability of women having unfavorable complications during pregnancy intercourse, so it is necessary that she be oriented according to the entrance doors to care, as well as classified as to gestational risk.[1-4] Hypertensive Pregnancy Syndrome (HPS) is a group of pathologies responsible for serious problems in obstetrics, it brings together chronic hypertension, gestational hypertension, preeclampsia, eclampsia, preeclampsia overlapped chronic hypertension.[1]

Chronic hypertension, especially in black women worldwide, is one of the main clinical implications that leads to unfavorable outcomes in pregnant women and is configured with the persistence of systolic blood pressure in a value ≥140 mmHg and diastolic of ≥90 mmHg or both.[2] In Brazil, pre-existing hypertension, preeclampsia, HELLP syndrome and eclampsia are the gestational complications responsible for high morbidity and mortality in public services totaling 13.6%.[3]

Risk factors associated with HPS are included among those related to non-modifiable factors such as age and history of comorbidity and intrinsic factors modifiable as life habits.[4] In this sense, low schooling may be a factor directly associated with preeclampsia, other factors

such as age group, obesity, physical inactivity, personal or family history of hypertensive syndromes, increased blood pressure in pregnancy, presence of chronic hypertension, thrombophilias, endothelial inflammatory activity and even psychoemotional risks may interfere with maternal prognosis.[5]

The risk factors related to HPS, because they are distinct, hinder the predictive clinical association. Therefore, health studies adopt primitive elements,[6] these concern the corresponding characteristic of a risk factor, for example, age would be a primitive element and, age groups, risk factors for developing a disease, as well as weight and quantity in kilograms that determine weight as normal, overweight and obesity.[7] In the case of pregnant women, the mother-fetus health relationship is alerted, in addition to drawing attention to the beginning of early prevention.[8] With the early capture of pregnant women, identification of hypertensive disorders and follow-up by prenatal consultations, it is possible to reduce hospitalization and death, as well as raise discharge rates.[9]

Some outcomes observed in women with HPS are related to maternal and fetal health. Among the main fetal associations are: abnormal fetal presentation, congenital malformation, severe acute respiratory syndrome, hypoglycemia, hyperbilirubinemia, preterm delivery, developmental delay, placental detachment and neonatal death.[4] As for maternal severity, thrombocytopenia, thrombocytopenia, hemolysis, changes in coagulation, hydroelectrolytic balance, renal injury, hepatocellular necrosis, cerebrovascular manifestation, scotomas, headache, convulsion, visual symptoms, hemorrhage, vulvar edema and cerebral edema.[1] However, pregnancy pathologies, as well as the entire vital process, require a clinical look from health professionals to direct care.[10]

The use of continuous monitoring of vital parameters, the application of nursing consultations in a targeted manner, home monitoring, the investigation of changes in biochemical patterns and the construction of a delivery plan are activities aimed at identifying maternal risk factors, opportunities for better coverage in the health service, especially in those under the supervision of the nursing professional, also assisting in reducing the expenses to the health system by allocating qualified care and reducing the pilgrimage of pregnant women.[11]

The multifaceted and interdependent factors that are related to hypertensive disorders show the need to establish links between risk factors and primitive elements. For this, studies[6-11] characterize primitive elements as the essential characteristics of each risk factor associated

with it. However, there are still few studies in the literature that point out the risk factors and associated elements related to the identification of HPS in primary care. In this sense, experience has been the only tool used, but it is not sufficient for intervention to be involved in possible maternal impairments.[12] In this perspective, this study aimed to identify the risk factors and primitive elements associated with hypertensive syndromes in prenatal pregnant women.

Method

This integrative review of the literature was based on the following steps: identification of the theme and selection of the research hypothesis; establishment of criteria for inclusion and exclusion of studies/search in the literature; definition of the information to be extracted from the selected studies/categorization of the studies; evaluation of the included studies; interpretation of the results; presentation of the review/synthesis of knowledge.[13] The following question was: What are the risk factors and primitive elements associated with hypertensive syndromes in pregnant women during prenatal care? We opted for the Population, Exposition and Outcomes (PEO) strategy in order to seek answers directed to the research question.[14]

The terms indexed in the descriptors in health sciences (DeCs) as well as the respective synonyms were used, with a view to covering the findings, for Latin American bases and the Medical Subject Headings (MeSH) for the Bases in English: population (*gestantes*/pregnant woman), pregnant woman(s); Exposition (*Hipertensão induzida pela gravidez*/hypertension, pregnancy-induced), gestational hypertension; outcomes (*cuidado Pré-natal*/prenatal care), prenatal care. Others related to the theme were: nursing process, clinical record, nursing consultation, primary care nursing, primary care nursing, office nursing, prenatal care.

The following databases were searched: Latin American and Caribbean Literature on Health Sciences (LILACS), Medical Literature Analysis and Retrieval System Online (MEDLINE) via EBSCO Information Services, Nursing Database (BDENF), SCOPUS Preview, Web of Since (WoS), Cumulative Index to and Nursing and Allied Health Literature (CINAHL) through the journal portal of the coordination of improvement of higher education personnel (CAPES). The study was conducted in a paired manner between September and October 2020. The crossover strategy as well as the respective Boolean operators are described in Chart 1.

Chart 1- Database search strategies related to research. Crato, Ceará, Brazil, 2020.

Databases	Search strategy	(*n*)
MEDLINE	("pregnant women" [Mesh]) AND ("hypertension, pregnancy-induced [Mesh]" AND "gestational hypertencion [Mesh]") AND ("primary care nursing [Mesh]") AND ("basic care nursing [Mesh]") AND ("nursing consultation [Mesh]") AND ("office nursing [Mesh]") OR ("nursing process [Mesh]") AND ("clinical record [tiab]") OR ("prenatal care [Mesh]") AND ("antenatal care [tiab]")	2,000
SCOPUS	(TITLE-ABS-KEY ("pregnant women") AND TITLE-ABS-KEY ("hypertension,pregnancy-induced" OR "gestational hypertencion") OR TITLE-ABS-KEY ("primary care nursing" AND "basic care nursing" AND "nursing consultation" AND "office nursing") OR TITLE-ABS-KEY ("nursing process" AND "clinical record") OR TITLE-ABS-KEY ("prenatal care" AND "antenatal care")	980
WoS	TÓPICO:("pregnant women") AND TÓPICO:("hypertension, pregnancy-induced" AND "gestational hypertencion") AND TÓPICO:("primary care nursing") AND ("basic care nursing") AND ("nursing consultation") AND ("office nursing") OR TÓPICO:("nursing process") AND ("clinical record") OR TÓPICO:("prenatal care [Mesh]") AND ("antenatal care [tiab]")	42
CINAHL	MH ("pregnant women") AND MH ("hypertension, pregnancy-induced") OR MH ("gestational hypertencion") OR MH ("primary care nursing") OR MH (basic care nursing) OR MH (nursing consultation) OR MH ("office nursing") OR MH ("nursing process") OR MH ("clinical record") OR MH ("prenatal care") OR MH (antenatal care)	2,250
BDENF and LILACS	("gestantes") OR ("mulheres* grávida*") AND ("hipertensão induzida pela gravidez") OR ("hipertensão gestacional") AND ("processo de enfermagem") OR ("ficha clínica") OR ("enfermagem no consultório") OR ("cuidado pré-natal")	10

The method of data reduction was used to reduce, show and compare, as well as completion and verification of the data obtained in the productions.[13] As selection criteria of the studies, the choice of evidence was adopted that indicates the type of study most appropriate for review[14]: randomized clinical trials (RCT), cohort studies and case control, since they provide safe scientific evidence.

It is emphasized that no temporal restriction was performed to search and include the articles. The articles were submitted to filtering, consisting of the inclusion criteria: articles available electronically with full text online via capes portal and/or contact with the author of the work, classified as original; studies, published in Portuguese, English or Spanish. The production in Portuguese is justified by the large number of studies developed in primary care with pregnant women in the Brazilian scenario and from other countries that speak the same language.

The authors developed a form for data collection in order to organize the main information related to the studies (Author; Year of publication; Country; Base; Drawing; Sample;

Level of evidence) as well as data from the development of the article. For the extraction of primitive elements and risk factors, the PORONTO tool was used, which analyzes semi-automatic ontological terms.[15]

The level of evidence (NE) was classified into seven levels: I – Evidence of systematic reviews or meta-analysis of clinical trials; II – Evidence of at least one well-designed randomized controlled trial; III – Clinical trial studies without randomization; IV –Cohort studies and control case with explicit design; V – Systematic review of descriptive/qualitative studies; VI – That includes a qualitative study and VII - Opinion of authorities/expert reports.[16]

The flowchart was used to demonstrate the operationalization of the search and selection, as shown in Figure 1.

Figure 1 – Inclusion process of integrative review studies, Brazil, 2021.
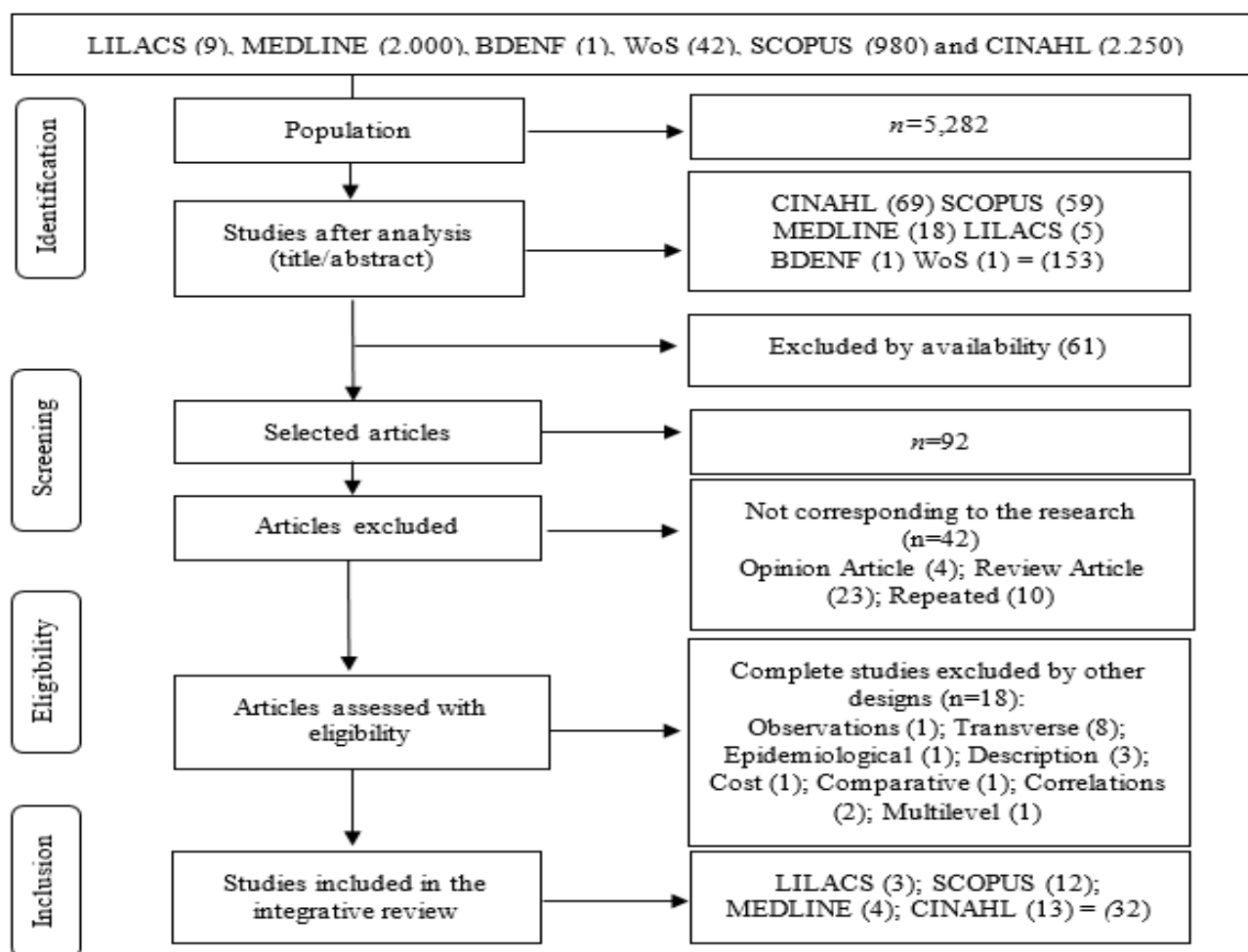
Data analysis was descriptive analytical with evidence grouped by convergences, which generated synthesis. Because it was a study with data from the public domain, it

was not necessary to be appreciated by the research ethics committee.

Results

A number of 32 studies with prevalence of production from Brazil were obtained with 12 studies (Chart 2).

Chart 2- Characterization of the scientific production of the studies included in the integrative review, Brazil, 2021.

Author (Year) Country/Database	Design/Sample/LE*	Results	Conclusion
Hou et al (2020)[17] China SCOPUS	Case control 177 pregnant women IV	Risk factors and elements: Age (29 years) (p<0.001); Weight (79Kg) (p<0.001); †BMI (26) (p<0.001); Serum elements (hemocysteine, uric acid, cysteine, calcium, zinc, globulin, albumin, glomerular filtration, hemoglobin) (p<0.001); Family history of ‡SAH (p<0.001).	The established risk factor prediction model and scoring system have high sensitivity and specificity, which can provide good estimates for risk stratification of §HIG.
Berhe et al (2020)[18] Ethiopia CINAHL	Prospective cohort 782 pregnant women IV	The elements: Low education, rural residence, choice of delivery method, primiparous, anemic, maternal malnutrition, socioeconomic conditions, preterm birth, ‖LGA babies (aRR = 3.3 (2.3, 4.6); Gestational age of 37 to 39 weeks resulted in perinatal death, stillbirth, asphyxia (aRR = 2.6 (1.9, 3.8); Low birth weight (RR 95% CI = 5.1(3.4, 7.); Higher admission to intensive care (aRR = 5.1(3.1, 8.4).	Pregnancy induced hypertension was associated with an increased risk of adverse perinatal outcomes, such as low birth weight, birth asphyxia, small for gestational age, preterm delivery, and perinatal death.
Maducolil et al (2020)[19]	Prospective cohort 223 pregnant	Identified risk factors: Age (>35 years)	Hypertensive mothers have several other

Qatar CINAHL	women IV	(p<0.001); Multiparous (1 to 4 children) (p<0.001); Pre-existence of ¶DM, high BMI, obesity, cesarean section and prematurity (p<0.001).	comorbidities. When compared to the general population, they are older, multiparous, diabetic and obese with a higher risk of premature births and cesarean section. Lifestyle modification, extensive preconception counseling, and multidisciplinary antenatal care are necessary for such a high-risk group.
Ndwiga et al (2020)[20] Kenya CINAHL	Hypertensive mothers have several other comorbidities. When compared to the general population, they are older, multiparous, diabetic and obese with a higher risk of premature births and cesarean section. Lifestyle modification, extensive preconception counseling, and multidisciplinary antenatal care are necessary for such a high-risk group.	Risk factors: 36 weeks of gestation, family history of SAH and **PE, increased systolic pressure (>180 mmHg); Outcomes: low birth weight, HELLP syndrome (AOR: 4.3; CI 2.0-10.2; p<0.001); Renal dysfunction (AOR; 1.7; CI 0.7-4.1; p = 0.192) Stillbirth (AOR = 4.9; CI 3.1-8.1; p<0.001) Neonatal death (AOR: 8.5; CI 3.8-21.3; p<0.001).	Early-onset preeclampsia is associated with greater disease severity and worse perinatal outcomes. It is critical that women and their families are more aware of danger signs. In order to mitigate adverse outcomes, it is critical to recognize the importance of early screening and history taking, blood pressure, and consistent and effective management in accordance with national standards and guidelines.
Jacob et al (2020)[21] Brazil CINAHL	Correlational Cohort 120 pregnant women IV	Risk factors: Low socioeconomic status (p=0.002); Low education (p=0.043); BMI up to 66 (p=0.026); ††High BP, mean of 5 prenatal consultations, multiparous, older than 30 years and SAH (p=0.0024)	The group of pregnant women with ‡‡SHG has a mean age of 30.9 years, social vulnerability and overweight or obesity. Considering the type of arterial hypertension, pregnant women with chronic arterial hypertension are older

		Lower gestational age (p=0.0219); Abortions (p=0.014).	and have a higher number of abortions.
Mekie, Mekonnen, Assegid (2020)[22] Ethiopia CINAHL	Case control 321 pregnant women III	Risk factors and elements: Age greater than 23 years, body mass index (AOR = 2.00, 95% CI (1.10, 3.63); Unplanned pregnancy (AOR = 2.35, 95% CI (1.01, 5.52); History of hypertension (COR = 2.18, 95% CI (1.29, 3.68); Urinary tract infection (COR = 2.12, 95% CI (1.28, 3.52; Use of contraceptive methods, alcohol abuse (AOR: 1.29, 95% CI 0.72, 2.34), More than 4 cups of coffee per day (AOR 1.67, 95% 0.69, 4.05); Low consumption of fruits and vegetables (AOR 0.42, 95% 0.22, 0.82).	Unplanned pregnancy and high body weight led to PE. Encouraging pregnant women to practice preventive consumption of fruits and vegetables is key to preventing PE. Health professionals could also use these factors for early prediction, diagnosis, and management of PE and its complications.
Laine et al (2019)[23] Norway SCOPUS	Retrospective cohort 929,963 pregnant women IV	For gestational hypertension, the contributing factors were (obesity, advanced maternal age over 40, type I DM) and bigemellar pregnancy; In PE (maternal age over 35 years, nulliparity, type I and II diabetes and body mass index) and singleton pregnancy.	The risk of PE in double pregnancies was three to four times higher compared with singleton pregnancies, regardless of maternal age, parity, educational level, smoking status, maternal comorbidity or in vitro fertilization. The risk of gestational hypertension was not increased in women with twin pregnancies after adjustment for major risk factors.
Jieyu et al (2019)[24] China SCOPUS	Prospective cohort 14,702 pregnant women IV	Risk factors found: Age (p<0.0001), Body mass index (p<0.0001); Significant systolic and	Variation was associated with increased risk of gestational hypertension and PE

		diastolic blood pressure (p<0.0001); Time of blood pressure measurement, gestational diabetes mellitus and anemia, previous pregnancy and parturition (p<0.0001). Blood pressure variability is associated with §§SBP with ||||HG and PE.	suggesting continuous blood pressure assessment in high-risk pregnant women.
Vonck et al (2019)[25] Belgium SCOPUS	Randomized clinical trial 969 pregnant women II	Risk factors: maternal age, low fetal weight, age, allergies, parity, history of hypertension, thrombophilia, height, body mass index, intrauterine death, fetal size.	Suffering from high blood pressure in pregnancy is a precursor to poor cardiology in health in later life. Preventing or delaying SHG is important.
Vandenberk et al (2019)[26] Belgium SCOPUS	Correlational cohort 108 pregnant women IV	Risk factors and elements: Age (>30 years) (IQR: 28-33); Weight (>76kg) (IQR: 66-91); Anxiety, depression, helplessness, dependence, self-criticism, disorientation, perfectionism.	There is a relationship between adherence to remote monitoring and the characteristics of women at risk of HIG. Attention to women who show less adherence is essential.
Hu et al (2019)[27] United States MEDLINE	Randomized clinical trial 2,119,273 pregnant women II	There are high disparities in risk factors and elements related to black race, age (25 to 29 years), low education and tobacco use in African than non-African women (95% CI: 1.23, 1.27).	The results of this study provide important information for public health agencies and policymakers to develop specific interventions and allocate resources more efficiently to reduce HIG disparities at the population level.
Sheikh et al (2019)[28] Pakistan CINAHL	Retrospective cohort 595,408 pregnant women IV	Risk factors and elements: Age (15 to 49 years); severe headache; High pressure volumes; Seizures (p<0.05); Low socioeconomic status, Black race, History of SAH (AOR	It is recommended that the government focus its efforts on monitoring data collection processes and validating data through community surveys of representative

		1.36; 95% CI 1.14, 1.61); Miscarriage and stillbirth (95% CI 1.43, 1.73).	households. In addition, it is important to disseminate these data to raise community awareness of the threats to life and complications of pregnancy.
Wang et al (2019)[29] China CINAHL	Retrospective cohort 2834 pregnant women IV	Element identified with risk: Age (30 to 34 years old) (p=0.03); Preterm delivery (<37 weeks) (p=0.003); Increase in diastolic pressure (106 to 112 mmHg) (p<0.001); Nulliparity, proteinuria, preterm pregnancy, overweight, cesarean sections, inappropriate use of labetolol, nifedipine and methyldopa (p<0.001).	Management of preeclampsia was significantly different between the two institutions including use of antihypertensive drugs, magnesium, cesarean section rates, and intensive care unit admission. General provider knowledge was lacking in areas requiring specific diagnostic criteria and the use of antihypertensive medications.
Pealinga et al (2019)[30] United States CINAHL	Randomized clinical trial 162 pregnant women II	Risk factors and elements: Change in diastolic blood pressure, preterm pregnancy (<34 weeks) and anxiety (95% CI).	Blood pressure self-monitoring for the management of hypertension during pregnancy is feasible and well tolerated by women when combined with clinical monitoring.
Poniedziałek, Czajkowska et al (2019)[31] Poland CINAHL	Controlled clinical trial 66 pregnant women II	Risk factors and elements: Higher levels of leptin in pregnant women with gestational hypertension may be suggestive of the role of leptin in the development of HG (45.89 ± 35.91 vs. 24.09 ± 24.40 ng/mL, p= 0.006). Patients in the development of HG had higher BMI, hyperleptinemia can link obesity with gestational hypertension (R=0.56,	High body mass index in women with gestational hypertension.

		p=0.02); The gestational age at risk was 35 weeks.	
Sandstro et al (2019)[32] United States CINAHL	Prospective cohort 62,562 pregnant women IV	Risk factors: More than 37 weeks (95% CI 24.5–37.2); Nulliparous, women over 30 years old (p<0.001); BMI > 25 (p=0.001) Longer duration of infertility (p=0.006); History of assisted reproduction, PE, glucose alteration, proteinuria and hemoglobin of 10.3g/L had (p<0.05).	Multivariate model concluded a slight sensitivity for women between 34 and 37 weeks of developing PE.
Kalafat et al (2019)[33] England MEDLINE	Prospective cohort 143 pregnant women IV	Risk factors and elements: Gestational age greater than 31 weeks (p<0.001) History of gestational hypertension, 34 weeks preterm (p<0.005).	Home blood pressure monitoring in women with HG results in significantly fewer antenatal visits compared to women on a standard path of care.
Grum et al (2018)[34] Ethiopia MEDLINE	Case control 243 pregnant women IV	Risk elements: From the 20th to the 34th, there is a greater risk of developing GH; More than four cups of coffee per day (AOR: 3.26, 95% CI 0.42, 25.36) Nulliparity (AOR: 2.02, 95% CI 1.15, 3.55) Pregnancy for less than one year are factors and elements for PE and E; Consumption of fruits and vegetables is a protective factor (AOR: 0.95, 95% CI 0.01, 0.71).	Fruit and vegetable intake as well as receiving nutritional counseling during early pregnancy plays a role in reducing the development of preeclampsia or eclampsia. Nulliparous women have a risk factor for preeclampsia or eclampsia.
Perry et al (2018)[35] England CINAHL	Case control 166 pregnant women IV	Risk elements: chronic hypertension (p=0.004); Age of 32.5 years; Nulliparous, Caucasian, from the 30th week of pregnancy, newborn weight 3,211Kg (p<0.001).	Monitoring BP in hypertensive pregnancies has the potential to reduce the number of hospital visits without compromising maternity and pregnancy outcomes.

Kim, Lee e Park (2018)[36] Korea SCOPUS	Retrospective cohort 4163 pregnant women IV	Risk factors: Mean age 38 years (p=0.000); In hypertensive and normotensive women, the increase in systolic and diastolic pressure occurred at the 20th (p=0.000), 30th (p=0.000) and 40th (p=0.000) weeks; Maternal and fetal complications 16.8%.	The difference in BP at each hospital visit gradually decreased in normotensive pregnancy, however it increased in hypertensive women and influenced the outcome of pregnancy, being useful to predict pregnancy outcomes.
Shen et al (2017)[37] Canada SCOPUS	Retrospective cohort 8,085 pregnant women IV	Risk factors and elements: Abrupt placentation, LGA, preterm, APGAR < 7 at 1 min (AOR = 2.4). Age 30.3 weeks (p<0.28); Weight 25.8 kg (p<0.01); BMI ≥ 25 (p<0.01); Nulliparity, PE history, DM I and II (RR = 14.1 for HG and RR = 6.4 for PE). Outcomes: Cesarean section, abrupt placenta, preterm delivery.	There are differences in risk factors, effects and outcomes. HG and PE have similarity curves. The risk of PE is greater than that of HG in women with pre-existing factors.
Chen, Seov e Chen (2017)[38] Taiwan SCOPUS	Retrospective cohort 20,103 pregnant women IV	Risk factors and elements: Statistical difference for age (±26 years), parity, multiple pregnancies, smokers, overweight, ¶¶PCC and comorbidities; Nulliparity, without PCC, without USG is found in those who develop HG and PE (p<0.001); Age, high BMI, multiple pregnancies, excessive weight gain, smoking, and comorbidities tend to develop HG and PE (AOR, 13.71; 95% CI, 10.25–18.33); In PE the predictors are high BMI (AOR, 8.92; 95% CI, 6.67–11.92), nulliparity, excessive	Preterm placental calcification is not a progression of aging, but reflects placental pathology when observed at the 28th week of gestation.

		weight gain, smokers, PCC and polycystic ovary syndrome.	
Shi et al (2017)[39] United States CINAHL	Multilevel cohort 3,403 pregnant women IV	Elements that predispose to risk: Latin ethnicity; Age (27 to 29 years) [OOR: 0.781, 1.735]; Low education and obesity [ORR: 0.948, 1.767].	Blood pressure measurement obtained in prenatal screening at the facility, if based on a measurement at the first office visit, may increase the tendency for higher blood pressure.
Amorim et al (2017)[40] Brazil CINAHL	Retrospective cohort 28,399 pregnant women IV	Risk factors: Age younger than 50 years, mixed race, elementary school, history of hypertension, diabetes, twins, previous surgery, preeclampsia, SAH (personal) lead to severe preeclampsia and SAH.	It is considered that characterizing the profile of pregnant women and all information about their health is extremely relevant, as it contributes to the identification of risks and, with that, the development of preventive strategies aimed at reducing diseases and enabling the provision of quality care.
Barbosa et al (2015)[41] Brazil SCOPUS	Retrospective cohort 1501 pregnant women IV	Risk elements: Gestational age in weeks was indicated for eclampsia at 33 weeks to 37 weeks (p<0.0001); Women with incomplete prenatal care are at progressive risk of severe complications and death, children have a high chance of neonatal death (p<0.01).	Proper prenatal care is critical to overall maternal vitality
Chandi, Sirohiwal e Malik (2015)[42] India MEDLINE	Prospective cohort 300 pregnant women IV	Risk factors and elements: Four visits were carried out to compare blood pressure levels; Mean age of 25 years (p=0.45); Weight significantly influences the change in pressure induced by pregnancy (p<0.01);	Hypertriglyceridemia poses a risk for pregnancy-induced hypertension. After the 20th week there is a concentration of triglycerides with tissue oxidation.

		Triglycerides are higher in women with HIG. Cesarean women have babies with Apgar < 7 in the 1st min (p<0.01); Increase in blood pressure between 14th and 20th weeks. Changes in SBP and ***PAD are still related to triglyceridemia (p<0.01). Hypertriglyceridemia may be predictive of HIG after pregnancy.	
Ayala e Hermida (2013)[43] Spain SCOPUS	Randomized clinical trial 434 pregnant women II	Risk elements: Assessment of the hyperbaric index gives high sensitivity and specificity for the identification of hypertensive syndrome (p<0.001); 24-hour monitoring of women at risk of hypertension on an outpatient basis, especially from the second trimester.	Prophylactic therapeutic assessment tools are needed to assess pregnant women with hypertensive syndrome
Dane et al (2009)[44] Turkey SCOPUS	Randomized clinical trial 169 pregnant women III	Risk factors and elements: Glucose, triglycerides, high BMI, SBP > 100 indicate PE (p<0.0001).	There is an association between metabolic syndrome and pregnancy-induced hypertension
Assis, Viana e Rassi (2008)[45] Brazil LILACS	Case control 890 pregnant women IV	The risk factors were: Age over 30 for †††HCSPE (AOR: 5.218; 95% CI: 1.873 to 14.536) and protection factor for PE (AOR: 0.035; 95% CI: 0.003 to 0.364); Non-white race for PE (AOR: 13.158; 95% CI: 1.672 to 100,000) and previous PE for HCSPE (AOR: 4.757; 95% CI: 1.261 to 17.938); Obesity for HG (AOR: 17.636; 95% CI: 2.859 to 108.774); HCSPE for PE (AOR: 27.307; 95% CI: 4.453 to	The risk factors identified for SHG were obesity, non-white race, previous PE, age over 30 years and SAH as a factor that increases the risk for PE overlap. Primiparity was an independent risk factor for GH.

		167.440); Primiparity for HG (OR: 5.435; 95% CI: 1.923 to 15.385); Of the pregnant women with SAH, 73.5% developed HCSPE (p < 0.001).	
Carvalho et al (2006)[46] Brazil LILACS	Case control 29 pregnant women IV	Risk elements: Family history of SAH (p=0.0092) Maximum sleep DBP and pressure variability in the nocturnal sleep period and diastolic pressure load during wakefulness had significant predictive values for GH (p<0.001); high SBP and DBP (p<0.001).	The heritability of SAH and home blood pressure monitoring at the 28th gestational week were shown to have the highest predictive values for HG. Maximum DBP at nighttime sleep ≥ 64 mmHg presented sensitivity of 80%, specificity of 60% with positive and negative predictive values of 66.67 and 75 HG, respectively.
Ferrão et al (2006)[47] Brazil LILACS	Retrospective cohort 206 medical records IV	Risk factors and elements: Mean age of pregnant women 23.6 years; 49 premature newborns; Prevalence of HG, PE, lower birth weight and a low Apgar score in the first and fifth minutes (p<0.001).	Even with the introduction of antihypertensive therapy during pregnancy, little has been achieved in relation to perinatal complications.
Liu, Cheng, Cheng (2005)[48] Taiwan SCOPUS	Retrospective cohort 342 pregnant women IV	Risk factors and elements: Mean age of 31 years (p=0.064); Gestational age from 32 to 36; Complications (placenta, acute kidney injury, HELLP syndrome, sepsis and intracranial hemorrhage; Risk factors for preeclampsia (greater than or equal to 3 in parity, SBP > 180, DBP >100. SBP ≥ 180 and DBP ≥ 100). 105,	The high impact of maternal risk factors should be observed in prenatal care, time optimization improves accurate health care in patient safety

		preeclampsia, HELLP (p=0.008), maternal emergencies and low Apgar demonstrated influence on hypertensive disorders (p=0.034).	

Note: *Level of evidence (LE), [†]Body Mass Index (BMI); ‡Systemic Arterial Hypertension (SAH); [§]Pregnancy-Induced Hypertension (GHI); [††]Large for gestational age (LGA); [¶]Diabetes Mellitus (DM); **Preeclampsia (PE); ††Blood Pressure (BP); ‡‡Hypertensive Syndrome of Pregnancy (SHG); [§§]Systolic Blood Pressure (SBP); [||||]Gestational Hypertension (GH); [¶¶]Preterm Placental Calcification (PCC); ***Diastolic Blood Pressure (DBP); †††Chronic Arterial Hypertension Superimposed on Preeclampsia (HCSPE).

As for the design of the studies, a greater number of cohort studies (n=20, 62.6%), randomized clinical trials (n=6, 18.7%) and control case studies (n=6, 18.7%) were obtained. Regarding the classification of evidence, the following levels stand out: IV (n=25, 78.1%), II (n=5, 15.6%) and III (n=2, 6.3%). In the number of participants, between 25 and 2,119,273 pregnant women were investigated.

Age is the non-modifiable risk factor with important emphasis in the studies applying to it the age group of: 18 to 50 years[19-20,22-24,27,31-33,40-41,47-48] and the primitive element for age.[17-48] As for race, studies reveal similarity between white and black race with a slight prevalence of the black race.[27,40-41,46] The state of socioeconomic vulnerability and low schooling was higher for women who developed hypertensive syndromes.[19,26,30,33,46] Marital status and residence in urban/rural areas also influence the onset of HPS.[33]

Prematurity was one of the fetal factors that most impacted the quality of life of newborns.[18,29] Fetal weight is an important related element and was found to be less than 1,000Kg to 3,211Kg,[36,45,47] the Apgar index lower than seven was present in the first and fifth minutes.[3,35,47] Other implications are stillbirths, asphyxia, respiratory syndrome and death, restricted intrauterine growth.[22,29] Gestational age greater than 20 weeks or between 32 and 38 weeks,[24,27,32,45,48] 33 weeks for eclampsia and 37 weeks for preeclampsia.[31,41] The main maternal outcomes revealed acute renal injury, HELLP syndrome, sepsis and intracranial hemorrhage, preterm delivery.[28,32,35]

In maternal history diabetes mellitus, lupus erythemitis, thrombocytopenia, intrauterine restriction, smokers, increased glucose, triglycerides and body mass index

(>26), overweight, abrupt placentation, polycystic ovary syndrome, chronic hypertension, heart disease, chronic kidney disease, thrombocytopenia, fibrous uterus, stillbirth, previous abortion, proteinuria, emotional stress, headache, edema, alcohol use, family or personal history of HPS, psychological factors (anxiety, depression, fear, dependence), medication use, cesarean or vaginal delivery, twinness, duration of infertility, assisted reproduction, contraceptive methods, more than four cups of coffee per day, first pregnancy before the age of 25, nephropathy.[17,19-24,26-27,29-31,33-35,38-39,40,42,44,46,48] There are indications that exposure to high temperatures at the beginning of pregnancy and low temperatures before conception can lead to preeclampsia and eclampsia.[32]

The chance of preeclampsia increased the evolution of preeclampsia to multiparity/nulliparity, systolic blood pressure (SBP) > 105 to 180mmHg and diastolic blood pressure (DBP) >100,[23,26,31,36,46] in addition to the mean arterial pressure > 92mmHg.[26] Regarding gestational week, there is a risk if from the 10th week the SBP is >114mmHg, as well as if 20 weeks SBP >113 mmHg and at 30 weeks PAS > 115 mmHg, however DBP did not exceed 67 mmHg.[23] The hyperbaric index gave high sensitivity and specificity in the evaluation of hypertensive syndrome.[43] Calcium is an element with potential protective effect.[24-25]

It can be assumed that the increase in DBP variability in night sleep confers a certain protective effect for the development of HG, while a higher maximum DBP in night sleep would represent a higher risk factor for the development of HG.[22] All risk factors and primitive elements led to increased gestational hypertension and/or preeclampsia, and/or eclampsia and/or HELLP syndrome.[17-48] Unawareness of the problem potentially aggravates maternal risk.[43]

Prenatal and folic acid administration were significant indicators for controlling complications and neonatal death.[31,35,38,41-42,46] Less than four prenatal visits is a risk factor.[30]

Thirty primitive concepts that are interrelated to maternal risk factors with maternal and fetal outcomes were related. Among the factors, the presence of age is the presence of age as a non-modifiable risk factor, which was more frequent in the studies, being associated 46 times with the worst maternal outcomes. Hypertension during pregnancy as an isolated risk factor was present 39 times related to maternal-fetal

prognosis. Chronic hypertension was related 28 times to unwanted clinical manifestations that led to death or preterm delivery. Preeclampsia as well as fetal weight were 17 times among the terms associated with the evolution of the maternal-fetal condition. The empirical indicators present in the review are illustrated in Figure 2.

Figure 2 – Empirical indicators, Crato, Ceará, 2021
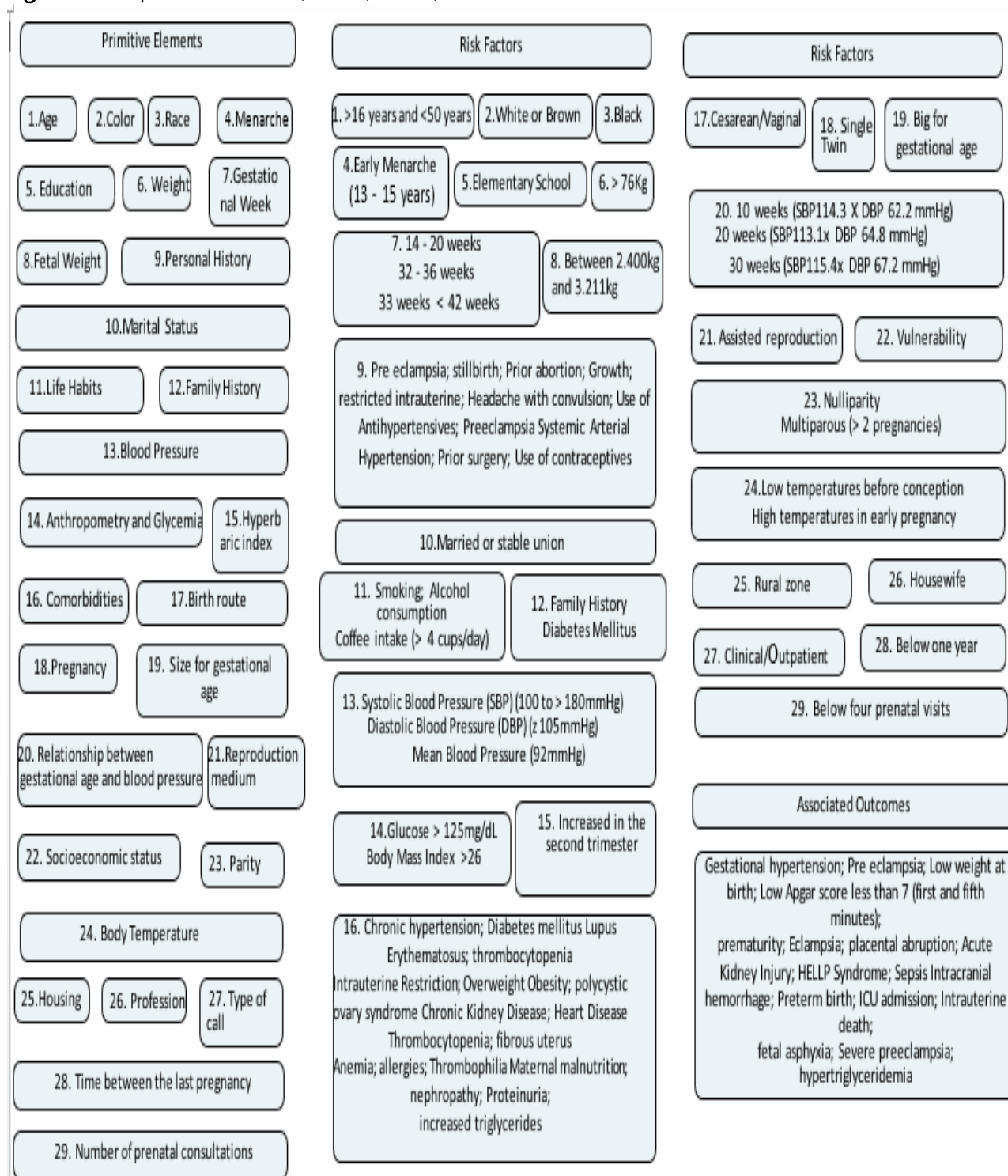
For 16 times the gestational week influenced the conjuncture of pregnancy. Other elements that constituted significance were: Monitoring blood pressure, obesity, body mass index, family history, diabetes mellitus, low birth weight and chronic hypertension, both appeared 11 to 13 times in the studies as an indication of maternal or fetal malaise influencing clinical outcomes.

Discussion

Maternal and perinal outcomes in pregnant women with hypertensive syndromes are associated with primitive concepts and maternal risk factors that directly imply life habits, reproductive planning, care with the conceptus, vulnerability situations and health conditions.[17-48] Thus, each risk factor may be related to an area of the woman's life and when treated reduces the risk of maternal-fetal complications.

The history of hypertensive diseases significantly increases the risk of a hypertensive syndrome with a significant association with preeclampsia.[49] In this sense, having family history, previous diseases or having some comorbidity are important factors to be observed in women with hypertension.[50]

A study evaluated 987 women with a view to strict blood pressure control,[51] and it revealed that severe maternal complications and severe hypertension are related to poor blood pressure management with the need for greater neonatal care and a higher risk of gestational loss. This corroborates the data of this study when relating hypertension with the worst maternal outcomes.

The literature indicates gestational age and some chemical indicators for women with predisposition to preeclampsia, they are: abnormal laboratory tests for biomarkers, proteinuria and oxygen saturation, in addition to headache.[52] These data are in accordance with what was found in this study, revealing age as one of the main markers for hypertensive syndrome.

Blood pressure is an important indicator in the predisposition to hypertensive syndromes. A study that evaluated women during nine months of gestation showed a difference in blood pressure measurements with a significant increase in those who developed HPS in relation to the group of pregnant women with stable pressure, which

led to maternal, perinatal and neonatal death in most cases.[28] .[28] In addition, devices tested at home can hide the true value of pressure, bringing greater risks to pregnant women who live away from health care.[19-20,28-31,40] These data is important, because housing in rural areas is a risk factor, in them there is the household meter, which hinders the confidentiality of the pressure measure.

In addition to the problem of uncontrolled blood pressure eating habits, in these circumstances it is understood that obesity and gestational diabetes can negatively influence. It is known that body mass index values influence blood pressure and lead to endothelial dysfunction and break in proangiogenic and antiangiogenic balance.[53] Some maternal outcomes such as renal, hepatic diseases, abrupt placentation, pneumonia, asphyxia, preeclampsia, gestational hypertension, HELLP syndrome and pulmonary edema that were listed in this study are in accordance with other research in the area.[3,54]

In primiparous women, family history and educational level distinguish outcomes among women with and without hypertensive syndromes, in these cases the nutritional aspect, physical activity, time between pregnancies and contraceptive use help to understand the health conditions of this woman and allow investing in quality prenatal care.[18,34] These data are in accordance with those found in this study.

Multiple pregnancies, low schooling and the number of prenatal visits directly influence how pregnancy will take place. A study[54] showed that gestational problems started frequently in the second trimester and are aggravated by low schooling and poor prenatal and postpartum care, in addition, as gestational age increases, chemical biomarkers increase, influencing worse prognoses.

In terms of prenatal care, this research showed that attendance of less than four prenatal consultations constitutes a risk factor for the development of HPS. In line with this statement, housework, child care and economic vulnerability led 101 women to limit prenatal care, resulting in hypertensive diseases.[21] In this sense, it is worth emphasizing that continuous monitoring by prenatal units facilitates the recognition of comorbidities, as well as helping to achieve the best health outcome.[39,55]

However, it is important to identify that the health system is not yet widely prepared to receive and refer this woman to the appropriate sectors. There is a wide failure in the services that culminates in the capture, delivery of exams, lack of professionals and supplies,

instability of bonds, and investments in training, composition and work material are needed for the teams.[9-11,22] Thus, the inequities related to geographical distances and physical barriers to reach these pregnant women should be reduced.[39]

As limitations, there are the number of studies in this area, especially in the identification of prenatal factors, and further reviews are needed as studies progress on the theme. It is expected that the study will provide support to the practice of health professionals, particularly nurses, and guide actions to promote the health and quality of life of pregnant women with HPS.

The implications for practice are based on the early identification of women who are or are at risk of developing some hypertensive syndrome, providing scientific evidence that can be implemented in care, supported by the history of nursing and physical examination. To this end, this review contributes to identifying the existing gaps in the identification of HPS still in primary care and reveals the insipid national production on the subject, fostering further research.

Conclusion

The literature presents as primitive elements: age, race, socioeconomic condition, fetal weight, Apgar index below seven in the first and fifth minute, gestational age greater than twenty weeks, and prenatal DBP as the most important indicators in the development of HPS. As for risk factors, women between 18 and 50 years old, black, in socioeconomic vulnerability and low schooling, with SBP up to 180 and DBP ≥100, between 32 and 38 weeks of gestation, fetus weighing from 1 to 3,211 Kg and Apgar < 7 in the first minute.

The study has implications for the practice of the nursing professional by directing the focus of health care to pregnant women, especially through the nursing consultation, a specific moment for implementation and targeted screening of the risk factors presented in this review. These factors can support the structuring of nursing instruments for women with HPS and qualify prenatal consultations.

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