HYPERTENSIVE SYNDROMES AND RISK FACTORS ASSOCIATED WITH GESTATION

SÍNDROMES HIPERTENSIVAS E FATORES DE RISCO ASSOCIADOS À GESTAÇÃO

SÍNDROMES HIPERTENSIVOS Y FACTORES DE RIESGO ASOCIADOS A LA GESTACIÓN

Isabella Félix Meira Araújo, Pietro Araújo dos Santos, Priscila Araújo dos Santos, Thainara Araújo Franklin

ABSTRACT

Objective: to identify, in the literature, the risk factors associated with hypertensive gestational syndromes.

Method: integrative review, carried out from the LILACS, MEDLINE, CUMED, BDENF and IBECS databases, with articles published in the period from 2000 to 2016, using the descriptors in Health: Gestational Hypertension and Risk Factors, with the final sample constituted by 17 productions.

Results: Prevalence of the LILACS Database was observed, totaling 11 (64.7%) articles, with nine (52.9%) Portuguese-speaking; level of evidence IV in eight (47.06%) of the journals and studies published in the year 2014 with four (23.5%) productions.

Conclusion: the results allowed to identify the following risk factors for GHS: extreme ages; non-white race; unfavorable socioeconomic and demographic level; personal and family background for PE; overweight; inadequate nutrition; chronic hypertension and DM.

Descriptors: Hypertension Pregnancy-Induced; Pregnancy High-Risk; Obstetric Nursing.
INTRODUCTION

Pregnancy is a unique and singular moment for the woman, since it represents the renewal of the family nucleus. However, this gestational period can, sometimes, carry maternal-fetal risks characterizing the so-called high-risk pregnancy.1

According to the World Health Organization (WHO), 2 it is estimated that in the world, one thousand women die from complications during pregnancy or childbirth every day. In 2008, the mortality of women as a result of high-risk pregnancies resulted in 358 thousand deaths and, 303 thousand maternal deaths by the end of 2015. Therefore, maternal death is considered an important indicator of human development, and it is extremely necessary to implement public health policy actions, to reduce these high mortality rates and consequently improve the quality of life of the population.

The Gestational Hypertensive Syndrome (GHS) is a multisystemic disease that occurs at the end of the gestational period and occurs in several clinical forms, with gestational hypertension, preeclampsia (PE), eclampsia and HELLP syndrome being the evidence. This syndrome is determined by arterial hypertension, followed by proteinuria and / or edema, these being called the GHS triad. Its diagnosis is performed around the 24th gestational week. It is categorized into two basic forms: PE, non-convulsive form, marked by the onset of acute hypertension after the 20th week of gestation; and eclampsia, which is a hypertensive emergency characterized by convulsive episodes consequent to the intense cerebral effects of PE.3

GHS occurs, first, in the gestational and puerperal conditions, as well as being the first cause of maternal death in our country, especially, when it comes to its most serious forms, such as eclampsia and HELLP syndrome.4 6 7

These gestational syndromes can cause multiple complications, such as hypertensive encephalopathy, cardiac failure, severe impairment of renal function, retinal haemorrhage, coagulopathies and association with PE. However, gestational hypertension, through effective prenatal care, through prevention, early detection, and control of risk factors is, sometimes, an avoidable condition. 5 7

Risk factors such as obesity, chronic hypertension, diabetes, inadequate diet and sedentary lifestyle are still detectable in pre-conception. Therefore, analyzing these risk factors is essential, in order to guide health professionals towards prevention and the early diagnosis and to collaborate for health education of the population, reducing damages to mothers and concepts.

OBJECTIVE

● To identify in the literature the risk factors associated with hypertensive gestational syndromes.

METHOD

Integrative review.8 The search for data occurred in the period from May to June 2016. The review was carried out from the electronic databases of the Latin American and Caribbean Literature in Health Sciences (LILACS), International Literature in Sciences of the (BDENF) and the Brazilian Institute of Education in Health Sciences (IBECS) were consulted through the website of the Virtual Health Library (VHL) of the Regional Medicine Library (BIREME). The search, in all the databases, was performed through the cross-checking between the descriptors available in the Descriptors in Health Sciences (DeCS): “gestational hypertension” [and] “risk factors”.

The formulation of the guiding question of this study was defined as follows: Which risk factors are associated with maternal predisposition to hypertensive syndromes?

The inclusion criteria were the studies that answered the guiding question of the research, published between 2000 and 2016, available electronically free of charge and written in English, Spanish or Portuguese. Already the exclusion criteria were repeated publications between the databases, abstracts of congresses, annals, editorials, monographs, dissertations and theses.

The combination of the descriptors identified, a sample, from a total, of 207 productions. The articles, were initially, selected by title and abstract. In this stage, 44 articles were chosen that approached concepts relevant to the study. After reading the texts in full, 17 articles were chosen that contemplated the objective and the guiding question of this work (Figure 1). Data analysis was based on relevant literature.

The six steps, described by Ganong, were used to construct this revision: elaboration of the guiding question; search in literature; data collect; critical analysis of included studies; discussion of results; presentation of the integrative review.9

The selected articles were classified into levels of evidence (LE): Level I - evidence comes from a systematic review or meta-analysis of all relevant randomized controlled...
trials or from clinical guidelines based on systematic reviews of randomized controlled trials; Level II: Evidence derived from at least one well-delineated randomized controlled trial; Level III - evidence obtained from well-delineated clinical trials without randomization; Level IV - Evidence from well-delineated cohort and case-control studies; Level V - evidence from a systematic review of descriptive and qualitative studies; Level VI - evidence derived from a single descriptive or qualitative study; and Level VII - evidence from the opinion of authorities and / or expert committees report.10

Evidence-based research, through the Integrative Review, allows the search for scientific knowledge through research or the application, in practice, of the results of the literature.11

Regarding the ethical and legal aspects, publications of national and international journals were used, whose authors were cited in all the moments in which the articles were mentioned.

![Flow diagram of the selection process of the articles included in the review. Jequié (BA), Brazil, 2016.](image)

**RESULTS**

17 selected articles, were analyzed, that met the previously established inclusion criteria. These were organized and distributed according to the authors / year of publication, title, journal and evidence found (Figure 2).

<table>
<thead>
<tr>
<th>Authors/Year</th>
<th>Title</th>
<th>Journal/ Ne</th>
<th>Evidence Found</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oliveira ACM; Santos AA; Bezerra ARB; Barros AMR; Tavares MCM (2016)</td>
<td>Maternal Factors and Adverse Perinatal Outcomes in Pre-eclampsia Patients in Maceió, Alagoas.</td>
<td>Brazilian Cardiology Arquivos /IV</td>
<td>The occurrence of PE was associated with maternal history of PE and black skin color and caused a high frequency of weight deviations of the newborn at birth and of the cesarean section.</td>
</tr>
<tr>
<td>Oliveira ACM; Graciliano NG (2015)</td>
<td>Hypertensive pregnancy syndrome and gestational diabetes mellitus in a public maternity hospital in a capital of the Brazilian Northeast, 2013: prevalence and associated factors.</td>
<td>Epidemiology and Health Services /VI</td>
<td>Advanced age, overweight and excessive weight gain in pregnancy are aspects that influence obstetric outcomes and therefore deserve the attention of health professionals.</td>
</tr>
<tr>
<td>Mangucci SB; Resende EA; Neto BO; Júnior RV;</td>
<td>Obesity and cardiometabolic risk factors during pregnancy.</td>
<td>Brazilian Journal of Gynecology and Obstetrics</td>
<td>Metabolic changes in gestation and cardiometabolic complications are more significant in obese pregnant women.</td>
</tr>
</tbody>
</table>
Hypertensive syndromes and risk factors…

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Title</th>
<th>Journal/Source</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oliveira EM; Borges MF (2014)</td>
<td>Pregnancy-induced hypertension syndrome and cardiovascular risk.</td>
<td>Journal of the Brazilian Medical Association / IV</td>
<td>The study showed an unfavorable cardiovascular risk profile in patients with a history of hypertensive gestational syndrome. It demonstrated, through changes in anthropometric measures, as well as metabolic measurements.</td>
</tr>
<tr>
<td>Henriques ACPT; Alencar JCG; Pinto LRM; Mota RMS; Macena RHM; Feitosa HN et al (2014)</td>
<td>Anthropometric predictors of gestational hypertensive disorders in a remote aboriginal community: a nested case-control study.</td>
<td>BMC Research Notes / IV</td>
<td>BMI and CC before pregnancy are anthropometric predictors of hypertensive pregnancy disorders (GD) in aboriginal women. These results imply the importance of early weight control in the prevention of GD in aboriginal women.</td>
</tr>
<tr>
<td>Sina M; Hoy W; Wang Z (2014)</td>
<td>Risk Factors on Hypertensive Disorders among Jordanian Pregnant Women.</td>
<td>Global Journal of Health Science / IV</td>
<td>The results showed that chronic hypertension, prenatal hypertension, family history of PE, diabetes, high BMI, nulliparity, previous PE history and low schooling were identified as risk factors and are factors for arterial hypertension complications.</td>
</tr>
<tr>
<td>Ehrentha DB; Catov JM (2013)</td>
<td>Importance of Engaging Obstetricians / Gynecologists in Cardiovascular Disease Prevention.</td>
<td>Current Opinion in Cardiology / V</td>
<td>The outcome of pregnancy and the risk of future cardiovascular disease (CVD) are now better understood, and the evidence links hypertension associated with pregnancy. Maternal obesity predisposes the mother to gestational diabetes (GDM) and type 2 DM in the future, hypertension, cardiovascular diseases and cancer.</td>
</tr>
<tr>
<td>Nogueira AI; Carneiro MP (2013)</td>
<td>Obesity and pregnancy.</td>
<td>Medical Journal of Minas Gerais / V</td>
<td>The main maternal complications of gestational age 35 years or older are gestational hypertension, GDM, increased frequency of preterm labor, previous placenta, premature amniorrhexis and multiple pregnancies. Monitoring of BMI and weight gain during pregnancy are low cost and very useful procedures for the reduction of maternal and fetal risks.</td>
</tr>
<tr>
<td>Gonçalves ZR; Monteiro DLM (2012)</td>
<td>Maternal complications in pregnant women with old age.</td>
<td>Femina/ V</td>
<td>Pre-gestational overweight and obesity, excessive weight gain during pregnancy and anemia were risk factors for PE.</td>
</tr>
<tr>
<td>Gonçalves CV; Sassi RAM; Cesar JA; Castro NB; Bartolomei AP (2012)</td>
<td>Body mass index and gestational weight gain as predictors of complications and outcome of pregnancy.</td>
<td>Brazilian Journal of Gynecology and Obstetrics / VI</td>
<td>Blood pressure during pregnancy is influenced by maternal characteristics. From the second to the third trimester of gestation, increased systolic and diastolic blood pressure is associated with an increased risk of gestational hypertension. The study confirmed that the family and previous history of PE, high BMI, diabetes and chronic hypertension are more frequent in patients with DHG. Diseases such as obesity, hypertension, diabetes and kidney disease produce changes in the</td>
</tr>
<tr>
<td>Santos EMF; Amorim LP; Costa OLN; Oliveira N; Guimarães AC (2012)</td>
<td>Gestational and metabolic risk profile in the public maternity prenatal service in Northeastern Brazil.</td>
<td>Brazilian Journal of Gynecology and Obstetrics / VI</td>
<td></td>
</tr>
<tr>
<td>Gaillard R; Bakker R; Willemsen SP; Hofman A; Steegers EAP et al (2011)</td>
<td>Blood pressure monitoring during pregnancy and the risk of gestational hypertensive disorders: The Generation R Study.</td>
<td>European Heart Journal / IV</td>
<td></td>
</tr>
<tr>
<td>Dalmáz CA; Santos KG; Botton MR; Roisenberg I (2011)</td>
<td>Risk factors for hypertensive disorders of pregnancy in Southern Brazil.</td>
<td>Journal of the Brazilian Medical Association / IV</td>
<td></td>
</tr>
<tr>
<td>Marinho BMV; Bonne AB; Avila MEM; Garrido ISG; Delli (2011)</td>
<td>Risk factors associated with pregnancy-induced hypertension.</td>
<td>Medisan/ IV</td>
<td></td>
</tr>
</tbody>
</table>

English/Portuguese

It was verified that the LILACS Database had the highest number of articles selected, totaling 11 (64.7%). The prevalence of Portuguese-language articles was reported in nine (52.9%), followed by English and Spanish, with six (35.3%) and two (11.8%) in the Portuguese language, respectively.

The analysis of the journals evidenced, with regard to the level of evidence, the highest prevalence of classification in level IV, with eight (47.06%) articles.

Regarding the temporal distribution, it was noticed that most of the studies were published in 2014, with four (23.5%) productions, followed by the years of 2012 and 2011, totaling six (35.2%); the year 2013, with two (11.8%) and, finally, the years 2016, 2015, 2010, 2009, 2008, with five (29.5%) in total. As for the periodical of the chosen productions, the predominance of the Brazilian Journal of Gynecology and Obstetrics is highlighted, with three (17.6%) articles.

**DISCUSSION**

After the reading and detailed analysis, we chose to group the risk factors found in seven categories named as follows: Maternal Age; Ethnicity; Socioeconomic and Demographic Factors; Personal and Family Background; Overweight and Nutritional Status; Chronic Hypertension and Diabetes Mellitus (DM).

- **Maternal Age**

According to the Ministry of Health, gestation with a maternal age above 35 years is characterized as a late pregnancy, being considered an important pre-existing risk factor for maternal-fetal morbidity and mortality.

Arterial hypertension is the most prevalent gestational complication, occurring, mainly, in women of advanced age. This fact is justified due to the vascular impairment of the age, which increases the susceptibility of pregnancy-specific hypertension. Therefore, it becomes indispensable to the planned pregnancy and the orientation of the health professional in the preconception of the women so that get quality care in the prenatal care program.

In Oliveira's research, carried out in a hospital referral center in high-risk pregnancies, in the municipality of Maceió, it was evidenced that the extremes of reproductive age are risk factors for pre-eclampsia. These data are in agreement with studies in the literature.

Still according to Magalhães, gestation in adolescence has a high incidence of adverse obstetric outcomes, among them, PE and eclampsia. This evidence is explained by the fact that toxemia is more frequent in younger adolescents (≤ 16 years), a group that presents a greater number of nulliparous patients, with poor nutritional status and deficits in prenatal care.

- **Ethnicity**

Afro-descendant women, when compared with other ethnic groups, have a higher incidence of chronic hypertension.

The black skin color seems to present a hereditary deformity in the cellular apprehension and in the conduction of sodium and calcium in the renal system, which can be explained by the presence of a sodium-economizing gene, thus predisposing, arterial hypertension and, consequently, PE overlapping with chronicity of high blood pressure levels. Another study carried out in Florida, with pregnant women diagnosed with PE, also showed an increased risk of this hypertensive syndrome in nonwhite women in all age groups.

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**Figure 2. Distribution of articles according to authors / year of publication, title, periodical and evidences found.**

<table>
<thead>
<tr>
<th>Authors</th>
<th>Year</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frattesi FF; Junior MDC</td>
<td>2010</td>
<td>Obesity and gestational complications.</td>
</tr>
<tr>
<td>Sanchez YT; Ferrer RL; Ferrer ML</td>
<td>2009</td>
<td>Characterization of risk factors in pregnant women with gestational and chronic hypertension in a health area.</td>
</tr>
</tbody>
</table>

**Table:**

<table>
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<tr>
<th>Journal</th>
<th>Language</th>
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<tbody>
<tr>
<td>Femina/ V</td>
<td>Portuguese</td>
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<tr>
<td>Cuban Journal of Comprehensive General Medicine /VI</td>
<td>English</td>
</tr>
<tr>
<td>Brazilian Cardiology Arquivos /IV</td>
<td>Spanish</td>
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</tbody>
</table>

Hypertensive syndromes and risk factors... vascular endothelium and caliber of the blood vessel, which leads to arteriolar constriiction. The association of potential risks to mother and fetus to obesity is well established, but knowledge of these risks and proper management of pregnancy are poorly practiced. Obesity, smoking, inadequate socioeconomic conditions and non-supplementation of folic acid, among others, were the most frequent risk factors for DHF. The risk factors identified for GHS were obesity, non-white race, previous PE, age above 30 years and chronic hypertension as a factor that increases the risk for PE overlap.
• Socioeconomic and Demographic Factors

Among the various risk factors for GHS described in the literature, this study showed that unfavorable socioeconomic and demographic conditions, such as low schooling and low family income, are directly associated with worse obstetric conditions.24

A study conducted in the State of Paraná, which evaluated trends in general maternal mortality and preeclampsia / eclampsia, showed that 66.1% of the women, who died of this syndrome, had up to eight years of incomplete study and about 59% family income of less than three minimum wages.25

Despite the evidence found, not all the articles surveyed were in agreement. According to a study by Assis, Viana and Rassi,20 a case-control study that investigated the main maternal risk factors in GHS, the socio-demographic characteristics did not establish a risk for this occurrence. However, this fact can be justified by the fact that the study was carried out in a public hospital where the majority of pregnant women were low-income.

• Personal and Family Background

Women who presented PE in previous gestation and those that evidence a family history of PE suggest a higher risk of relapse of the disease in future pregnancies, suggesting involvement of genetic factors.21,22

The development of PE seems to have an important link with maternal genes, as the following genetic mutations: (i) in glu298Asp of nitric oxide synthetase, leading to increased peripheral vascular resistance and (ii) in Leiden Factor V related to the blood coagulation system, although the results are not yet conclusive.26

In the Suleima study27, performed with 184 pregnant women diagnosed with gestational hypertension in Jordan, it was identified that the personal history of chronic hypertension and obstetric history, as well as the family history of PE, were considered risk factors for GHS.

• Overweight and Nutritional Status

Pregnancy contributes to the long-term development of overweight, because both the gestational, and postpartum periods are delicate periods for the development of obesity in women.28 Another determining factor in weight gain during pregnancy is the preweaning weight as it contributes not only to complications in pregnancy but, also, to the maintenance of obesity after conception, making it, a causative factor of insulin resistance, in the future.

Santos26 presents, in her study, the evidence that in pregnant women with high weight, when they entered prenatal care, had a pre-eclampsia risk of 17 times higher when compared to pregnant women with normal body mass index (BMI). Because of this, obtaining normal weight even before pregnancy becomes essential, since the treatment of obesity requires profound changes in the lifestyle and dedication of the patient.

The productions analyzed in this study indicated that the inadequacy of maternal gestational nutritional status favors the appearance of complications in pregnancy, such as overweight, gestational diabetes and preeclampsia. Therefore, the balanced diet and supervised weight reduction during and, if possible, initiated before pregnancy should be guided by the Nursing professional, in conjunction with the multiprofessional team.

In the gestation period, the woman’s diet needs to be enriched with vitamins, minerals, proteins and fats, since these nutrients are indispensable for the sustenance of the maternal organism and for adequate fetal development.10 Therefore, it is necessary to instruct pregnant women who are overweight by health professionals, emphasizing the risks of obesity for both her, and the fetus, as well as informing her about the benefits of a balanced and healthy diet.

• Chronic Arterial Hypertension and Diabetes Mellitus.

Chronic hypertension and DM are indicated as important risk factors for GHS, thus, configuring, a worrying data, since, these are now, a collective health problem that comes in an increasing epidemiological.

The study demonstrated, through the selected productions, that DM is a predisposition for GHS, and that, when associated, in the same gestation, there is a greater impairment of maternal and fetal health.22,24

Chronic hypertension in pregnancy is the condition of hypertension preexisting during pregnancy or diagnosed before the 20th week. According to Leeman and Fontaine (2008), this condition presents when systolic blood pressure is ≥ 140 mmHg and / or diastolic blood pressure ≥ 90 mmHg measured at two or more occasions. And, it can also, be configured as chronic hypertension of pregnancy, when first diagnosed, during...
pregnancy and not regularized after six to 12 weeks of delivery.\textsuperscript{31}

Approximately one to 5\% of pregnant women are affected by chronic hypertension and about 15 to 25\% of these women have PE.\textsuperscript{32}

Moura\textsuperscript{33} in her research, conducted in Ceará, identified the personal history of chronic hypertension, nephropathy and DM as risk factors associated with the development of hypertensive disorders during pregnancy. This study was in line with the study by Oliveira and Graciliano\textsuperscript{21} that investigated the prevalence and factors associated with the outcomes of GHS and GDM in a public maternity hospital in Maceió.

Thus, women with chronic hypertension and DM, who intend to become pregnant, should be assisted in a qualified manner and encouraged to control blood pressure and insulin levels with regular physical activity, adequate diet and medical treatment recommended by the physician.

**CONCLUSION**

The results allowed the identification of the following risk factors for GHS: Extreme ages, non-white race; unfavorable socioeconomic and demographic level; personal and family antecedents for PE; overweight; inadequate nutrition; chronic hypertension and DM.

Based on these findings, this study demonstrates the importance of early identification of these risk factors, which, are sometimes, previously detectable and preventable, minimizing future maternal-fetal complications. Therefore, the follow-up of the Nursing professional, in family planning and prenatal care programs, should be an important opportunity to guide, resolve any doubts and provide a comprehensive, humanized and individualized assistance to the woman.

However, from this analysis, in the literature an evident gap was evidenced that, showed preventive interventions in order to reduce the expressive indexes of GHS.

The work of the nurse is indispensable, together with the multiprofessional team, in the prevention and reduction of maternal morbimortality and its respective concept, thus, promoting, health education in an efficient way to patients who are still planning to become pregnant and to those who are already pregnant women.

In this way, this study is expected to collaborate to carry out further research in order to fill the gaps on the subject.

**REFERENCES**

Hypertensive syndromes and risk factors...


24. Oliveira ACM, Graciliano NG. Síndrome hipertensiva da gravidez e diabetes mellitus


