ISSN: 2230-9926

Available online at http://www.journalijdr.com

IJDR

International Journal of Development Research
Vol. 09, Issue, 06, pp.28152-28157, June 2019

RESEARCH ARTICLE OPEN ACCESS

PERIPARTUM CARDIOMYOPATHY: AN INTEGRATIVE REVIEW STUDY

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ARTICLE INFO

Article History:
Received 27th March, 2019
Received in revised form
05th April, 2019
Accepted 10th May, 2019
Published online 30th June, 2019

Key Words:
Peripartum Cardiomyopathy,
Diagnosis, Nursing,
Women's Health, Cardiology.

ABSTRACT

Introduction: Peripartum cardiomyopathy is the occurrence of heart failure of the left ventricle in women between the last month of pregnancy and the fifth month of the puerperium. The diagnosis is based on clinical and echocardiographic criteria imposed by National Heart, Lung and Blood Institute, but it is little emphasized and not screened in primary care. This article seeks to understand how the diagnosis is performed and what the risk factors associate with peripartum cardiomyopathy. **Objective:** To analyze the literary data on the theme, in order to subsidize an approach to this problem and facilitate a better prognosis for pregnant or puerperal women affected. **Method:** This is an integrative literature review, obtained through the search for scientific articles in the databases LILACS, MEDLINE, and BDENF, and the combination of the descriptors Cardiomyopathy, Diagnosis and Peripartum. The inclusion criteria were articles in English and Portuguese, without time delimitation, with abstract and full text available on the thematic Peripartum Cardiomyopathy, whose target population were pregnant and/or puerperal women. Books, articles, reviews, editorials, theses, government programs and reports, and studies whose sample did not include pregnant and/or puerperal women were excluded. **Results:** Ten articles were selected from the three databases. The findings showed the absence of screening for early detection of peripartum cardiomyopathy, resulting in negligence of symptoms and increased complications associated with the disease. **Conclusion:** This study contributes to highlight the knowledge gap, since this subject has been little discussed, especially in primary care.

Citation: ***Giselma Leite da Silva, Liniker Scolfild Rodrigues da Silva et al.*** **2019.** "Peripartum cardiomyopathy: an integrative review study", *International Journal of Development Research*, 09, (06), 28152-28157.

INTRODUCTION

Peripartum cardiomyopathy is the occurrence of congestive heart failure (HF), specifically of the left ventricle, in women who are usually in the period that comprises the last month of pregnancy and the fifth month of the puerperium. Also known as one of the modalities of dilated cardiomyopathy, its incidence varies from 1/1,300 to 1/15,000 live births (Urbanetz *et al*., 2009).It is a disease with unknown etiology, which presents a nonspecific clinical picture, such as: edema in the lower limbs (LLS), fatigue, dyspnea, which may occur in women of advanced maternal age, multiparity, black race, pregnancy, obesity, use of tocolytic, preeclampsia and hypertension. The complementary diagnosis comprises

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electrocardiogram, chest x-ray and echocardiogram, which can show abnormalities which include pulmonary congestion, pleural effusion, presence of left ventricular dysfunction (Resende *et al*., 2009; Urbanetz *et al*., 2009).The diagnosis is based on diagnostic and echocardiographic criteria, established by the National Heart, Lung and Blood Institute, namely: development of congestive heart failure (CHF) in the last month of pregnancy or in the first five months of the puerperium; absence of other cause justifiable for CHF; lack of heart disease diagnosed before the last month of pregnancy; left ventricular dysfunction evidenced by echocardiographic criteria, such as: shortening fraction or decreased ejection fraction and left ventricular end-diastolic diameter greater than 2.7 cm/m^2 (Urbanetz *et al*., 2009).

Thus, this study seeks to understand how the diagnosis of peripartum cardiomyopathy is performed using the following guiding question: What are the diagnostic forms and risk factors associated with peripartum cardiomyopathy? To answer this question, an integrative review was performed through the Virtual Health Library (VHL) by means of Health Sciences Descriptors, in Portuguese and English: Cardiomyopathy (*miocardiopatia*); Diagnosis (*Diagnóstico*); Peripartum (*Periparto*). Cardiomyopathy is a pathology little explored in a general way in basic care, especially in the population in the peripartum period (pre-partum, delivery and puerperium), which hinders the diagnosis and treatment, as well as coping with this disease by patients. Due to the scarcity of data relating to this population regarding diagnostic forms and associated risk factors that can be detected early, this study aims to identify the scientific production on diagnostic forms and cardiovascular risk factors associated with peripartum cardiomyopathy in the population of women attended to in primary care.

MATERIALS AND METHODS

To achieve the proposed objective, the method selected for the present investigation was the integrative literature review, which allows analyzing and summarizing the searched results about a specific topic in an orderly manner, allowing the applicability of the results of significant studies. It delimitates methodological steps, making them more consistent, which allows better utilization of evidence found in the selected studies (Souza *et al*., 2010). This integrative literature review was developed in five phases, according to Toledo (2008) and Souza *et al*. (2010): 1) Definition of the theme and the formulation of the guiding question; 2) Sampling selection; 3) Identification of pre-selected and selected studies; 4) Characterization of selected studies; 5) Analysis and interpretation of the results.Data collection occurred from May to October 2016 and was performed by searching online for articles that answered the following research question: What are the diagnostic forms and risk factors associated with peripartum cardiomyopathy? The collection of articles was performed by means of the VHL, using the following databases: International Literature in Health Sciences (MEDLINE), Latin American and Caribbean Literature in Health Sciences (LILACS) and Nursing Databases (BDENF).

The descriptors used were "cardiomyopathy" and "diagnosis" and "peripartum", and their respective standardized translations in the Health Sciences Descriptors (DECS).
The initial search occurred by crossing the descriptors by peers, namely: "cardiomyopathy" and "peripartum" (99 articles in the three databases), "cardiomyopathy" and "diagnosis" (14,909 articles in the three databases). Subsequently, there was the crossing of the three descriptors "cardiomyopathy" and "diagnosis" and "peripartum".The inclusion criteria for the sample selection were articles published in English and Portuguese, without time delimitation, with abstract and full text available online and which addressed the thematic Peripartum Cardiomyopathy, whose target population were pregnant and/or puerperal women, in addition to studies from review articles. The exclusion criteria were books, chapters of books, opinion articles, editorials, theses, government programs and reports, as well as studies whose sample did not include pregnant and/or puerperal women. Duplicates in more than one database were considered only once. For collection and analysis of the selected articles, a previously validated instrument for data collection was used (Ursi, 2005), which presents: identification of the article, introduction and objectives, methodological characteristics of the study, results and conclusion.

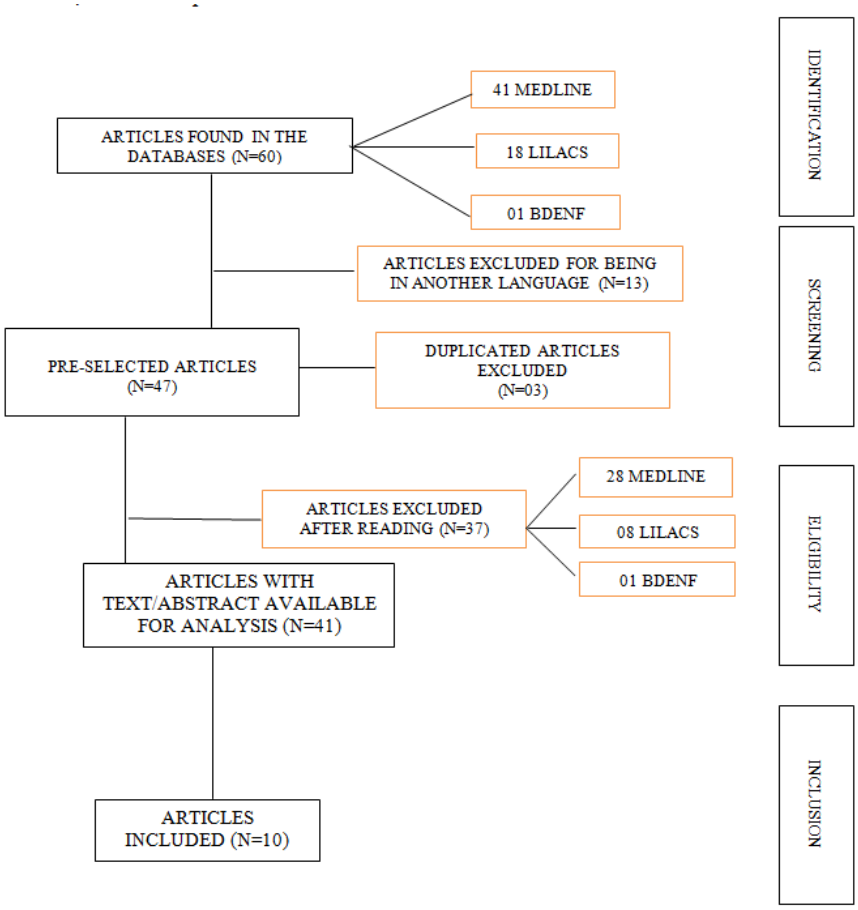
RESULTS

Searches were conducted in databases: MEDLINE, LILACS and BDENF resulting in 60 articles: 41 publications from MEDLINE, 18 from LILACS, and 01 form BDENF (Frame 1). In MEDLINE, after applying the appropriate filters, 33 publications were pre-selected, since they met at least one of the inclusion criteria, from these, five were selected for the present study once they m*et al*l inclusion criteria. In LILACS database, the search by the descriptors after applying the filters resulted in 18 articles, pre-selecting 13 that met at least one of the inclusion criteria, with its final sample including five articles. The BDENF database presented one article, which was excluded because it did not meet any inclusion criterion. After applying these criteria, the sample was restricted to 10 articles. Of the 47 pre-selected articles, five articles from MEDLINE and five from LILACS were included in the research. The synthesis and presentation of results used an instrument containing: author, research design, objectives, results and main conclusions.

The bibliographic search with the descriptors in MEDLINE database returned 41 publications. In LILACS database, the search resulted in 18 articles; in BDENF database, it returned only one article. After applying the criteria and reducing the universe by reading the abstracts of the 47 pre-selected articles, the sample reduced to 10 articles (MEDLINE= 05; LILACS= 05; BDENF= 00), thoroughly analyzed. The following flowchart, adapted from PRISMA, shows the process of selection of articles. The filters of the analyzed articles were database, language, abstract or full text available, "cardiomyopathy", "diagnosis", and "peripartum" as descriptors. The chosen languages were: English and Portuguese. Considering the three databases, after separately applying the language filter, 13 articles were excluded because their language was different from the one chosen for inclusion in the survey. Of the 47 pre-selected articles, three were duplicated, resulting in 44 articles not duplicated, of which 10 publications were selected and included based on the inclusion filter. Frame 3 describes the synthesis of the publications, in which the studies were identified by the authors. The 10 articles selected from the methodology amounted 51 different authors, namely: 33 physicians, 14 medical undergraduate students, four nurses. In relation to the type of journal that published the articles, there was one article in the Nursing

Frame 1. Search strategies in the databases by crossing the descriptors, Recife (PE), 2016

Search strategy	Used descriptors	LILACS	MEDLINE	BDENF	TOTAL
A	"Cardiomyopathy" and "peripartum"	62	36	1	99
B	"Cardiomyopathy" and "diagnosis"	13,970	936	3	14,909
C	"Cardiomyopathy" and "diagnosis" and "peripartum"	41	18	1	60
TOTAL		14,073	990	5	15,068



Source: Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement, 2016

Frame 3. Characterization of the articles selected for analysis. Recife (PE), 2016

Authors / Year / Journals	Title	Objectives / Study design	Results
Fett, J. D. / 2014 / World Journal of Cardiology.	Peripartum cardiomyopathy: A puzzle closer to solution	To highlight the important advances that have contributed to the solution of this problem and identify key areas that remain unanswered./ Review study	The author emphasizes the importance of sensitization to the problem, since it leads to a greater suspicion and favors the recognition of signs and symptoms, as well as the early diagnosis, and increases the chances of complete recovery of the ventricular function.
Liu et al., / 2014 / PLoS ONE	The Correlation between Peripartum Cardiomyopathy and Autoantibodies against Cardiovascular Receptors.	To correlate the autoantibodies of cardiac receptors with the onset of PPCM. A study was carried out with 37 patients with diagnosed PPCM and 36 normal pregnant women. Based on the Clinical evaluation, two-dimensional echocardiographic studies and measurement of receptors (b1R-AABs or M2R-AABs) by enzyme and enzyme-linked immune-enzymatic assay (ELISA). / Cross-sectional study.	The b1R-AABs and M2R-AABs receptors reveal significant elevation in patients with PPCM and are correlated with left ventricular enlargement, size and worse cardiac contraction function. Autoantibodies against cardiovascular recipients are independent risk factors for the initiation of PPCM and are present in HF regardless of primary cardiac disease.
Cemin et al., / 2013 / Current Cardiology Reviews.	Peripartum Cardiomyopathy: Moving Towards a More Central Role of Genetics.	To address the central role of genetic performance in the development of PPCM. / Cross-sectional study.	PPCM results from a complex interaction between gestational and genetic factors. More large-scale studies are necessary to confirm a central role of genetics in the pathogenesis of PPCM, which could lead to the reclassification of this cardiomyopathy and its inclusion in a particular genetic form associated with gestation.
Huang et al., / 2012 / African Health Sciences	Clinical characteristics and risk factors for peripartum cardiomyopathy.	To explore the clinical characteristics and factors associated with CMP in 52 patients. All patients admitted with CMP were prospectively analyzed and compared with control cases in the same period. The diagnosis was made through ECO TT and other causes of known Left Ventricular Insufficiency were ruled out. / Cross-sectional study	High levels of hs-CRP, respiratory infection, and arterial hypertension were independent risk factors for CMP. White blood cells, cTnI, CRP-as and NT-proBNP in CMP patients were also higher than in the control, while blood albumin level was lower.

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Souza et al. / 2012 / Revista Insuficiência Cardíaca.	Non-compacted myocardium as a non-differential diagnosis of peripartum cardiomyopathy. About a case.	To differentiate the PPCM and non-compacted myocardium (NCM) by analyzing the pathological criteria. Case study performed with 01 patient that developed CHF with proven ventricular dysfunction at echocardiogram 15 days after delivery. / Cross-sectional study.	At diagnosis, there were doubts about the pathologies, in which the main exclusion criterion was the CNMR test.
Patta & Nunes. / 2012 / Arquivos Catarinenses de Medicina.	Peripartum Cardiomyopathy: case report	To evaluate the incidence in postpartum women who developed PPCM after complications of DVT. Case study performed with 01 patient that developed PPCM in the first month of puerperium. / Control case study.	Deep venous thrombosis (DVT) related to the risk of developing PPCM as well as CHF.
Kamilu M. K / 2011 / European Journal of Echocardiography.	Right ventricular systolic function in peripartum and dilated cardiomyopathies	Evaluate and compare the RV systolic function between PPCM and idiopathic DILATED CM using the tricuspid annular plane systolic excursion (TAPSE). Cross-sectional study among adults referred for echocardiography to three laboratories in the city of Kano, Nigeria. Patients were recruited in series from October 2008 to May 2009. DCM and PPCM were defined according to the 2007 recommendations of the European Society of Cardiology Working Group on Myocardial and Pericardial Diseases. Reduced TAPSE, meaning RV systolic dysfunction, was defined as ≤14 mm. A total of 90 patients were recruited within 8 months. / Cross-sectional study.	The present study found, perhaps for the first time, that the systolic function of the RV in CMP patients was worse than that of patients with idiopathic DCM.
Resende et al., / 2009 / Revista Medica de Minas Gerais.	Peripartum Cardiomyopathy: relevant aspects	To emphasize the importance of the knowledge of PPCM in order to develop therapeutic care in primiparous and puerperal patients. Study performed with 01 patient. / Control case study.	HF is a relevant factor for PPCM pathology in pregnant and puerperal women.
Alves et al., / 2007 / Revista Brasileira de Enfermagem	Nursing Process Application: case study with a puerperal woman	To describe Nursing Processes to guide them in the care of puerperal women with PPCM and its complications. Clinical case study performed with 01 puerperal woman, emphasizing the importance of the nursing process. / Clinical case study.	Nursing diagnoses and interventions were described aiming at their importance in the care of patients with PPCM as in its complications.
Moreira et al., / 2005 / Arquivos Brasileiros de Cardiologia.	Clinical characteristics associated with unfavorable outcome in peripartum cardiomyopathy	To evaluate the clinical and pathological characteristics for a PPCM diagnosis. Study with 12 patients with PPCM divided into 2 groups: 06 without cardiac alterations; 06 with cardiomegaly and persistent ventricular dysfunction. The comparisons were made with Student's t and Fisher's exact, with a more pronounced evolution in black patients. Cross-sectional study	The related risk factors for the PPCM diagnosis are: black race, multiparity, twinning, preeclampsia, gestational hypertension and advanced maternal age (> 30 years).

Journal, three in the Medical Journal, six in the Journal of Cardiology. The selected articles were published from the years 2005 to 2014. Most articles identified derived from studies conducted in the USA.

DISCUSSION

In the articles analyzed, many authors state that Peripartum Cardiomyopathy (PPCM) is a disease with unknown etiology, which can arise at the end of pregnancy (last month) until five months after delivery, in previously healthy women, and its initial manifestation occurs through congestive heart failure (CHF) (Rombaldi *et al*., (2005); Moreira *et al*., 2005; Silva *et al*., 2009; Patta; Nunes, 2012; Souza *et al*., 2012; Fett, 2014), Liu *et al*., 2014). According to Rombaldi *et al*., (2005); Moreira *et al*., (2005); Souza *et al*., (2012) Patta; Nunes (2012) and Liu *et al*., (2014), the criteria for diagnosing PPCM include: development of HF in the last month of pregnancy or until the fifth month of puerperium, absence of cardiopathy and previous identifiable cause for the HF, left ventricular systolic dysfunction, characterized by left ventricular ejection fraction (LVEF) < or = 45% and left ventricular shortening fraction (LVSF) of 30%. The latter occurs differently in the geographic regions, being higher in Africa. For Rombaldi *et al*., (2005); Resende *et al*., (2009), the risk factors that lead to PPCM are: multiparity, black race, preeclampsia and arterial hypertension. For Huang *et al*., (2012), serum levels of C-reactive protein (CRP), respiratory infection and arterial hypertension were considered as independent risk factors for the CMP, in addition to also mentioning increased values of cardiac troponin I (cTnI), pro-atrial natriuretic peptide (NT-proBNP) and white blood cells, but he agrees with the authors regarding the age and arterial hypertension. This study showed no difference in relation to the factors multiparity or delivery route. According to Fett (2014), regarding the genetic factor, there is still much to add to the knowledge of its participation in the etiology of PPCM, but considers a genetic pre-disposition greater in African and alludes to a complex interaction between these factors, pregnancy and immune system for the development of the disease, also cited in (Cemin, 2013). This author also mentions the high levels of C-reactive protein, whose study performed with 46 patients showed high levels of hs-CRP, tumor necrosis factor and interleukin 6 in line with (Liu *et al*., 2014). For Fett (2014), there are many triggers involved in the etiology of PPCM, but he considers that this may be the biggest dilemma still involving this pathology. Although its mechanism is still unknown, there is evidence that autoimmunity has an important role in the development of the PPCM (Liu *et al*. 2014).According to the authors Moreira *et al*., (2005); Resende *et al*., (2009); Patta; Nunes (2012) and Souza *et al*., (2012) the signs and symptoms reported by pregnant and puerperal women were respiratory and cardiac disorders, in addition to thrombi in the lower limbs. The latter was not described by Moreira *et al*., (2005). However, Patta and Nunes (2012) described that the deep venous thrombosis (DVT) related to the risk of developing PPCM and CHF. For the authors, the prognosis will depend on the severity of the disease and the response to treatment. A study conducted in Nigeria by Kamilu (2011) showed that the function of right ventricular ejection fraction of patients with peripartum cardiomyopathy are worse than those with idiopathic cardiomyopathy. The tests that define the diagnosis, according to Resende *et al*., (2009);

Souza *et al*., (2012) and Patta, Nunes (2012), were: electrocardiogram, echocardiogram, chest radiography and laboratory tests. Moreira *et al*., (2005), used only echocardiographic Doppler, and Feet (2014) only mentions the echocardiogram. The study of Souza (2012) confirms that Nuclear Magnetic Resonance Imaging (MRI) is indicated for differential diagnosis of other etiologies.

The drug therapy prescribed in the studies of Resende *et al*., (2009) and Patta; Nunes (2012), consisted of digoxin, diuretics, nitrates, beta blockers, aiming to reduce the preload and afterload and increase cardiac inotropism.Fett (2014) considers that a combination of tolerated dosages of beta-blockers (BB) and angiotensin-converting enzyme (ACEI) inhibitors is the most useful to obtain a total recovery of ventricular function, and also that, in the event of serious failure, the treatment should be only with BB, or only ACEI/Angiotensin receptor blockers (ARB), instead of the previous combination (BB+ACEI).Also mentions that anticoagulation should be implemented to prevent thromboembolic events in those with LVEF < or = 0.35.For Patta and Nunes (2012), the maintenance should be performed throughout a year with beta-blockers or angiotensin converting enzyme inhibitors (ACEI) and, for Moreira *et al*., (2005), the drugs of maintenance are: carvedilol, enalapril maleate, spironolactone and warfarin sodium. The treatment is similar to that of Heart Failure of other etiologies, however, each case requires a particular treatment for adequate clinical control, according to Patta; Nunes (2012); Fett (2014) refers to the fact that the total recovery is even greater in the PPCM that in another dilated cardiomyopathy. In the study by Liu *et al*., (2014), the decrease in titles of auto-antibodies coincided with the decrease of the left ventricle, and with the improvement in cardiac function after the treatments.

The form of therapy is effective when the prognosis improves, thus, health professionals, during their assistance, should put into practice their knowledge about this disease, outlining goals and diagnostics to improve health-disease condition of pregnant and puerperal women (Alves *et al*., 2007; Silva *et al*., 2009; Patta; Nunes, 2012; Souza *et al*., 2012).Alves *et al*. (2007) reported the importance of nursing in understanding the PPCM, because it emphasizes the diagnoses and goals of the North American Nursing Diagnosis Association (NANDA), used by the nursing staff for the physical and psychological well-being of patients.The health professionals, especially nurses, should develop an assistance based on scientific knowledge about this disease so that they can prescribe based on diagnoses and develop goals to be followed, observing patients' biopsychosocial, so as to promote an assistance based not only on the pathological dimension, but mainly on the understanding of pregnant and puerperal women as social beings, in all health units (Alves *et al*., 2007).The application of the Nursing Process, according to Alves *et al*., (2007), with the use of the NANDA Nursing Interventions Classification (NIC), and Nursing Outcomes Classification (NOC), aimed at assisting patients within a broad and comprehensive perspective, emphasizing the conditions of health and disease of pregnant and puerperal women.

Fett (2014) emphasizes the importance of the awareness of health professionals and pregnant women to this problem, since there should be a higher rate of suspicion from the awareness that pregnant or puerperal women may develop an acute HF associated with pregnancy, regardless of a history, or not, of cardiomyopathy. This would lead to a greater chance of early diagnosis, by the recognition of either the patients or their health professionals. Moreover, in an early diagnosis, the greater is the left ventricular ejection fraction (LVEF) and that, in a greater LVEF, the greater are the chances of complete recovery, which occurs differently in lower LVEF, especially regarding Africans.

Final Thoughts

The selected articles presented very specific goals on peripartum cardiomyopathy, such as: the genetic contribution in the etiology of the disease, risk factors associated with a worse prognosis, the Nursing Process, knowledge about the PPCM, among others. However, only one study emphasized the importance of early diagnosis. The analyzed studies showed that that diagnosis is often made or confirmed by echocardiographic criteria and, when the patients already showed signs of ventricular impairment, which can be ascertained or confirmed by echocardiogram and MRI, among others. As observed, although rare or underdiagnosed, this disease represents a bad prognosis, because often evolves with left ventricular failure which may culminate in contraindication to subsequent pregnancies due to the risk of recurrence or worsening of the ventricular function, although the majority of the analyzed literature reported a high rate of recovery, it is considered of high mortality due to late diagnosis. Therefore, in addition to the fact of not having reports of suspicion or some type of screening as a form of early detection of PPCM still in the low-risk prenatal care or in initial consultations of the puerperium, what would favor a proper and early approach, such as referral to high-risk prenatal care and proper treatment to avoid complications, or in order to treat them, resulting in negligence of signs and symptoms by pregnant or puerperal women who have just given birth, and even by health professionals. This study suggests a greater attention to the theme and a possible diagnostic screening for the problem, still in primary care, in order to increase the studies on the issue and, therefore, decrease the cases of mortality from this pathology, as well as provide a better prognosis for pregnant or puerperal women affected, as well as serve as a theoretical basis on the theme and its importance in the context of public health, since, when affected, these patients result in health expenses with (re-) hospitalizations, treatment, in addition to affecting the quality of life.

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