

ANALYSIS OF CORRELATION BETWEEN POST-SPINAL ANESTHESIA HEADACHE AND POSTPARTUM DEPRESSION: A LITERATURE REVIEW

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Abstract: This study presents a systematic review of literature published in Portuguese regarding the correlation between the development of post-dural puncture headache and the incidence of postpartum depression, including a critical assessment of the methodological quality of the studies. It is presented from articles published between 2005 and 2022, using the following descriptors: post-spinal anesthesia, post-spinal anesthesia headache, postpartum depression. Searches were carried out in the databases of Academic Google, Science Direct and the Virtual Health Library, in addition to anesthesiology books published between 2014 and 2017. An introduction was described and discussed on the use of spinal anesthesia, the appearance of headache after dural puncture, the clinical manifestations and the association of postpartum depression in patients who required spinal anesthesia. It was evidenced that there are many studies on the proposed topic, but there was no direct relationship between postpartum depression and post-spinal anesthesia headache. Therefore, it is concluded that further studies are needed to elucidate the variants of causal factors.

Keywords: post-spinal anesthesia, post-spinal headache, postpartum depression.

INTRODUCTION

With the evolution of anesthetic techniques, more adequate means for neuraxial blockade, such as spinal anesthesia, have been developed. Thus, the improvement of anesthetic techniques is remarkable in relation to the quality and complexity offered to the patient. Spinal anesthesia consists of applying anesthetic drugs in the subarachnoid space in direct contact with the cerebrospinal fluid, in the spinal region, aiming at blocking nerve conduction, which helps in pain management and in the preparation of surgical interventions, the purpose of this intervention

being the pharmacological sectioning of the spinal cord, resulting in motor, sensory and sympathetic anesthetic properties located below the chosen level. It is indicated in several situations, such as procedures in infraumbilical regions, orthopedics in lower limbs, urology and obstetrics. (CASAGRANDE, A. F. et al. **The use of spinal anesthesia in surgical situations: a literature review**. Research, Society and Development, v. 11, n. 11, p. e283111133689–e283111133689, 23 ago. 2022).

It is known that spinal anesthesia is an invasive method, bringing with it several possible complications, since perforation of the dura mater occurs, causing side effects and complications such as hypotension, dyspnea, drowsiness, postoperative paresthesia, tremors and itching. The main and most frequent side effect is post-dural puncture headache (PDPH), which is characterized by pain manifested in an orthostatic or sitting position and is classified as a secondary headache. Some factors are related to its appearance, such as adulthood, female sex, pregnancy and the diameter of the perforation hole of the dura mater and arachnoid meninges. (**Headache after spinal anesthesia: an integrative review** | Global Academic Nursing Journal. www.globalacademicnursing.com, 18 nov. 2022).

Its manifestation usually occurs within 5 days after spinal anesthesia, which may be a consequence of a cerebrospinal fluid leak. It may be associated with neck pain, tinnitus, hearing disturbances, photophobia and/or nausea. The harmful effects can be reduced through milder interventions, such as rest, enteral hydration, use of analgesics and caffeine, as well as the blood patch technique. (NETTO, I. B. et al. **Post-Spinal Headache**. Revista Neurociências, v. 18, n. 3, p. 406–410, 31 mar. 2001).

Based on this, PDPH can be related to the physiological changes of pregnancy

itself, which corroborate the appearance of headache due to the redistribution of body fluids, since there is a deviation of venous return in the paravertebral direction, caused by compression of the vena cava by uterine growth. In addition, it is important to emphasize the influence of cultural aspects and their impact on the pregnant woman's perceptions and attitudes in relation to labor, pain and her mechanism to endure pain, since the surgical route associated with anesthesia generates a slower recovery, interfering in the mother's care for the NB (NETTO, I. B. et al. **Post-Spinal Headache**. Revista Neurociências, v. 18, n. 3, p. 406–410, 31 mar. 2001).

On some occasions, the natural course of the delivery route is interrupted due to obstetric complications, resulting in a deviation from the plan, which can make the moment traumatic for the woman. With this, it is likely that there will be the emergence of negative symptoms with the potential to evolve into postpartum depression, whose symptoms are depressed mood, emotional lability, sleep and appetite changes, psychomotor agitation or retardation, and feelings of worthlessness and guilt. According to the international classification of diseases, PPD is classified as one in which the symptoms begin within 6 weeks after delivery, while the 5th edition of the diagnostic and statistical manual of mental disorders does not distinguish PPD by periods, but starting during pregnancy or up to 4 weeks postpartum (**Postpartum depression in women who had an unscheduled cesarean section** | Revista Eletrônica Acervo Saúde. acervomais.com.br, 3 jun. 2021; RENNÓ JR., J. et al. **Is Cesarean section a risk factor for postpartum depression?** Revista Debates em Psiquiatria, v. Ano 5, p. 38–42, 1 ago. 2015).

Therefore, the objective of this review is to explore the incidence of postpartum depression and correlate it with women

who have headache after undergoing spinal anesthesia for PPD, as this medical condition results in a major impact on public health, both for the mother and for the newborn.

METHODOLOGY

This article consists of an analytical and descriptive study based on the literature review method with synthesis of evidence on the relationship between post-spinal anesthesia headache and postpartum depression. The purpose of this article is to integrate the knowledge of pathophysiology and risk factors for post-spinal headache with the development of postpartum depression due to cultural and psychosocial aspects, verifying whether there is a correlation between these comorbidities.

For this, two authors were responsible for searching and selecting the articles and books that were analyzed, using the Academic Google, Science direct and Virtual Health Library databases, in addition to information sources such as anesthesiology books published between 2014 and 2017. This step was carried out between 07/03/2023 and 07/07/2023.

Eligibility criteria considered the characteristics of the study, such as PICOT-D (population, intervention, comparison, outcome, type of study and context), book chapters, articles written in Portuguese with availability of full text in electronic support, studies of up to 10 years, use of spinal anesthesia, complications of spinal anesthesia, post-spinal anesthesia headache, postpartum depression in pregnant women who had cesarean section. Exclusion criteria established were studies on depression in non-pregnant groups, periods prior to 2005 and materials prior to 20 years, and pregnant women who did not have a cesarean section.

The search strategy included terms and keywords such as: post-dural puncture

headache, post-spinal anesthesia headache, postpartum depression, spinal anesthesia and headache, considering publications from 2005 to 2022, in which there was adequacy to the theme and excluding articles not available in full.

Methods were applied to assess the risk of bias in the included studies. This involved a critical assessment of the methodological quality of the studies, considering possible sources of bias and limitations. The ROBIS method was used for verification.

RESULTS

Specific methods used for the synthesis of results, such as thematic analysis, grouping of categories or meta-analysis, when applicable, were used in the development of this literature review, so that in the initial search in the established databases using the descriptors associated by Boolean indicators “AND” and “OR”, the following were found: 774 articles on post-dural puncture headache, 846 articles on post-spinal headache and 44,200 articles on postpartum depression in Academic Google; 297 articles on post-spinal headache in the Virtual Health Library; 214 results with the search for the descriptor “post-spinal anesthesia” and 36 results for the search “headache after spinal anesthesia” in Science direct. By using the periodicity filter, whose date was established from 2005 to 2022 for reviewing the articles and performing a careful selection of titles, it was possible to obtain a reduction in the number of articles selected, which became 18 articles in total. From the critical reading of the articles, it was possible to reduce the number of articles to 15 studies, aiming at a higher quality analysis based on these works. For this, it was also considered whether the article had full text and whether it addressed the descriptors initially established. This process can be visualized in the flowchart below.

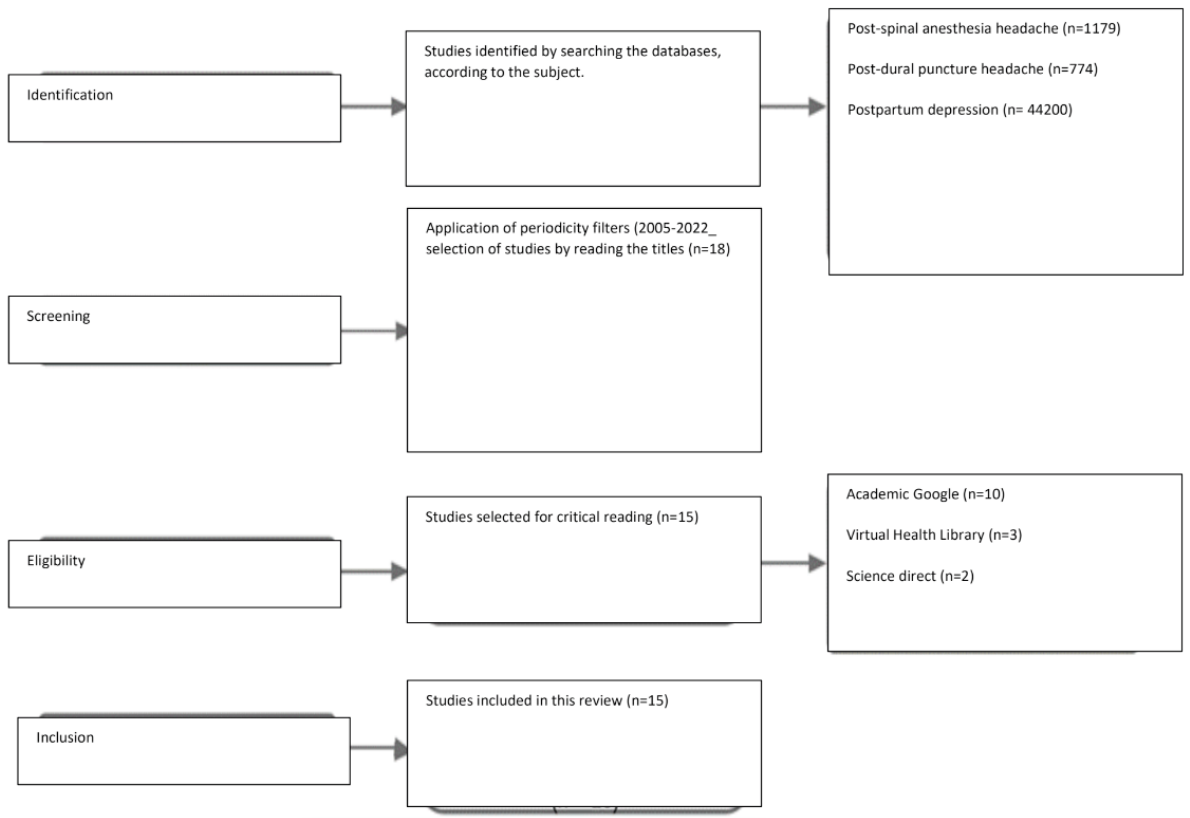


Figure 1 Organization and selection of documents for this review. Source: Survey data (2023).

With the full reading of the 15 articles, it was possible to verify the following data: author of the article, title, year of publication, database, type of study, objective of the article and main findings in the article for the construction of this literature review, as it was placed in table 1 found in Annex I.

The main information extracted through this analysis was used to build the discussion of this literature review, with the purpose of verifying the association between post-dural puncture headache and postpartum depression.

DISCUSSION

Spinal anesthesia, also called spinal anesthesia, aims to block nerve conduction through the use of anesthetic solutions, such as bupivacaine, procaine, prolocaine, lidocaine and mepivacaine. A certain dose, when injected into the subarachnoid space, results in conduction blockade of nerve structures in the spinal cord and peripheral nerves. (**Headache after spinal anesthesia: an integrative review** | Global Academic Nursing Journal. www.globalacademicnursing.com, 18 nov. 2022).

Physiologically, cerebrospinal fluid (CSF) is mostly produced (60%) by the choroid plexuses and, as a function, it mechanically protects the brain and spinal cord against changes in pressure or shock, in addition to defending against infectious agents in the CNS. It is distributed throughout the cerebral ventricles and subarachnoid space and, when CSF pressure is measured, it varies according to position, corresponding to 40 cm H₂O when sitting and 5-10 cm H₂O when supine. Thus, from the moment there is an imbalance between CSF production and CSF loss (approximately 0.35 mL/min), complications or adverse effects associated with CSF hypotension begin. (HEBERLE, A. G. et al. **Post-spinal anesthesia headache treated with**

epidural blood packing: Epidemiological analysis. Revista Brasileira de Neurologia e Psiquiatria, p. 118, 1 jan. 2015).

Among the contributing factors for this imbalance to occur, we can mention the puncture upon requests for laboratory tests, accidental perforation of the dura mater during epidural anesthesia and after performing spinal anesthesia. Concomitantly, included to these factors, there are determinants such as adulthood, diameter of the hole resulting from the perforation and pregnancies. According to studies, the frequency of PDPH can vary from 0.4 to 3% when performed with preventive care and approximately 70% depending on the diameter of the needle used for the puncture (NETTO, I. B. et al. **Post-Spinal Headache.** Revista Neurociências, v. 18, n. 3, p. 406–410, 31 mar. 2001).

Consequently, among the clinical manifestations resulting from the spinal anesthesia process, there are tremors, skin irritation, drowsiness, postoperative tingling, hypotension and dyspnea. However, post-dural puncture headache corresponds to the most common symptom, and may occur alone or in association with the symptoms described. When characterizing it, PDPH corresponds to severe pain, sometimes described as disabling, starting up to 5 days after the procedure. It gets worse when standing or sitting, a common position in puerperal women during breastfeeding, improving spontaneously in 2 weeks, although measures such as rest, use of analgesics and hydration help in the improvement process. Associated with pain, there may be hearing disorders, tinnitus, neck pain, photophobia and nausea. (**Headache after spinal anesthesia: an integrative review** | Global Academic Nursing Journal. www.globalacademicnursing.com, 18 nov. 2022).

Therefore, according to the Subcommittee on Classification of Headaches of the International Headache Society, PDPH is

classified as “secondary headache attributed to non-vascular intracranial disorder due to CSF hypotension” and, for this, certain criteria must be met, such as (I) worsens within 15 minutes of standing and improves after 15 minutes of supine position; (II) association with one of the symptoms such as photophobia, neck stiffness, tinnitus and hypoacusis; (III) appearance after 5 days of puncture and (IV) disappearance after 48 h with treatment or spontaneously (NETTO, I. B. et al. **Post-Spinal Headache**. Revista Neurociências, v. 18, n. 3, p. 406–410, 31 mar. 2001).

Simultaneously with this possible complication related to the cesarean section and the need for anesthesia, there is the puerperal period. This, regardless of the mode of delivery, is marked by the woman's great sensitivity and vulnerability due to the physiological changes of the body's return to pre-gestational conditions, adaptation to the change of routine due to the care of the newborn, and also, the weight involved in high expectations and social pressure on those who exercise motherhood. This whole context makes this period susceptible to the development or worsening of mental disorders in women with predisposition (IACONELLI, V. **POSTPARTUM DEPRESSION, POSTPARTUM PSYCHOSIS AND MATERNAL SAD**. Revista Pediatria Moderna, julho-Agosto, v. 4, 2005).

Eight out of ten women may experience maternal sadness, also called puerperal blues, characterized by depressed mood, emotional lability, easy crying, irritability and sleep disorders. Its etiology is multifactorial, with risk factors such as sleep deprivation, unplanned pregnancy, inadequate family support and previous diagnosis of major depression having great weight. It is self-limiting, starting on the 7th to 10th day after delivery, lasting up to two weeks, has

a mild intensity that does not prevent the mother from carrying out her tasks, and, in general, does not require the use of drug treatment. (IACONELLI, V. **POSTPARTUM DEPRESSION, POSTPARTUM PSYCHOSIS AND MATERNAL SAD**. Revista Pediatria Moderna, julho-agosto, v. 4, 2005).

PPD refers to a major depressive episode of severe to moderate intensity characterized by sad or irritable mood, despair and emptiness, accompanied by somatic and cognitive changes that negatively affect the woman's ability to maintain her work activities. It increases the risk of discontinuing breastfeeding, compromises family relationships and the creation of a stable bond between mother and child, which can lead to inadequate support for the child's physical and psychological needs, triggering impairment to psychomotor, cognitive, social, and language development. The diagnosis is clinical and considers the symptoms when their onset occurs within 1 year after delivery (RENNÓ JR., J. et al. **Is Cesarean section a risk factor for postpartum depression?** Revista Debates em Psiquiatria, v. Ano 5, p. 38–42, 1 ago. 2015).

The etiology is multifactorial and complex, the development of PPD occurs in women with a predisposition to psychiatric diseases, the main factor being the occurrence of depression during pregnancy. Other factors include the context of the puerperal woman in question, inadequate nutrition, sedentary lifestyle, abrupt reduction in levels of reproductive hormones, thyroid disorders, dysfunctions in the hypothalamic-pituitary-adrenal axis and genetic vulnerability - family history of major depression and bipolar disorder predispose to perinatal depression, when the onset of symptoms occurs during pregnancy or up to the 4th postpartum week according to DSM-5 (**Cesarean section and postpartum depression: a review of risk**

factors | Revista Eletrônica Acervo Científico. acervomais.com.br, 30 jan. 2021).

There are also psychological and socioeconomic factors such as isolation, inadequate family or partner support, addiction to crack, alcohol or other drugs, financial difficulties and/or family conflicts and lack of pregnancy planning. In addition to these, sleep deprivation and/or physical limitations that occur at the end of pregnancy, during childbirth and in the period immediately after childbirth are major factors directly proportional to the risk for PPD. In these, associations have been found between the presence of obstetric complications, such as antepartum hemorrhage or emergency cesarean section. (**Postpartum depression in women who had an unscheduled cesarean section** | Revista Eletrônica Acervo Saúde. acervomais.com.br, 3 jun. 2021).

Postpartum depression is underdiagnosed and rarely addressed during care for pregnant and postpartum women. Obstacles to this screening are due to the lack of time of prenatal care and delivery professionals and the stigma related to psychiatric illnesses during pregnancy and postpartum by women and professionals alike. It is a disease with serious complications that require individualized drug and non-drug treatment. In multidisciplinary care for pregnant women at the time of delivery, the presence of qualified professionals for the management of these symptoms in patients with risk factors is important. The scarcity of studies on the subject is raised in scientific articles and are obstacles in the construction of a solid literature base that allows correlating PPD with the mode of delivery (RENNÓ JR., J. et al. **Is Cesarean section a risk factor for postpartum depression?** Revista Debates em Psiquiatria, v. Ano 5, p. 38–42, 1 ago. 2015).

Labor is marked by intense expectations of all involved and involves physical, psychological, social and cultural aspects in

relation to pain and mechanisms to support pain. In Brazil, choosing the mode of delivery is a decision that encompasses all these aspects that go beyond medical indications. And the frustration and bad experience with this moment can occur regardless of the mode of delivery, especially when there are obstetric complications such as the need to use forceps (**Postpartum depression in women who had an unscheduled cesarean section** | Revista Eletrônica Acervo Saúde. acervomais.com.br, 3 jun. 2021). Cesarean delivery is valued by delivery care professionals and women because it is considered safer, less painful and comfortable, although it requires anesthesia and a longer post-operative recovery time. This mode of delivery is so overestimated that the rate of cesarean sections in Brazil reaches 45.9%, a figure three times higher than that recommended by the WHO, 15% (RENNÓ JR., J. et al. **Is Cesarean section a risk factor for postpartum depression?**) Revista Debates em Psiquiatria, v. Ano 5, p. 38–42, 1 ago. 2015). There is no denying the importance of a cesarean section in the obstetric context when well indicated, and care is taken to provide good guidance on the importance of the procedure and its possible complications with a good doctor-patient relationship and comprehensive attention to anamnesis (**Postpartum depression in women who had an unscheduled cesarean section** | Revista Eletrônica Acervo Saúde. acervomais.com.br, 3 jun. 2021).

As the personal history of major depressive disorder prior to or during pregnancy is the main risk factor for PPD, it is essential to screen for depressive symptoms in order to prepare the professional who will assist the pregnant woman. Spinal anesthesia can have complications such as tremors, skin irritation, drowsiness, postoperative tingling and especially CPPD, which delays post-surgical recovery and can lead to physical

and/or psychological limitations such as difficulty in breastfeeding and caring for the newborn, which are risk factors in the aggravation or onset of mood disorders during the complex puerperal period in patients with predisposition (RENNÓ JR., J. et al. **Is Cesarean section a risk factor for postpartum depression?**) Revista Debates em Psiquiatria, v. Ano 5, p. 38–42, 1 ago. 2015).

CONCLUSION

With this article, it is possible to conclude that there was no direct relationship between post-spinal headache and postpartum depression. However, since postpartum depression has a multifactorial etiology and

post-spinal anesthesia headache causes an increase in hospital stay in patients, it is also not possible to deny a possible association between both conditions, so it would be important to have clinical studies aimed at analyzing a cause and effect relationship between post-spinal anesthesia headache and postpartum depression. In addition, it is clear the importance of understanding both conditions in order to provide a better therapeutic approach to pregnant women and, through prophylactic measures, to avoid the development of these comorbidities, guaranteeing a better clinical development for the patient.

ANNEX I

Author of the article / Title / Year of publication	Database	Type of study	Goal	Main findings
Heberle AG, Ecker R, et al./ Headache after spinal anesthesia treated with epidural blood packing: Epidemiological analysis. / 2015	Academic Google	Cross-sectional cohort study	To identify the frequency of post-spinal anesthesia headache treated with epidural blood tamponade in a hospital in the southwest of Paraná.	Historical perception of secondary headache as a benign complication of spinal anesthesia common to all people; establishes the current frequency of post-spinal headache (PRC) with traumatic needles; describes the “CSF loss theory” and explains the pathophysiology for obtaining CPR. It characterizes prophylactic recommendations to avoid CPR, defining that these do not have definitive evidence, but must be used with the intention of avoiding the return of patients to the surgical center and socioeconomic impacts.
Cecilio GM, Sleiman LG, et al. / Headache incidence after spinal anesthesia in a philanthropic maternity hospital / 2020	Academic Google	Observational and analytical study with a sample of 100 patients	To evaluate the incidence of post-dural puncture headache in obstetric patients undergoing cesarean section in a tertiary health institution.	It defines the groups in which the prevalence of post-dural puncture headache (PDPH) is more common; characterizes the “theory of delayed healing of the dural orifice”; establishes risk factors, separating them into modifiable and non-modifiable; characterizes the clinical picture of PDPH and establishes the importance of conservative measures. PDPH is a primary cause of morbidity and patients with PDPH have an increased length of hospital stay. The article concludes that national studies to estimate the incidence of PDPH and approach to spinal anesthesia must be carried out.

Netto IB, Catharino AMS, et al. / Headache after spinal anesthesia: Associated risk factors and prevention of its occurrence - Update / 2010	Academic Google	Literature review	To present the risk factors that trigger post-spinal headache (PRC), as well as procedures that may reduce its frequency.	Epidemiology and classification of headaches; Post-spinal anesthesia headache (PRC) is classified as a secondary headache, usually occurring after the spinal anesthesia procedure due to CSF hypotension. There are risk factors that facilitate its appearance, such as adulthood, pregnancy and the diameter of the orifice of perforation of the dura mater and arachnoid meninges. In this article, it is found that prevention methods are useful to decrease the incidence of CPR and details how risk factors act to cause CPR.
Casagrande AF, Dutra DS, et al. / Use of spinal anesthesia in surgical situations: A literature review / 2022	Academic Google	Literature review	Evaluate the use of spinal anesthesia in different surgical situations, elucidating positive and negative points.	Concept and history of spinal anesthesia, as well as application methods; considers post-spinal anesthesia headache as the most frequent complication of this procedure, clarifying risk factors responsible for increasing the incidence of this condition.
Oliveira RN, Grachten AP, Filho JAVV / Post-spinal anesthesia headache / 2014	Virtual Health Library	Literature review	Addressing the pathophysiology, clinical scenario and therapeutic options for post-spinal anesthesia headache.	Concept and application of spinal anesthesia; In the 1930s, the spinal anesthesia technique was abandoned due to the association of vomiting and the high incidence of PDPH with a high mortality rate in cesarean sections, returning only in the 1950s with the development of a new needle design, gauges and atraumatic tips, however complications still exist, generating the need for differential diagnosis and adequate treatment; CPPD remains a cause of morbidity for patients, but it is possible to reduce its incidence with knowledge of its pathophysiology and risk factors.
Matos MM, Leite MDP, et al. / Postpartum depression in women who had an unscheduled cesarean section / 2021	Academic Google	Literature review	Analyze the symptoms and causes of postpartum depression (PPD), including unscheduled cesarean section as one of the risk factors, as well as assess the consequences of depression for the life of the mother and baby.	It establishes the prevalence of postpartum depression (PPD); establishes the onset time and clinical signs of PPD; relates the puerperium to maternal physiological changes and establishes risk factors that may influence the development of PPD. Association between cesarean section and PPD
Iaconelli V. / Postpartum depression, postpartum psychosis and maternal sadness / 2005	Academic Google	Literature review	Describe postpartum depression, maternal psychosis, and maternal sadness (Baby blues).	It characterizes maternal clinical conditions, helping in the differential diagnosis of conditions (PPD, maternal sadness and psychosis); establishes clinical picture and diagnosis of PPD.
Costa RP, Sousa IF, et al. / Headache after spinal anesthesia: An integrative review / 2022	Academic Google	Integrative review	To analyze and list the risk factors that predispose to headache after subarachnoid anesthesia, as well as the form of prevention through an integrative literature review.	Application of subarachnoid anesthesia, side effects of the procedure and related complications. Characterization of post-dural puncture headache as intense pain manifested according to the position of the patients, according to the CSF hypotension generated. Relates pathophysiology, epidemiology and risk factors for understanding CPPD.
Vieira VLR, Macedo CF, et al. / Post-dural puncture headache in obstetrics / 2009	Academic Google	Literature review	To carry out an updated synthesis of the historical and pathophysiological aspects, as well as the prevention and treatment of post-dural puncture headache in Obstetrics.	The article deals with anatomy of the dura mater, cerebrospinal fluid and consequences of perforation of the dura mater, which are important aspects for understanding spinal anesthesia and its consequences. From this, there is a better delimitation of post-puncture headache and therapeutic methods used to treat the condition.

JR. JR, Cavalsam JP, Lobo HR, et al. / Cesarean delivery is a risk factor for postpartum depression / 2015	Academic Google	Literature review	Establish whether the mode of delivery is a facilitator for postpartum depression.	It establishes symptoms of postpartum depression and particularities of the condition, such as a high association with anxious and obsessive-compulsive symptoms. It analyzes how cultural aspects impact perceptions of labor. Brings beneficial and harmful characteristics of cesarean delivery and associates traumatic events with delivery routes.
Rua MO, Soares GFG, Lima CSA, et al. / Cesarean section and postpartum depression: A review of risk factors / 2021	Academic Google	Literature review	To analyze the interrelationship between cesarean delivery and postpartum depression, assessing causes, risk factors and reflexes.	It discusses the issue of preference for cesarean sections by pregnant women and considers the risks of these procedures for women; places the development of PPD as multifactorial and differentiates or correlates it with other mental disorders related to cesarean section. It establishes important risk factors for the development of the clinical picture of PPD.
Biricik E., Karacaer F, et al. / The effect of epinephrine, norepinephrine and phenylephrine in the treatment of post-spinal hypotension: a comparative clinical study / 2020	Science Direct	Clinical trial	To compare the effect of epinephrine with norepinephrine and phenylephrine in the treatment of hypotension after spinal anesthesia and ephedrine requirement during cesarean delivery.	Practical application methods of spinal anesthesia; Analysis of the best drugs used in the procedure; defines incidence of post-spinal anesthesia hypotension.
Vidal M, Strzelecki A., Houadec M, et al. / Subarachnoid spinal hematoma after spinal anesthesia: Case report / 2015	Science	Case report	To report a case of subarachnoid hematoma after spinal anesthesia in a young patient with no risk factors.	It describes subarachnoid spinal hematoma as a rare complication of spinal anesthesia, as well as defining some predisposing factors for this condition. Typical symptoms of subarachnoid hematoma do not meet the criteria for post-dural puncture headache (PDPH), being essential for the differential diagnosis.
Höehr ACR, Londero RG / Post-puncture headache in puerperal patients undergoing spinal anesthesia / 2012	Virtual Health Library	Screening study	To evaluate the occurrence of post-dural puncture headache in pregnant women undergoing spinal anesthesia for cesarean sections at the University Hospital of ULBRA in the second half of 2010.	It defines the incidence of post-dural puncture headache in obstetric patients; defines risk factors and clinical signs of PDPH; characterizes the treatment of PDPH and concludes that it must be treated aggressively because it is a primary cause of morbidity and increases hospital stay in obstetric patients.
Silva IIM. / Non-invasive treatment of post-dural puncture headache: review of clinical trials and suggested protocol for ``Hospital do Servidor Público Municipal de São Paulo`` SP / 2022	Virtual Health Library	Literature review	Through a review of clinical trials published in the last ten years, propose a treatment protocol for PDPH to be applied in the ``Hospital do Servidor Público Municipal (HSPM) de São Paulo`` - SP	It defines post-dural puncture headache (PDPH) and establishes its clinical signs; establishes the etiology of PDPH; studies protocols for the treatment of PDPH, defining the best therapeutic approach.

Table 1: Overview of studies included in this literature review

REFERENCES

- BIRICIK, E. et al. **O efeito de epinefrina, norepinefrina e fenilefrina no tratamento da hipotensão pós-raquianestesia: estudo clínico comparativo.** Brazilian Journal of Anesthesiology, v. 70, n. 5, p. 500–507, set. 2020.
- CASAGRANDE, A. F. et al. **O uso da raquianestesia em situações cirúrgicas: uma revisão de literatura.** Research, Society and Development, v. 11, n. 11, p. e283111133689–e283111133689, 23 ago. 2022.
- Cefaleia pós anestesia raquidiana: uma revisão integrativa** | Global Academic Nursing Journal. www.globalacademicnursing.com, 18 nov. 2022.
- Cesárea e depressão pós-parto: uma revisão dos fatores de risco** | Revista Eletrônica Acervo Científico. acervomais.com.br, 30 jan. 2021.
- Depressão pós-parto em mulheres que tiveram cesárea não programada** | Revista Eletrônica Acervo Saúde. acervomais.com.br, 3 jun. 2021.
- GUSTAVO FLORES CECILIO; LUMA GARCIA SLEIMAN; FERREZ, D. **Incidência de cefaleia após anestesia subaracnoideia em uma maternidade filantrópica.** v. 22, n. 4, p. 156–162, 28 jun. 2022.
- HEBERLE, A. G. et al. **Cefaleia pós-anestesia raquidiana tratada com tamponamento sanguíneo peridural: Análise epidemiológica.** Revista Brasileira de Neurologia e Psiquiatria, p. 118, 1 jan. 2015.
- HÖEHR, A. C. R.; LONDERO, R. G. **Cefaleia pós-punção em pacientes puérperas submetidas a raquianestesia.** Rev. AMRIGS, p. 125–128, 2012.
- IACONELLI, V. **DEPRESSÃO PÓS-PARTO, PSICOSE PÓS-PARTO E TRISTEZA MATERNA.** Revista Pediatria Moderna, Julho-Agosto, v. 4, 2005.
- NETTO, I. B. et al. **Cefaléia Pós-Raquianestesia.** Revista Neurociências, v. 18, n. 3, p. 406–410, 31 mar. 2001.
- NIGRI DE OLIVEIRA, R. et al. **CEFALEIA PÓS-RAQUIANESTESIA.** [s.l: s.n.]. Disponível em: <<https://docs.bvsalud.org/biblioref/2018/04/882562/cefaleia-pos-raquianestesia.pdf>>.
- RENNÓ JR., J. et al. **Is Cesarean section a risk factor for postpartum depression?** Revista Debates em Psiquiatria, v. Ano 5, p. 38–42, 1 ago. 2015.
- SILVA, I. I. DE M. **Tratamento não invasivo da cefaléia pós-punção dural: revisão de ensaios clínicos e sugestão de protocolo para o Hospital do Servidor Público Municipal de São Paulo SP.** pesquisa.bvsalud.org, 2022.
- VIDAL, M. et al. **Hematoma espinhal subaracnoideo após raquianestesia: relato de caso.** Brazilian Journal of Anesthesiology, v. 66, n. 5, p. 533–535, set. 2016.
- VIEIRA, V. L. R. et al. **Cefaleia pós-punção da dura-máter em obstetrícia.** rmmg.org, v. 19, n. 3, p. 52–58, [s.d.].