European Journal of Obstetrics & Gynecology and Reproductive Biology 225 (2018) 214–220

Contents lists available at ScienceDirect

European Journal of Obstetrics & Gynecology and Reproductive Biology

journal homepage: www.elsevier.com/locate/ejogrb

Review article

Posttraumatic stress disorder related to postpartum haemorrhage: A systematic review

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ARTICLE INFO

Article history:
Received 2 March 2018
Accepted 10 April 2018

Keywords:
Posttraumatic stress disorder
Posttraumatic stress symptoms
Postpartum hemorrhage
Emergency hysterectomy
Systematic review

ABSTRACT

In some cases childbirth leads to negative psychological responses such as posttraumatic stress disorder (PTSD). Postpartum hemorrhage (PPH) is a common and major complication of childbirth, which occasionally requires emergency hysterectomy in severe cases. Patients often describe these complications as a traumatic experience. It is unknown whether PPH is a risk factor for developing PTSD. In this systematic review we summarize the current knowledge about the association between PPH with or without emergency hysterectomy and posttraumatic stress symptoms or PTSD. If PPH is a risk factor for PTSD, this will allow adequate preventive measures with the aim to reduce the long-term effects and socioeconomic problems associated with PTSD. To conduct this review MEDLINE, EMBASE, Web of Science, ClinicalTrials.gov, Cochrane Central Register of Controlled Trials, Cochrane Library and PsycINFO databases were searched for publications between January 1986 and October 2017. Manuscripts evaluating the association between PPH and peripartum emergency hysterectomy and PTSD or posttraumatic stress symptoms were included. Fifty-two articles met the criteria for full-text review. Seven articles were included in this review. Five studies focused on the association between PPH and PTSD and two studies evaluated the association between emergency hysterectomy and PTSD. Three studies found no association between PPH and PTSD. Two studies reported a higher risk of developing PTSD or posttraumatic stress symptoms after PPH. Two studies reported a higher risk of developing PTSD after emergency hysterectomy. Meta-analysis was not possible due to the heterogeneity of these studies. Based on the results of these studies there may be an association between PPH and PTSD. Secondly, it seems likely that an association exists between emergency postpartum hysterectomy and PTSD, but the strength of this conclusion is limited by the small amount of studies included.

Contents

Abbreviations: PTSD, posttraumatic stress disorder; PPH, postpartum hemorrhage; DSM-IV, DSM-5 Diagnostic and Statistical Manual of Mental Disorder-Fifth Edition; IES (-R), Impact of Event Scales (revised); TES-B, Traumatic Event Scale; PCL, PTSD Checklist for DSM-IV; PSS, Posttraumatic Stress Disorder Symptom Scale.

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https://doi.org/10.1016/j.ejogrb.2018.04.012
0301-2115/

Introduction

Although childbirth is a joyful event for most women, for some women it leads to negative psychological responses such as posttraumatic stress disorder (PTSD). PTSD is a trauma- and stressor-related disorder an individual may develop in response to experiencing one or more traumatic events [1]. According to the Diagnostic and Statistical Manual of Mental Disorder-Fifth Edition (DSM-5), PTSD is characterized by reliving experiences of the traumatic event (criterion B), avoidance of reminders of the trauma (criterion C), negative thoughts and mood (criterion D) and hyperarousal (criterion E). The symptoms persist for at least one month (criterion F) and lead to considerable social, occupational, and interpersonal dysfunction (criterion G) [2]. In a number of studies, one-third of women appraised childbirth as traumatic [3–5]. Prevalence rates in the literature show that 0·9–4·6% of women suffer from PTSD related to childbirth in American, European and Australasian populations [6,7]. Postpartum PTSD has a negative impact on relationships between women and their partners and the new-born and might affect child behaviour and development [8–13].Negative birth experience may result in postponing or avoiding future childbearing, or requests for elective caesarean sections as an attempt to avoid re-traumatization by vaginal childbirth [12,13]. Requests for termination of an unplanned pregnancy and sterilization to avoid childbirth after a previous traumatic delivery have also been described previously [14]. Thus, postpartum PTSD is an important public health issue considering the number of births worldwide.

Possible risk factors for developing PTSD or posttraumatic stress symptoms related to childbirth are studied widely. Recently, a meta-analysis of 50 studies involving 21,429 women from 15 countries found risk factors to be divided in pre-birth vulnerability (depression in pregnancy, fear of childbirth, a history of PTSD), risk factors during birth (negative subjective birth experiences, lack of support, assisted vaginal or caesarean birth, dissociation during labor, complications) and risk factors after birth (poor coping and stress) [6].[6] Several studies have described maternal and neonatal complications during pregnancy and labor as predictors for development of maternal PTSD and posttraumatic stress symptoms [15,16].

Whenever childbirth is complicated with blood loss of 500 mL or more within 24 h after birth it is classified as postpartum hemorrhage (PPH) [17]. In 0·1–0·3 per 1000 deliveries emergency hysterectomy is needed as a treatment for PPH [18,19].

Although the physical maternal morbidity due to PPH with or without emergency hysterectomy has extensively been investigated, PTSD due to PPH has rarely been studied.

Given that the global incidence of PPH is estimated to be between 1% –5% of all deliveries [20,21] it is of paramount importance to know whether women experiencing PPH are at risk for developing posttraumatic stress symptoms or PTSD.

Based on our clinical experience and several qualitative studies, patients often describe PPH as a condition in which a traumatic feeling of powerlessness and the fear of slowly bleeding to death takes over [15,22]. If emergency hysterectomy is necessitated to control hemorrhage, this often is described by patients and their partners as very traumatic and of high emotional impact [23].

In a study performed by Sentilhes et al. [15], two-thirds of the participants reported to have negative memories of the childbirth and PPH, the main reported memory being a fear of dying. Regarding future pregnancy, 20·6% of the women decided not to become pregnant again due to fear of a recurrence of PPH. Of the 15 women who became pregnant again and had full term pregnancies, 60% reported intense anxiety throughout pregnancy [15]. In a study performed by Elmir et al. [23], results showed that women who underwent an emergency hysterectomy following severe PPH were likely to suffer from flashbacks and nightmares about ongoing bleeding, to have depressed feelings and intrusive thoughts and images of childbirth [23]. Results of these studies report on symptoms following PPH which may be present during PTSD, but the authors did not assess PTSD as an outcome.

If PPH is identified as a risk factor for PTSD, this allows identification of at-risk patients and adequate preventive measures with the aim to reduce the long-term effects and social and economic problems associated with PTSD. In this systematic review we summarize the current knowledge about the association between PPH with or without emergency hysterectomy and posttraumatic stress symptoms or PTSD.

Materials and methods

This review was completed using PRISMA guidelines [24].A systematic search was carried out by a librarian with systematic review experience, using computerized databases MEDLINE (PubMed), EMBASE, Web of Science, ClinicalTrials.gov, Cochrane Central Register of Controlled Trials, Cochrane Library, Directory of Open Access Journals and PsycINFO (Appendix A). Articles were identified with the use of a combination of the following text words and associated database specific MeSH terms: “Postpartum Period” or “Postnatal”, “Post-Traumatic Stress disorder” or “Post-Traumatic stress symptoms”, “Postpartum Hemorrhage” or “Postpartum Bleeding”, with no restrictions in language, from the inception of each database to October 2017. Authors TZ and MS reviewed each citation and abstract independently using a standardized data abstraction form, in duplicate. Exclusion criteria consisted of: 1) case report, letter, conference abstract, commentary and 2) no peer review. Full-text articles were retrieved as needed to determine eligibility criteria. After discussion, consensus was reached among the reviewers in all cases.

Results

The literature search yielded 1651 articles. After eliminating duplicates a total of 1099 references were identified. Of the 1099 reviewed, 1047 were removed after abstract review because they did not meet inclusion criteria. In total 52 articles were included for full-text review. Of the 52 full-text articles, 45 were removed based on the exclusion criteria (Fig. 1). Therefore, we report on five studies regarding PTSD following PPH, which are summarized in Table 1, and two studies regarding PTSD following postpartum hysterectomy as a treatment of PPH, which are summarized in Table 2. Due to heterogeneity of study designs, methods and results of the included citations we concluded that performing a meta-analysis would not be feasible.

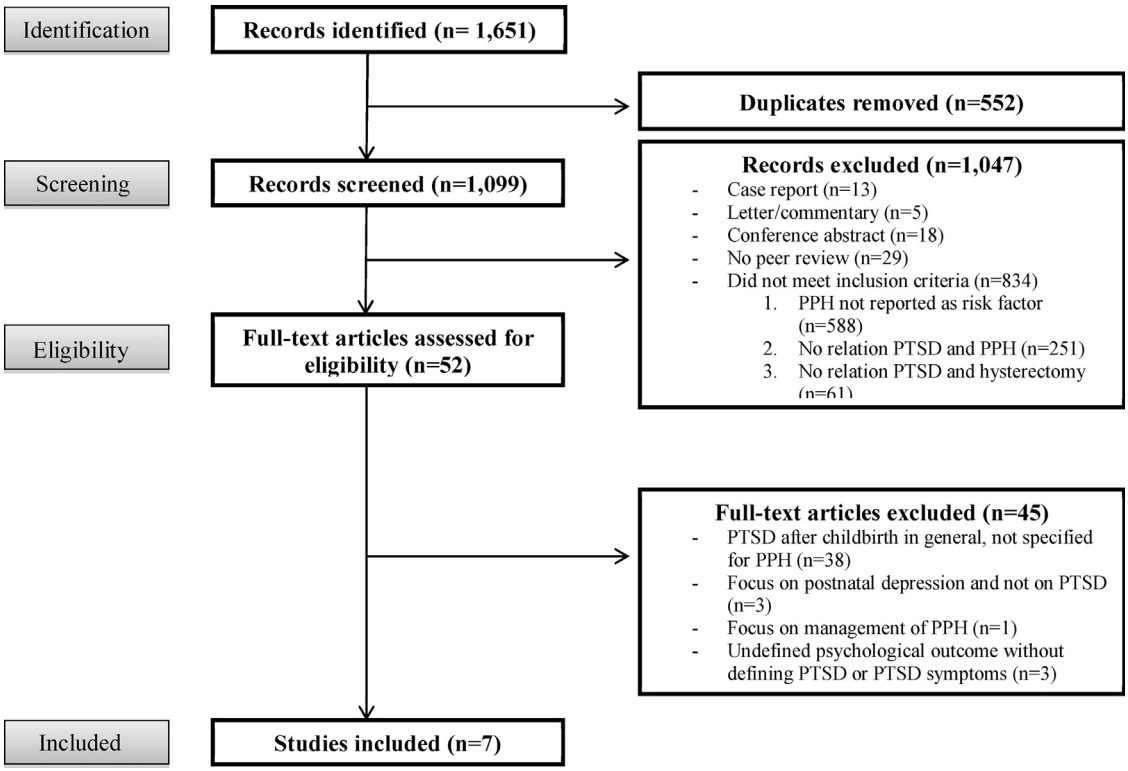


Fig. 1. Article selection process.

PTSD or posttraumatic stress symptoms following PPH

Five studies were included in the systematic review (Fig. 1) [16,25–28]. Study characteristics are presented in Table 1. All studies were published between 2011 and 2017. Study countries included the following: Great Britain (Thompson et al. [26]), the Netherlands (Stramrood et al. [25]), Australia and New Zealand (Furuta et al. [27]) and France (Ricbourg et al. [28], Sentilhes et al. [16]). Study population sizes ranged from 17 to 167 women. Studies were designed prospectively (Thompson et al. [26], Furuta et al. [27], Sentilhes et al. [16]) or retrospectively (Stramrood et al. [25]) and one is a pilot study (Ricbourg et al. [28]).

Screening for PTSD was done at different time points, varying from one week to one year postpartum (Table 1) [16,25–28].

PPH was defined differently by all studies; Thompson et al. [26], Furuta et al. [27], and Ricbourg et al. [28] defined severe PPH as ≥1500 mL of blood loss or a drop in haemoglobin levels. Stramrood et al. [25] defined a PPH as ≥1000 mL of blood loss. Sentilhes et al. [16], defined PPH as mild (≥500 mL) or moderate (1000 mL). Sentilhes et al. [16], also evaluated the risk of PTSD after previous PPH or after a haemoglobin level of less than 9 g/dl (5·6 mmol/L) postpartum (Table 1). PTSD was defined in a variety of measures and cut-offs. Furuta et al. [27], Ricbourg et al. [28], and Sentilhes et al. [16] used the Impact of Event Scales (IES-R), a 22-item self-report measure that assesses subjective distress caused by a traumatic event. The IES-R yields a total score (0–88) and subscale scores can be calculated for Intrusion, Avoidance and Hyperarousal. Used cut-offs varied from ≥20 to ≥30. Stramrood et al. [25] and Sentilhes et al. [16]used the Traumatic Event Scale (TES-B), a 23-item questionnaire that was designed especially for diagnosing PTSD following childbirth in accordance with the DSM-IV, covering criterion A to F. Cut-offs varied. Stramrood et al. [25] defined PTSD when all criteria (A-F) were met. Sentilhes et al. [16] defined PTSD if a respondent reported at least one of five symptoms of criterion B, three of seven symptoms of criterion C, and two of five symptoms of criterion D. If the symptoms were present for at least one month, criterion F was met; if the woman rated the degree to which her life was affected by the symptoms greater than 5 on a 10-point scale, criterion G was met. Thompson et al. [26] used the PTSD Checklist for DSM-IV (PCL), a 17-item self-report measure that assesses the DSM-IV symptoms of PTSD, this can yield a total score ranging from 17 to 85, using a cut-off of ≥44 (Table 1).

Results varied between studies. Thompson et al. [26] found no significant correlation between PPH and PTSD. Stramrood et al. [25] found a significant correlation in their univariate analysis, but this correlation disappeared in their multivariate analysis. Furuta et al. [27] found a significant correlation for certain symptoms of PTSD (intrusion, avoidance), but not for a complete diagnosis of PTSD. A significant correlation between PPH and PTSD one month postpartum was found in the pilot of Ricbourg et al. [28], but after three months this significance disappeared. Sentilhes et al. [16] reported that in multivariate analysis, haemoglobin levels of less than 9 g/dl (5·6 mmol/L) and previous PPH were associated with PTSD according to the TES and IES. They found no association between blood loss ≥500 mL or ≥1000 mL and PTSD (Table 1).

PPH followed by emergency hysterectomy and the risk of developing posttraumatic stress symptoms or PTSD

Two studies assessed PTSD or PTSD symptoms after an emergency hysterectomy for treatment of PPH [29,30]. Study characteristics are presented in (Table 2). Participants were included in France (Michelet et al. [30]) and in the United States of America (De la Cruz et al. [29]). Both studies are retrospective cohort studies. Study sample sizes ranged from 44 to 74 women. In the study of Michelet et al. [30], screening was done at a median of 26·5 months. De la Cruz et al. [29] performed screening at a mean of 3·91 years after the delivery.

Both studies classified emergency hysterectomy after severe PPH as a risk factor.

Table 1
Characteristics of the studies included in the systematic review regarding PTSD after PPH.

Authors	Design	Site	Size and follow-up (N =) *	Response rate	Definition of PPH (data source)	Type of PTSD- measurement	Time of measurement	Results*
Thompson et al. [26]	Prospective cohort	Multi centre (N = 17)	P: 167 C: 0	81	Primary PPH (≥1500 mL), fall in haemoglobin level <5.0 mmol/L or drop of >2.0 mmol/L	17-item PTSD Checklist = PCL questionnaire (cut-off >44)	2 and 4 months postpartum	Risk of PTSD after PPH similar to general postpartum population.
Stramrood et al., [25]	Retro-spective cohort	Multi centre (N = 6) and midwifery practice (N = 4)	P: 428, P with PPH: 34 C: 0	47	PPH (≥1000 mL) (self-reported)	Traumatic Event Scale-B questionnaire (cut-off: to meet all criteria A-F)	2–6 months postpartum	Multivariate: no association between PPH and PTSD, univariate: association between PPH and PTSD
Furuta et al. [27]	Prospective cohort	Single centre	P: 147 P with PPH: 73 C: 1677	53	Major obstetric hemorrhage (1500 mL or more), (clinical records)	Impact of Event Scale PTSD symptoms questionnaire 'intrusion'(cut-off ≥), 'avoidance' (cut-off ≥20)	6–16 weeks postpartum	Higher risk of intrusion (p = .023, adjusted OR = 2.11) and avoidance (p < 0.001, adjusted OR = 3.28) among patients
Ricbourg et al. [28]	Prospective cohort (pilot study)	Single centre	P: 30, C: 30 PP: 30, CP: 30 3 months: P: 17, C: 17, PP: 13, CP: 9	85	Severe PPH (mean 1440 mL, range 500–3700 mL) (clinical records)	Impact of Event Scale-revised questionnaire (cut-off ≥ 30)	1 and 3 months postpartum	Higher incidence of PTSD after PPH. 1 month: p = .08 Partners p = .02 3 months: p = .47
Sentilhes et al. [16]	Prospective cohort	Single centre	P: 549	49,8	Mild PPH (≥ 500 mL) Severe PPH (≥ 1000 mL), postpartum haemoglobin level less than 9 g/dl (5.6 mmol/L), previous PPH (clinical records)	Impact of Event Scale-revised questionnaire (cut-off ≥ 15) and Traumatic Event Scale (cut-off per criterion: *B: ≥ 1 symptoms *C: ≥ 3 symptoms *D: ≥ 2 symptoms *E: ≥ 1 month *F: ≥ score 5)	12 months	Multivariate: Mild PPH (≥ 500 mL) no association between PPH and PTSD Severe PPH (≥ 1000 mL) no association between PPH and PTSD Postpartum haemoglobin level less than 9 g/dl Associated with PTSD (aOR 2.7, 95% CI 1.0–7.5) Previous PPH Associated with PTSD (aOR 5.3, 95% CI 1.3–21.4)

*P = patients, C = controls, PP = partners of patients, PC = partners of controls.

Table 2
Characteristics of the studies included in the systematic review regarding PTSD after emergency hysterectomy due to PPH.

Authors	Design	Site	Size and follow up (N =)*	Response rate	Maternal morbidity type (data source)	Type of PTSD-measurement	Period/time of measurement	Results*
Michelet et al. [30]	Retrospective cohort	Single centre	P: 44	80	Emergency hysterectomy due to severe postpartum hemorrhage (clinical records)	Impact of Event Scale-Revised (cut-off ≥30)	Median 26.5 months (range 3 months to 8 years)	P: 64% ≥ 30 P: 50% psychological help because of the symptoms C: no data
de la Cruz et al. [29]	Retrospective cohort	Multi centre	P: 74 C: 335	Unknown	Peripartum emergency hysterectomy (online survey)	Post-Traumatic Stress Disorder Symptom scale (17-item, 4 point Likert scale)	P: mean time 3.91 years C: mean time 1.63 years (p < .001)	Time of survey P: 40.5% PTSD C: 8.9% PTSD Adjusted OR 15.48 [95%CI = 6.23–38.46]) Recalling six months postpartum P: 77.2% PTSD C: 7.1% Adjusted OR 55.82 [95% CI = 19.65–158.60])

*P = patients, C = controls.

Michelet et al. [30] used the IES-R as a measurement for PTSD with a cut-off ≥30 and only screened patients, not controls. De la Cruz et al. [29] used the Posttraumatic Stress Disorder Symptom Scale (PSS), a self-report instrument with a 17-item questionnaire on three dimensions of PTSD: re-experiencing, avoidance and hyperarousal. A cut-off of ≥15 was used as a positive screen for PTSD (Table 2).

Michelet et al. [30] found a PTSD prevalence of 64% in patients, but did not screen for controls. Fifty percent of the participants received psychological help because of their complaints. De la Cruz et al. [29] found a significant correlation between PTSD and emergency hysterectomy (OR 15·48 [95% CI = 6·23–38·46) (Table 2). Meta-analysis was not possible due to the heterogeneity in these studies.

Discussion

In this systematic review we reviewed the available data on the association between PPH with or without emergency hysterectomy and PTSD or posttraumatic stress symptoms.

Five studies made an attempt to find the association between PPH and PTSD. Most of these studies lack elements of proper design. One study used a retrospective design, four studies had a small sample size and study designs in these studies varied widely. Three of the included studies reported no association between PPH and PTSD. Two studies reported a higher chance of developing PTSD or PTSD symptoms after PPH. To summarize, results are inconclusive. Although the results are inconclusive, the clinical experience is that women perceive PPH as traumatic and as a feeling of slowly bleeding to death. Due to the low number of papers and varied design and quality, the reviewed literature shows no clear evidence that PPH is a risk factor for developing PTSD related to childbirth. It should be noted that definitions of the severity of PPH differed between studies, with cut-offs varying between 500 mL and above 1500 mL. One can imagine that the impact of 500 mL of blood loss on the clinical and psychological status of a patient is different than the impact of blood loss above 1500 mL. This may contribute to finding inconclusive results.

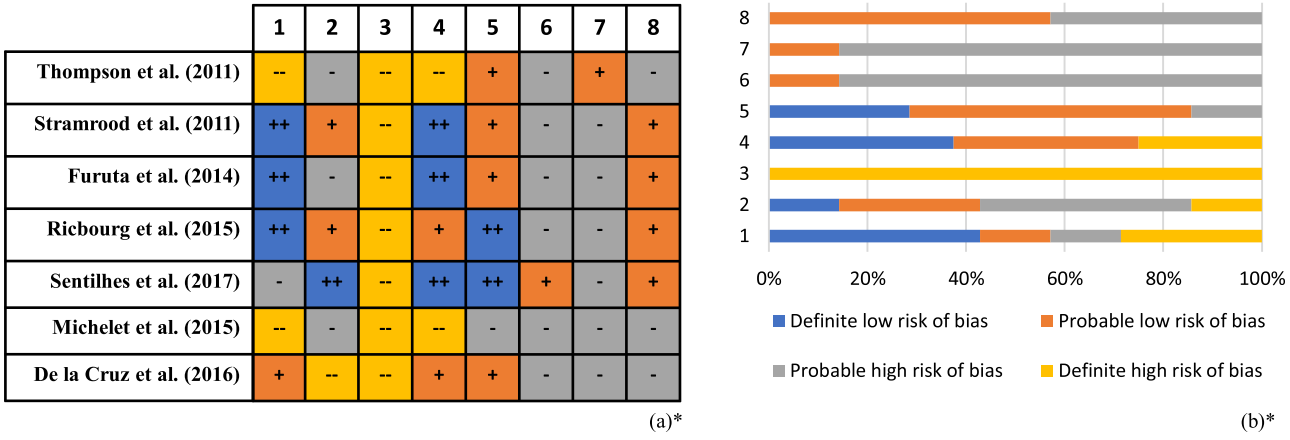
With regard to studies on emergency hysterectomy necessary to control hemorrhage, only two studies evaluated the risk of PTSD. One study found a significant difference in PTSD rates between patients and controls. The other study found that 64% of the patients met the criteria for PTSD, but this was not compared to a control group. Based on the existing literature, this percentage of patients meeting the criteria for PTSD after emergency hysterectomy is much higher than in the normal postpartum population. This seems to suggest there likely is an association between emergency hysterectomy and PTSD or posttraumatic stress symptoms.

For this review a quality assessment was performed according to the Cochrane tool to Assess Risk of Bias in Cohort Studies [31] (Fig. 2). All included studies used a wide variety of questionnaires and tools to define PTSD. All used tools (IES, IES-R, PCL, TES and PPS) are self-report questionnaires, which, in itself, is a major limitation. Also, the gold standard to diagnose PTSD is the Clinician Administered PTSD Scale for DSM-IV (CAPS-5), which none of the included studies used. Moreover, most studies were published before the DSM-5 was introduced, which means the criteria for PTSD according to the DSM-IV were used.

The study of Thompson et al. [26] is of low quality. Although it has the strength of being a multicentre, prospective cohort study with a large sample size, limitations of the study are the use of a general postpartum population as a control group, the over-representation of highly educated women in the cohort and possible bias from the observer effect. Also, participating hospitals may have provided greater support to women experiencing PPH as a result of being under study.

The study of Stramrood et al. [25] is of moderate quality. A major strength of this study is its sample size. The retrospective nature of this study is one of the major limitations, as women with pre-existing PTSD could not be identified, and thereby hinder 'clean' analysis of the problem under investigation.

The study of Sentilhes et al. [16] is of moderate quality. Major strengths of this study are its prospective design, large cohort and long-term follow-up. Also, the assessment of exposure and adjustment and assessment of prognostic factors are strengths. Similar to the previous study, participants with pre-existing



* Index
1. Was selection of exposed and non-exposed cohorts drawn from the same population?
2. Can we be confident in the assessment of exposure?
3. Can we be confident that theoutcome of interest was not present at start of study?
4. Did the study match exposed and unexposed for all variables that are associated with the outcome of interest or did the statistical analysis adjust for these prognostic variables?
5. Can we be confident in the assessment of the presence or absence of prognostic factors?
6. Can we be confident in the assessment of outcome?
7. Was the follow-up of cohorts adequate?
8. Were co-interventions similar between groups?

Fig. 2. Assessment of risk of bias (31). (a) Summary of risk of bias for each trial; double plus sign: definite low risk of bias; plus sign: probable low risk of bias; minus sign: probable high risk of bias; double minus sign: definite high risk of bias. (b) Risk of bias graph about each risk of bias item presented as percentages across al included studies.

psychological histories or PTSD were not identified, and thus not excluded.

The study by Furuta et al. [27], is of moderate quality. Furuta et al. [27] performed an analysis where different types of maternal morbidity were combined. Therefore, it was not possible to determine whether experiencing severe PPH itself resulted in a higher risk of developing PTSD symptoms such as 'intrusion' and 'avoidance'.

Ricbourg et al. [28] reported the results of a prospective pilot study, therefore a small sample group is used and no conclusions can be drawn from these results. A larger prospective study is ongoing. The quality of this pilot study is moderate.

Michelet et al. [30] is a study of low quality since they did not compare their outcomes with control patients and the study group is small.

The study of De la Cruz et al. [29] is of moderate quality and a strength is the use of a specific statistical method (Monte Carlo simulation and propensity score matching) to control for multiple confounders. However, there are several limitations. Firstly, the cause of emergency hysterectomy was not specified. Secondly, the sampling method was performed only in online communities and therefore may not be generalisable, as participants elected to join internet groups for support. Participants were asked to recall their emotional state during labor at six months postpartum, therefore at high risk for recall-bias. The authors did not report on any pre-existing PTSD, which is another limitation regarding the high percentage of PTSD in the non-exposed group (Fig. 2).

This systematic review has several strengths. As required by standard procedures in systematic reviews, the search strategy was extensive and reproducible. We defined strict eligibility criteria and therefore kept bias risk to a minimum. Our review provides an up-to-date and complete description of the risk of PTSD or PTSD symptoms after PPH. This study also has several limitations. First of all, performing a meta-analysis was not feasible due to the heterogeneity of study designs, methods and results of the included citations. All of the articles in this review correspond to countries in Europe, Australia and America, and therefore there is a bias in regional representation. The amount of studies that made an attempt to evaluate the risk of PTSD following PPH is limited. The studies discussed here are of insufficient quality to support our hypothesis.

The conclusions drawn in the discussed studies appear too strong considering the study designs and their associated limitations. Based on the results of these studies we cannot conclude that patients who have experienced emergency peripartum hysterectomy have a higher risk of developing PTSD. Although these studies could not substantiate an increased occurrence of PTSD after emergency hysterectomy, the considerable amount of posttraumatic stress symptoms do hint towards an association between emergency hysterectomy and posttraumatic stress symptoms. No clear association was reported between PPH and PTSD in the five studies discussed.

Conclusion

In conclusion, the amount of studies that made an attempt to evaluate the risk of PTSD following PPH is limited. Because of the inconsistent results in the studies discussed we cannot support the hypothesis that experiencing PPH with or without emergency hysterectomy is associated with a higher prevalence of PTSD. Despite the limited available literature, it seems plausible that hysterectomy induces such severe emotional distress that it can cause lasting mental complaints, considering the experience is often described by patients and their partners as very traumatic and considering the additional lost perspective of future pregnancies.

Regarding the high number of women with childbirths complicated by PPH with or without emergency hysterectomy around the world and the impact it can have on the lives of mothers and their partners, it is crucial to gain further knowledge about the risk factors of developing PTSD postpartum in order to adequately prevent or treat this condition. Screening for early PTSD symptoms would allow access to interventions preventing long term mental health problems [32–34]. For future research it is important that severity of PPH is defined and categorized based on the amount of blood loss, as one can imagine that the impact of 500 mL of blood loss differs from the impact of blood loss above 1500 or 2000 mL. Future research would need to focus on evaluating the association between severe PPH with or without emergency hysterectomy and PTSD or posttraumatic stress symptoms in a prospective study design with larger sample size using validated questionnaires or interviews and long-term follow up.

Funding

None.

Contribution to authorship

T.R. Zaat, M.E. van Steijn, J.M. de Haan-Jebbink, M. Olff, C.A.I. Stramrood, M.G. van Pampus, defined as 'all of the authors', had substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work. All of the authors drafted the work critically for important intellectual content. All of the authors approved this version of the review. All of the authors agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Declaration of interests

All authors declare no competing interests.

Acknowledgments

Bert Berenschot, Librarian/information specialist at Medical Library, OLVG Amsterdam.

Roos Steenhuis, Librarian/information specialist at Medical Library, OLVG Amsterdam.

Wieke Heideman, Epidemiologist, OLVG Amsterdam.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at https://doi.org/10.1016/j.ejogrb.2018.04.012.

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