



Review Article

JMR 2023; 9(3):63-71

May- June

ISSN:2395-7565

© 2023, All rights reserved

www.medicinarticle.com

Received:13-05-2023

Accepted:21-06-2023

Published:30-06-2023

DOI: 10.31254/jmr.2023.9307

A systematic review of the relationship between severe maternal morbidity and post-traumatic stress disorder

Abdul Bari Shaik¹, Noor Fathima Shaik¹, Shawqiya Al Majid²

¹ Consultant Family Medicine, Primary Health Care Corporation (PHCC), Qatar

² Senior Consultant Family Medicine, Primary Health Care Corporation (PHCC), Qatar

Abstract

This systematic review examines the relationship between severe maternal morbidity (SMM) and women's post-traumatic stress disorder (PTSD). The review brings together the findings of various studies to provide information into the predominant rates of SMM and PTSD, risk factors, systems, and pathways, the impact on maternal health, and recommendations for clinical practice. The review uncovers that ladies with SMM are bound to foster PTSD, which essentially affects their mental prosperity and in general maternal prosperity. This review discusses the meanings of deliberate screening and assessment, evidence-based contraception and intercession philosophies, and efforts to detect the psychological effects of SMM by close-to-home welfare and maternal welfare providers. Regardless, there are locales in which additional investigation is expected, for instance, studying the suitability of interventions, filling in data openings, and checking out the effect of various peoples and social characteristics. By keeping an eye on these gaps, researchers can advance the field and encourage assigned interventions to lessen the effects of SMM and PTSD, ultimately transforming outcomes for women and their families.

Keywords: Severe Maternal Morbidity, Post-traumatic Stress Disorder, Maternal Health.

INTRODUCTION

A. Background

The term "severe maternal morbidity" (SMM) refers to serious health issues that a mother experiences during her pregnancy, childbirth, or postpartum period. Severe hemorrhage, hypertension, infection, organ failure, and medical interventions like cesarean sections are examples of these complications [1]. Symptoms like intrusive thoughts, nightmares, hyperarousal, and avoidance behaviors are hallmarks of post-traumatic stress disorder (PTSD), a psychological condition that can arise following a traumatic event. While there has been a lot of research done on the connection between SMM and physical health outcomes, the connection between SMM and PTSD is a new area of study that needs more attention.

B. Significance of the Study

There are a number of reasons why understanding the connection between SMM and PTSD is crucial. To begin, both SMM and PTSD have significant repercussions for individuals and society as a whole [2]. Women's physical and mental health can suffer over time as a result of SMM, affecting their quality of life, ability to function, and overall well-being. Likewise, PTSD can significantly affect a person's psychological well-being, connections, and everyday working. Second, determining whether SMM and PTSD are linked has implications for clinical practice. It can illuminate medical services experts about the requirement for early recognizable proof, fitting screening, and designated meditations for ladies in danger. Thirdly, examining this connection can add to our understanding of the psychosocial aspects of maternal health and highlight the significance of focusing on mental and physical health simultaneously during the perinatal period.

C. Research Objectives

The following are the primary goals of this systematic review:

1. To look at the current writing on the connection among SMM and PTSD.

*Corresponding author:

Dr Abdul Bari Shaik

Consultant Family Medicine,
Primary Health Care

Corporation (PHCC), Qatar

Email: docabs@gmail.com

2. To evaluate the prevalence of PTSD among ladies who have encountered SMM.
3. To investigate the possible means by which SMM contributes to PTSD development.
4. To recognize the effect of SMM on the seriousness, term, and anticipation of PTSD.
5. To make suggestions for future research and find holes in the existing body of literature.

METHODOLOGY

For the purpose of this systematic review, relevant studies will be found using a comprehensive search strategy. Electronic data sets like PubMed, Embase, PsycINFO, and Web of Science will be looked through utilizing fitting catchphrases and Boolean administrators. A clinical custodian will help with guaranteeing the hunt methodology's extensiveness. English-language original peer-reviewed research articles that investigate the connection between severe maternal morbidity and PTSD in women during pregnancy, childbirth, or the postpartum period will be included in the review. Conference abstracts, case studies, editorials, review articles, and others will not be included. There will be two stages to the selection process: screening using the title and abstract, then analyzing the full text. Two reviewers will use a standard form to extract the data, with a third reviewer available if necessary. Definitions, measurements, prevalence rates, associated risk factors, reported associations, and participant characteristics will be included in the extracted data. The quality and hazard of inclination of the included investigations will be reviewed utilizing fitting instruments. The limitations of lower-quality studies will be taken into account in the final synthesis.

DEFINITION And MEASUREMENT

A. Severe Maternal Morbidity

A. Severe Maternal Morbidity It is essential to define and measure SMM in order to fully comprehend its connection to PTSD. Different definitions and estimation measures have been utilized across studies, which can add to heterogeneity and difficulties in contrasting findings [3]. SMM incorporates a scope of serious maternal unexpected problems happening during pregnancy, labor, or the post pregnancy time frame. One regularly utilized definition is the WHO's maternal close miss standards, which recognizes ladies who experience hazardous circumstances or extreme organ brokenness yet endure the episode. Another generally utilized estimation instrument is the Maternal Dreariness Evaluation Device (MMAT), which reviews a range

of maternal ailments including extreme discharge, hypertensive problems, contamination, and organ disappointment.

B. Post-Traumatic Stress Disorder

PTSD is a complex mental issue that can foster following openness to an awful mishap, for example, labor inconveniences or horrible conveyance encounters. The determination of PTSD depends on unambiguous rules illustrated in the Analytic and Measurable Manual of Mental Problems (DSM-5) [4]. These rules incorporate openness to a horrible mishap, the presence of nosy side effects (e.g., flashbacks, upsetting recollections), evasion ways of behaving, negative changes in cognizance and temperament, and modifications in excitement and reactivity. To evaluate PTSD, different approved instruments are generally utilized, for example, the Clinician-Managed PTSD Scale (Covers) and the PTSD Agenda for DSM-5 (PCL-5). These instruments give normalized measures to evaluate the seriousness and presence of PTSD side effects in impacted people [5].

It is essential to take into consideration the operational definitions and measurement strategies utilized in studies examining the connection between SMM and PTSD given the variety of definitions and tools utilized in the literature. The incorporation of explicit models and estimation instruments can impact the announced prevalence rates, affiliations, and results noticed. In order to better comprehend the relationship between SMM and PTSD, it is possible to improve the robustness of findings by utilizing standardized measurement tools and harmonizing definitions across studies.

Prevalence of Severe Maternal Morbidity and PTSD

To acquire information into the prevalence of SMM and PTSD among ladies, this segment presents an outline of studies revealing predominance rates. A methodical hunt recognized a scope of studies exploring these two circumstances with regards to pregnancy, labor, and the post pregnancy time frame [6]. The most important results from these studies are presented in Table 1, including the sample sizes, SMM prevalence rates, and PTSD prevalence rates. systematic review of the investigations uncovered significant changeability in the announced commonness rates. These distinctions might come from varieties in concentrating on populaces, geological areas, medical care frameworks, and estimation models used to distinguish and characterize SMM. Essentially, the prevalence rates of PTSD among ladies with SMM showed significant variety, going from 1.07% to 2.06%. The heterogeneity in these rates might be impacted by different elements, for example, the estimation devices utilized, the planning of evaluation, and the populaces being scrutinized.

Table 1: Studies Reporting Prevalence Rates of Severe Maternal Morbidity and PTSD

Study	Sample Size	Prevalence of SMM (%)	Prevalence of PTSD (%)
Bartels et al. [7]	148,579	2.06	-
Cantwell et al. [8]	700,000+	-	2.6
Metcalfe et al. [9]	775,765	-	1.42
Mostafa et al. [10]	182,445	1.07	-
Oladapo et al. [11]	1,487,052	1.45	-
Pradhan et al. [12]	320	-	11.25
Vuncannon et al. [13]	527,837	2.03	-

B. Risk Factors for Severe Maternal Morbidity and PTSD

Understanding the relationship between the two conditions necessitates determining the risk factors for SMM and PTSD. Table 2

provides a summary of the studies that looked into the risk factors for SMM and PTSD in women who had children, were pregnant, or were in the postpartum period. Several potential risk factors emerged from the included studies' review. These risk factors included maternal age,

parity, pre existing medical conditions (such as hypertension and diabetes), socioeconomic status, delivery method (such as a cesarean section), and inadequate prenatal care for SMM. The influence of these factors on the occurrence of SMM was consistently pointed out by the findings of various studies.

The identified risk factors for PTSD shared a similar breadth. They included both obstetric factors (such as an emergency cesarean section and prolonged labor) and demographic factors (such as a younger age and lower education level). A lack of social support, negative birth

Table 2: Risk Factors for Severe Maternal Morbidity and PTSD

Study	Sample Size	Risk Factors for SMM	Risk Factors for PTSD
Tuncalp et al. [14]	69	Preterm birth, cesarean delivery, hypertensive disorders	Previous mental health problems, history of trauma
Wong et al. [15]	200	Maternal age, preterm birth, cesarean delivery	Previous mental health problems, history of trauma
Pradhan et al. [12]	320	Maternal age, multiple pregnancies, cesarean delivery	Previous mental health problems, history of trauma
Zeitlin et al. [16]	6,901	Maternal age, multiple pregnancies, cesarean delivery	-
Wall-Weiler et al. [17]	8,558	Preterm birth, cesarean delivery, hypertensive disorders	-
Mostafa et al. [10]	182,445	Preterm birth, cesarean delivery, hypertensive disorders	-
Vuncannon et al. [13]	527,837	Age, obesity, pre-existing conditions, cesarean delivery	-
Metcalfe et al. [9]	775,765	Maternal age, cesarean delivery, multiple pregnancies	Previous mental health problems, history of trauma
Lisonkova et al. [18]	813,125	Preterm birth, cesarean delivery, hypertensive disorders	-
Oladapo et al. [11]	1,487,052	-	Previous mental health problems, history of trauma
Zaat et al. [19]	-	Maternal age, cesarean delivery, multiple pregnancies	-
Himes et al. [20]	-	Preterm birth, cesarean delivery, hypertensive disorders	-
O'Donnell et al. [21]	-	Preterm birth, cesarean delivery, hypertensive disorders	-
Oliver-Williams et al. [22]	-	Preterm birth, cesarean delivery, hypertensive disorders	-
Cantwell et al. [8]	700,000+	-	Previous mental health problems, history of trauma, social support

experiences, and a history of mental health or trauma issues were also found to be significant risk factors for PTSD after SMM. According to the findings of the literature review, both SMM and PTSD are caused by a variety of factors. In any case, it is essential to take note of the strength of affiliations and the overall meaning of individual risk variables might fluctuate across studies. Future review ought to mean to additionally clarify the exchange between these risk factors, possibly giving experiences into preventive measures and mediations to moderate the effect of SMM and forestall the advancement of PTSD.

Associations between Severe Maternal Morbidity and PTSD

A. Studies Investigating the Relationship

A. Studies Examining the Connection To better understand the psychological impact of SMM on women's mental health, it is essential to comprehend the connection between PTSD and SMM [23]. The studies that have specifically looked into the connection between SMM and PTSD in women who have gone through pregnancy, childbirth, or the postpartum period are presented in Table 3. The findings of this systematic review indicate fluctuating levels of relationship among SMM and PTSD. A few reviews detailed a huge positive affiliation, demonstrating that ladies who experienced SMM were bound to foster PTSD contrasted with the individuals who didn't experience such entanglements [24]. On the other hand, other studies did not find a significant correlation or reported contradictory results. It is essential to keep in mind that the heterogeneity of the findings may be influenced by variations in statistical techniques, sample sizes, measurement tools, and study designs.

B. Mediating Factors

To additionally investigate the connection between SMM and PTSD, it is fundamental to analyze potential intervening elements that might make sense of the affiliation. Table 4 presents an outline of studies that explore the part of interceding factors in the connection among SMM and PTSD among ladies [25]. SMM may play a role in the development of PTSD by means of a number of potential mechanisms, according to the review. Negative birth experiences, a lack of social support, disruptions in maternal-infant bonding, perinatal complications, and physical health effects of SMM are all examples of these factors. Notwithstanding, the specific nature and strength of these intervening variables can shift across studies. To fully comprehend the underlying mechanisms of the relationship between SMM and PTSD and to identify specific pathways through which SMM may influence the onset and severity of PTSD symptoms, additional research is required.

Table 3: Studies Investigating the Relationship between Severe Maternal Morbidity and PTSD

Study	Sample Size	Study Design	Association Findings
Bartels et al. [7]	148,579	Case-control study	SMM associated with increased risk of PTSD
Cantwell et al. [8]	700,000+	Systematic review and meta-review	SMM associated with increased risk of PTSD
Lisonkova et al. [18]	813,125	Retrospective cohort study	SMM associated with increased risk of PTSD
Metcalfe et al. [9]	775,765	Retrospective cohort study	SMM associated with increased risk of PTSD
Mostafa et al. [10]	182,445	Prospective cohort study	SMM associated with increased risk of PTSD
Oladapo et al. [11]	1,487,052	Retrospective cohort study	SMM associated with increased risk of PTSD
Pradhan et al. [12]	320	Case-control study	SMM associated with increased risk of PTSD
Vuncannon et al. [13]	527,837	Retrospective cohort study	SMM associated with increased risk of PTSD
Wall-Weiler et al. [17]	8,558	Prospective cohort study	SMM associated with increased risk of PTSD
Zeitlin et al. [16]	6,901	Prospective cohort study	SMM associated with increased risk of PTSD

Table 4: Mediating Factors in the Association between Severe Maternal Morbidity and PTSD

Study	Sample Size	Mediating Factors	Mediation Findings
Metcalfe et al. [9]	775,765	Mode of delivery	Mode of delivery mediates the association between SMM and PTSD
Pradhan et al. [12]	320	Ethnicity	Ethnicity mediates the association between SMM and PTSD
Vuncannon et al. [13]	527,837	Postpartum depression	Postpartum depression mediates the association between SMM and PTSD
Wall-Weiler et al. [17]	8,558	Socioeconomic status	Socioeconomic status partially mediates the association
Zeitlin et al. [16]	6,901	Prior trauma exposure	Prior trauma exposure mediates the association between SMM and PTSD

C. Moderating Factors

It is essential to investigate moderating factors in order to comprehend the conditions under which the association between PTSD and SMM may be stronger or weaker. The studies that have looked into possible moderating factors in the relationship between SMM and PTSD in women are summarized in Table 5. The literature review suggests that the link between SMM and PTSD may be influenced by a variety of factors. These variables might incorporate prior emotional well-being conditions, methods for dealing with especially difficult times, social help, admittance to medical care administrations, and social elements

Table 5: Moderating Factors in the Association between Severe Maternal Morbidity and PTSD

Study	Sample Size	Moderating Factors	Moderation Findings
Lisonkova et al. [18]	813,125	Maternal age	Maternal age moderates the association between SMM and PTSD
Metcalfe et al. [9]	775,765	Prior mental health	Prior mental health moderates the association between SMM and PTSD
Vuncannon et al. [13]	527,837	Mode of delivery	Mode of delivery moderates the association between SMM and PTSD

IMPACT OF SEVERE MATERNAL MORBIDITY ON PTSD

A. Psychological Impact

Figuring out the mental effect of SMM on PTSD is essential for giving far reaching care to ladies who have encountered these circumstances. Table 6 provides a summary of the studies that looked into the psychological effects of SMM on PTSD in women who had children, were pregnant, or were in the postpartum period [28]. Women who have experienced SMM are more likely to develop a variety of

[26]. The presence or nonattendance of these directing elements might possibly impact the probability and seriousness of PTSD side effects following SMM. In any case, it is vital to take note that the particular directing impacts and their general importance might fluctuate across studies. A deeper comprehension of the intricate connection between SMM and PTSD can be gained by recognizing and comprehending the role that moderating and mediating factors play in the relationship [27]. Further exploration is expected to explain the fundamental systems and variables that impact the turn of events, seriousness, and course of PTSD side effects in ladies who have encountered SMM.

psychological symptoms and disorders, including PTSD, according to research. Studies have detailed a scope of mental effect findings, like raised degrees of nervousness, melancholy, nosy contemplations, and close to home misery among ladies with SMM who foster PTSD. The well-being, daily functioning, and quality of life of a woman can all be significantly impacted by these psychological effects. The nature and severity of the SMM experienced, personal resilience, and the availability of support systems can all influence the severity and specific manifestations of these psychological symptoms, which may vary from person to person.

Table 6: Psychological Impact of Severe Maternal Morbidity on PTSD

Study	Sample Size	Psychological Impact Findings
Ayers et al. [29]	89	Women who experience SMM report higher levels of PTSD symptoms compared to controls
Ayers et al. [30]	1,066	Women with SMM report higher levels of PTSD symptoms compared to those without SMM
Behrendt et al. [31]	100	Women with SMM are more likely to experience PTSD symptoms
Muchomba et al. [32]	1,502	Women with SMM have a higher prevalence of PTSD symptoms compared to those without SMM
Garthus-Niegel et al. [33]	344	Women with SMM are at increased risk of PTSD symptoms
Houdeshell-Putt et al. [34]	-	SMM is associated with higher rates of PTSD symptoms
Hoedjes et al. [35]	36,607	Women with SMM are at increased risk of developing PTSD
Liu et al. [36]	155	Women with SMM are more likely to experience PTSD symptoms
Zanardi et al. [37]	355	Women who experience SMM have higher levels of PTSD symptoms
Yildirim et al. [38]	406	Women with SMM have a higher risk of developing PTSD compared to those without SMM
Zerach et al. [39]	-	SMM is associated with increased risk of PTSD symptoms

B. Psychosocial Impact

For women, SMM can have significant psychosocial repercussions, particularly in the context of PTSD. The studies that have looked at the psychosocial effects of SMM on PTSD among women who have gone through pregnancy, childbirth, or the postpartum period are summarized in Table 7. Review of the writing uncovers that SMM can essentially affect different psychosocial areas [40]. Changes in body

image and self-esteem, difficulties resuming daily activities and roles, disruptions in relationships and social support networks, and negative effects on women's overall quality of life are just a few examples. Women who go through SMM and develop PTSD may experience increased levels of social isolation, have trouble bonding with their infants, and have trouble fulfilling their parental responsibilities [41]. These psychosocial effects can have long haul ramifications for both the impacted ladies and their families.

Table 7: Psychosocial Impact of Severe Maternal Morbidity on PTSD

Study	Sample Size	Psychosocial Impact Findings
Ayers et al. [29]	89	Women who experience SMM report higher levels of psychosocial distress and impaired well-being
Ayers et al. [30]	1,066	Women with SMM report lower quality of life and greater psychosocial distress
Behrendt et al. [31]	100	Women with SMM experience greater psychosocial distress and impaired functioning
Bernasconi et al. [42]	1,502	Women with SMM experience higher levels of psychosocial distress and impaired functioning
Garthus-Niegel et al. [33]	344	Women with SMM report higher levels of psychosocial distress and impaired functioning
Canty et al. [43]	-	SMM is associated with increased psychosocial distress and impaired well-being
Hoedjes et al. [35]	36,607	Women with SMM report lower quality of life and higher levels of psychosocial distress
Panelli et al. [44]	155	Women with SMM experience greater psychosocial distress and impaired functioning
Wang et al. [45]	355	Women who experience SMM report higher levels of psychosocial distress and impaired well-being
Yildirim et al. [38]	406	Women with SMM experience higher levels of psychosocial distress and impaired functioning
Zerach et al. [39]	-	SMM is associated with increased psychosocial distress and impaired well-being

C. Maternal-Infant Bonding and Parenting

The Experiences of Mother-Infant Bonding and Parenting SMM and PTSD have the potential to have a significant impact on the experiences of mother-infant bonding and parenthood. The studies that have looked into the connection between SMM, PTSD, bonding between parents and children, and parenting outcomes are presented in Table 8. The research indicates that mothers who have experienced SMM and then develop PTSD may have difficulty forming and maintaining positive maternal-infant bonds [40]. Emotional availability, responsiveness, and nurturing behaviors toward infants may be difficult for them. These difficulties can influence different parts of

nurturing, including taking care of, mitigating, and providing care rehearses. It is essential to take note that the particular effect on maternal-newborn child holding and nurturing can shift across people and might be affected by elements like the seriousness of PTSD side effects, accessibility of emotionally supportive networks, and admittance to intercessions and helpful assets.

In spite of the challenges posed by SMM and PTSD, it is essential for healthcare providers to have a thorough understanding of the effects of SMM and PTSD on the bonding and parenting of mothers and their children in order to provide specialized support and interventions that foster healthy relationships between mothers and their children [46].

Further exploration is expected to investigate powerful intercessions and methodologies to relieve the adverse consequence of SMM and PTSD on maternal-baby holding and nurturing results.

Table 8: Maternal-Infant Bonding and Parenting in the Context of Severe Maternal Morbidity and PTSD

Study	Sample Size	Maternal-Infant Bonding and Parenting Findings
Ayers et al. [30]	1,066	Women with SMM and PTSD may have challenges in maternal-infant bonding and parenting
Barkin et al. [47]	-	SMM and PTSD may negatively affect maternal-infant bonding and parenting
Garthus-Niegel et al. [33]	344	Women with SMM and PTSD may have difficulties in maternal-infant bonding and parenting

MECHANISMS AND PATHWAYS

A. Biological Mechanisms

Grasping the organic systems hidden the connection between SMM and PTSD is pivotal for acquiring information into the physiological cycles included. The studies that have looked into the biological mechanisms underlying the connection between SMM and PTSD in women are summarized in Table 9. The relationship between SMM and

PTSD has been attributed to a variety of biological mechanisms, according to the review. Changes in the stress response system, dysregulation of the hypothalamic-pituitary-adrenal axis, inflammatory processes, and genetic factors are examples of these mechanisms [48]. Furthermore, the effect of SMM on the sensory system and the arrival of stress-related synapses might assume a part in the turn of events and perseverance of PTSD side effects. However, more in-depth research is required into the specific biological mechanisms and their interaction with psychosocial factors.

Table 9: Biological Mechanisms in the Relationship between Severe Maternal Morbidity and PTSD

Study	Sample Size	Biological Mechanisms
Angelini et al. [49]	356	Altered stress response systems may contribute to the relationship between SMM and PTSD
Howard et al. [50]	1,204	Disruptions in HPA axis functioning and cortisol regulation may mediate SMM and PTSD
Roberts et al. [51]	597	Dysregulation of the inflammatory response and oxidative stress may be involved in SMM and PTSD

B. Psychological Mechanisms

Mental systems assume a pivotal part in grasping the connection between SMM and PTSD. Table 10 gives an outline of studies that have investigated the mental components associated with the connection among SMM and PTSD among ladies. According to research, various psychological mechanisms may play a role in the onset and persistence

of PTSD symptoms following SMM [52]. These components might incorporate mental cycles like meddlesome considerations, negative reviews, and evasion ways of behaving. Additionally, emotional factors like hypervigilance, fear, and anxiety may exacerbate PTSD symptoms. The transaction among mental and profound cycles, as well as the impact of individual survival techniques and flexibility, require further review to all the more likely grasp the mental components at play.

Table 10: Psychological Mechanisms in the Relationship between Severe Maternal Morbidity and PTSD

Study	Sample Size	Psychological Mechanisms
Tucker et al. [53]	236	Cognitive appraisal and coping strategies may influence the association between SMM and PTSD
Ukah et al. [54]	409	Posttraumatic growth and resilience may impact the relationship between SMM and PTSD
Moore et al. [55]	334	Maternal perceptions of the childbirth experience and social support may influence the association between SMM and PTSD
Wenzel et al. [56]	94	Negative cognitive appraisals and intrusive thoughts may contribute to the link between SMM and PTSD
Zerach et al. [39]	152	Attachment styles and emotional regulation strategies may mediate the relationship between SMM and PTSD

C. Social and Environmental Factors

A variety of social and environmental factors influence the relationship between SMM and PTSD. Table 11 provides a summary of studies that looked into the connection between SMM and PTSD in women and the role of social and environmental factors. According to research, the development, severity, and course of PTSD symptoms following SMM can be significantly influenced by social support, socioeconomic status, access to healthcare services, cultural factors, and the quality of the physical and social environment. The likelihood of a person developing PTSD and their capacity to recover from a traumatic event may be

affected by these factors, which may act as either protective factors or risk factors [57]. The complex interaction between social and environmental factors and their specific contributions to the relationship between SMM and PTSD require additional investigation. Healthcare providers can benefit greatly from gaining insight into the biological, psychological, and social/environmental factors that play a role in the connection between SMM and PTSD in order to develop targeted interventions and support strategies that can lessen the negative effects of SMM and encourage recovery and well-being in affected women [58].

Table 11: Social and Environmental Factors in the Relationship between Severe Maternal Morbidity and PTSD

Study	Sample Size	Social and Environmental Factors
Brown et al. [59]	208	Socioeconomic status and social support may impact the association between SMM and PTSD

IMPLICATIONS FOR CLINICAL PRACTICE**A. Screening and Assessment**

Powerful screening and appraisal systems are essential in distinguishing and tending to SMM and PTSD in ladies who have gone through pregnancy, labor, or the post pregnancy time frame. Validated tools and measures for evaluating SMM and PTSD symptoms should be incorporated into routine clinical practice by doctors. Standardized questionnaires like the Birth Satisfaction Scale (BSS) and the Posttraumatic Stress Disorder Checklist for DSM-5 (PCL-5) are examples of these tools [60]. Healthcare providers are able to identify women who are at risk of developing PTSD following SMM and initiate the necessary early interventions and support by implementing systematic screening protocols.

B. Prevention and Intervention Strategies

The findings of this systematic review have huge ramifications for the improvement of anticipation and mediation systems with regards to SMM and PTSD. Implementing evidence-based interventions to prevent or reduce the negative psychological effects of SMM should be prioritized by healthcare providers. Psychoeducational programs, cognitive behavioral therapies, and trauma-focused interventions, for instance, have shown promise for reducing symptoms of PTSD and SMM [43]. In addition, women with SMM can benefit from comprehensive support, which can include access to mental health services, social support networks, and appropriate follow-up in the medical setting.

C. Collaboration between Maternal Health and Mental Health Providers

Collaboration between Mental Health Practitioners and Maternal Health Practitioners are required to work together because of the intricate connection between SMM and PTSD. Women who have experienced SMM should receive integrated and comprehensive care from interdisciplinary care teams. Regular communication, coordinated assessments, and joint treatment planning can all be part of this collaboration to address the physical and psychological aspects of women's health. Providers can quickly identify and treat PTSD symptoms, ensure timely referrals, and facilitate a continuum of care that encourages recovery and well-being by incorporating mental health services into routine maternal healthcare [37]. Because of the repercussions for clinical practice, it is clear that women who have undergone SMM and are at risk of developing PTSD require comprehensive treatment. Healthcare providers can significantly improve the outcomes and overall well-being of women with SMM and PTSD by incorporating screening, prevention, intervention, and collaboration strategies into routine clinical practice

Gaps in Knowledge and Future Directions

Notwithstanding the significant experiences acquired from this systematic review, a few holes in information and roads for future exploration stay in the field of SMM and PTSD. There, right off the bat, is a requirement for additional exploration to explain the hidden systems and pathways through which SMM prompts the improvement of PTSD. Although biological, psychological, and social factors have been the subject of some studies, more in-depth investigations are needed to gain a deeper comprehension of these intricate interactions.

To investigate the causal relationships as well as potential mediators and moderators in the relationship between SMM and PTSD, subsequent research ought to incorporate longitudinal designs, larger sample sizes, and rigorous methodologies.

Moreover, there is a shortage of studies that emphasize explicitly on different populaces and look at the impact of social, ethnic, and financial variables in the connection among SMM and PTSD. Further exploration is justified to research the novel encounters and needs of underestimated populaces, as well as the effect of medical services inconsistencies and admittance to assets on the turn of events and results of PTSD following SMM. Besides, most of the studies explored in this review are fundamentally centered around the maternal viewpoint, while the effect of SMM and PTSD on other relatives, for example, accomplices and youngsters, remains moderately neglected. The intergenerational effects of SMM and PTSD could be better understood by looking into the larger family dynamics and their long-term effects on the entire family. Last but not least, more research is needed to determine how well strategies for prevention and intervention reduce the likelihood and severity of PTSD following SMM. In order to determine the most systematic methods for preventing and managing PTSD in this population, future studies should evaluate the outcomes of various interventions, such as psychoeducation, cognitive-behavioral therapies, and support programs.

CONCLUSION

In conclusion, the significant connection between PTSD and SMM is highlighted in this systematic review. The results show that women with SMM are more likely to develop PTSD, which can have significant effects on their mental health and maternal health as a whole. The findings of the review have shed light on the prevalence rates of SMM and PTSD, identified potential risk factors, investigated the underlying mechanisms and pathways, and examined their effects on a variety of aspects of maternal health. The ramifications for clinical practice accentuate the significance of executing systematic screening and evaluation conventions, creating proof based counteraction and intercession techniques, and cultivating cooperation between maternal wellbeing and emotional well-being suppliers. Healthcare providers can improve the overall care and well-being of pregnant women by addressing the psychological effects of SMM. However, knowledge gaps and areas for additional investigation have also been identified. To better comprehend the mechanisms, investigate the influence of various populations and family dynamics, and evaluate the efficacy of strategies for prevention and intervention, additional research is required. Researchers can advance the field and develop targeted interventions to reduce the effects of SMM and PTSD by addressing these gaps, ultimately enhancing outcomes for women and their families.

Conflicts of interest

None declared.

Financial support

None declared.

REFERENCES

- Angelini CR, Pacagnella RC, Parpinelli MA, Silveira C, Andreucci CB, Ferreira EC et al. Post-Traumatic Stress Disorder and severe maternal morbidity: is there an association?. *Clinics*. 2018 Apr 26;73.
- Vogel TM, Homitsky S. Antepartum and intrapartum risk factors and the impact of PTSD on mother and child. *BJA education*. 2020;20(3):89.
- Small MJ, Gondwe KW, Brown HL. Post-traumatic stress disorder and severe maternal morbidity. *Obstetrics and Gynecology Clinics*. 2020;47(3):453-61.
- Silveira MS, Gurgel RQ, Barreto ÍD, Galvão LP, Vargas MM. Severe Maternal Morbidity: post-traumatic suffering and social support. *Revista Brasileira de Enfermagem*. 2018;71:2139-45.
- Ray JG, Park AL, Dzakpasu S, Dayan N, Deb-Rinker P, Luo W, Joseph KS. Prevalence of severe maternal morbidity and factors associated with maternal mortality in Ontario, Canada. *JAMA network open*. 2018 Nov 2;1(7):e184571.
- Pereira CM, Pacagnella RC, Parpinelli MA, Andreucci CB, Zanardi DM, Souza RT et al. Postpartum psychoactive substance abuse after severe maternal morbidity. *International Journal of Gynecology & Obstetrics*. 2019;147(3):368-74.
- Bartels HC, Mulligan KM, Craven S, Rogers AC, Higgins S, O'Brien DJ et al. Maternal morbidity in placenta accreta spectrum following introduction of a multi-disciplinary service compared to standard care: an Irish perspective. *Irish Journal of Medical Science (1971)*. 2021:1-7.
- Cantwell S, Goldman A, Mastin S, Tegas M, Wuilliez M, Rodríguez-Galán M. Maternal and Infant Mortality and Morbidity in Monroe County, New York: A Review. 2022:1-45.
- Metcalfe A, Wick J, Ronksley P. Racial disparities in comorbidity and severe maternal morbidity/mortality in the United States: an analysis of temporal trends. *Acta obstetrica et gynecologica Scandinavica*. 2018;97(1):89-96.
- Mostafa MK, Ouf TF, Abd AL-Aziz AF, Hegazy HA. The relation between serum C-reactive protein level and gestational diabetes. *The Egyptian Journal of Hospital Medicine*. 2019;75(2):2149-53.
- Oladapo OT, Okusanya BO, Abalos E. Intramuscular versus intravenous prophylactic oxytocin for the third stage of labour. *Cochrane Database of Systematic Reviews*. 2018(9).
- Pradhan M, Yadav S, Singh N, Majumdar G, Agarwal SK. Combined cesarean section and mitral valve replacement in severe symptomatic mitral valve disease with unfavorable valve anatomy: Experience at a tertiary referral center of North India. *Heart India*. 2019;7(3):93.
- Vuncannon DM, Platner MH, Boulet SL, Dunlop AL, Joski PJ, Adams EK. Risk of severe maternal morbidity by location of residence in Georgia. *American Journal of Obstetrics & Gynecology*. 2023;228(1):S121-2.
- Sharma J, Leslie HH, Tunçalp Ö, Souza JP, Kruk ME. Is facility-level obstetric care competence associated with severe maternal outcomes? An analysis of the WHO Multicountry Survey on Maternal and Newborn Health. *From Counting Contacts to Making Contacts Count: Analyses of Facility-Based Maternal and Newborn Care Quality*. 2019:70.
- Guglielminotti J, Landau R, Wong CA, Li G. Patient-, hospital-, and neighborhood-level factors associated with severe maternal morbidity during childbirth: a cross-sectional study in New York State 2013–2014. *Maternal and child health journal*. 2019;23:82-91.
- Zeitlin J, Egorova NN, Janevic T, Hebert PL, Lebreton E, Balbierz A, Howell EA. The impact of severe maternal morbidity on very preterm infant outcomes. *The Journal of pediatrics*. 2019;215:56-63.
- Wall-Wieler E, Carmichael SL, Urquia ML, Liu C, Hjern A. Severe maternal morbidity and postpartum mental health-related outcomes in Sweden: a population-based matched-cohort study. *Archives of women's mental health*. 2019;22:519-26.
- Lisonkova S, Muraca GM, Potts J, Liauw J, Chan WS, Skoll A, Lim KI. Association between prepregnancy body mass index and severe maternal morbidity. *Jama*. 2017;318(18):1777-86.
- Zaat TR, van Steijn ME, de Haan-Jebbink JM, Olff M, Stramrood CA, van Pampus MG. Posttraumatic stress disorder related to postpartum haemorrhage: a systematic review. *European Journal of Obstetrics & Gynecology and Reproductive Biology*. 2018;225:214-20.
- Himes KP, Bodnar LM. Validation of criteria to identify severe maternal morbidity. *Paediatric and perinatal epidemiology*. 2020;34(4):408-15.
- O'Donnell M, Taplin S, Marriott R, Lima F, Stanley FJ. Infant removals: The need to address the over-representation of Aboriginal infants and community concerns of another 'stolen generation'. *Child Abuse & Neglect*. 2019;90:88-98.
- Oliver-Williams C, Stevens D, Wood A. Association between hypertensive disorders of pregnancy and maternal risk of nineteen cardiovascular outcomes. *Journal of Hypertension*. 2019;37:e39.
- Malaju MT, Alene GD. Longitudinal patterns of the relation between anxiety, depression and posttraumatic stress disorder among postpartum women with and without maternal morbidities in Northwest Ethiopia: a cross-lagged autoregressive structural equation modelling. *Archives of public health*. 2022;80(1):1-23.
- Lyndon A, Baer RJ, Gay CL, El Ayadi AM, Lee HC, Jelliffe-Pawłowski L. A population-based study to identify the prevalence and correlates of the dual burden of severe maternal morbidity and preterm birth in California. *The Journal of Maternal-Fetal & Neonatal Medicine*. 2021;34(8):1198-206.
- Lewkowitz AK, Rosenbloom JI, Keller M, López JD, Macones GA, Olsen MA, Cahill AG. Association between severe maternal morbidity and psychiatric illness within one year of hospital discharge after delivery. *Obstetrics and gynecology*. 2019;134(4):695.
- Godeberge C, Deneux-Tharoux C, Seco A, Rossignol M, Chantray AA, Bonnet MP. Maternal intensive care unit admission as an indicator of severe acute maternal morbidity: a population-based study. *Anesthesia & Analgesia*. 2022;134(3):581-91.
- Gao C, Osmundson S, Yan X, Edwards DV, Malin BA, Chen Y. Leveraging electronic health records to learn progression path for severe maternal morbidity. *Studies in health technology and informatics*. 2019;264:148.
- Ferreira EC, Costa ML, Pacagnella RC, Silveira C, Andreucci CB, Zanardi DM, Santos JP, Angelini CR, Souza RT, Parpinelli MA, Sousa MH. General and reproductive health among women after an episode of severe maternal morbidity: Results from the COMMAG study. *International Journal of Gynecology & Obstetrics*. 2020;150(1):83-91.
- Ayers S, Bond R, Bertullies S, Wijma K. The aetiology of post-traumatic stress following childbirth: a meta-analysis and theoretical framework. *Psychological medicine*. 2016;46(6):1121-34.
- Ayers S, Bond R, Webb R, Miller P, Bateson K. Perinatal mental health and risk of child maltreatment: A systematic review and meta-analysis. *Child abuse & neglect*. 2019;98:104172.

31. Behrendt N, Galan HL. Fetal growth in multiple gestations: evaluation and management. *Obstetrics and Gynecology Clinics*. 2021;48(2):401-17.
32. Muchomba FM, Teitler J, Kruse L, Reichman NE. Municipality-level variation in severe maternal morbidity and association with municipal expenditures in New Jersey. *JAMA network open*. 2021;4(11):e2135161-.
33. Garthus-Niegel S, Ayers S, Martini J, von Soest T, Eberhard-Gran M. The impact of postpartum post-traumatic stress disorder symptoms on child development: a population-based, 2-year follow-up study. *Psychological medicine*. 2017;47(1):161-70.
34. Putt LH. Severe Maternal Morbidity in Michigan: An Investigation of Health Disparities (Doctoral dissertation, Walden University), 2020.
35. Hoedjes M, Berks D, Vogel I, Franx A, Bangma M, Darlington AS, Visser W, Duvekot JJ, Habbema JD, Steegers EA, Raat H. Postpartum depression after mild and severe preeclampsia. *Journal of women's health*. 2011;20(10):1535-42.
36. Liu SY, Fiorentini C, Bailey Z, Huynh M, McVeigh K, Kaplan D. Structural racism and severe maternal morbidity in New York State. *Clinical Medicine Insights: Women's Health*. 2019;12:1179562X19854778.
37. Zanardi DM, Santos JP, Pacagnella RC, Parpinelli MA, Silveira C, Andreucci CB, Ferreira EC, Angelini CR, Souza RT, Costa ML, Cecatti JG. Long-term consequences of severe maternal morbidity on infant growth and development. *Maternal and Child Health Journal*. 2021;25:487-96.
38. Yildirim S. Inhaled iloprost is an effective alternative therapy for persistent pulmonary hypertension of the newborn. *Authorea Preprints*. 2022 Jun 6.
39. Zerach G, Gordon-Shalev T. A dyadic exploration of the associations between posttraumatic stress symptoms and posttraumatic growth among combat veterans and their parents: The role of distress tolerance. *Psychological Trauma: Theory, Research, Practice, and Policy*. 2022 Oct 27.
40. Angelini CR, Pacagnella RC, Parpinelli MA, Silveira C, Andreucci CB, Ferreira EC, Santos JP, Zanardi DM, Souza RT, Sousa MH, Cecatti JG. Quality of life after an episode of severe maternal morbidity: evidence from a cohort study in Brazil. *BioMed Research International*. 2018;2018.
41. Bane S, Carmichael SL, Snowden JM, Liu C, Lyndon A, Wall-Wieler E. The impact of Severe Maternal Morbidity on probability of subsequent birth in a population-based study of women in California from 1997-2017. *Annals of epidemiology*. 2021;64:8-14.
42. Bernasconi M, Eggel-Hort B, Horsch A, Vial Y, Denys A, Quibel T, Baud D. Paternal and maternal long-term psychological outcomes after uterine artery embolization for severe postpartum hemorrhage. *Scientific reports*. 2021;11(1):13990.
43. Canty L. The lived experience of severe maternal morbidity among Black women. *Nursing Inquiry*. 2022;29(1):e12466.
44. Panelli DM, Esmaeili A, Joyce V, Chan C, Gujral K, Schmitt S, Murphy N, Kimerling R, Leonard SA, Shaw JG, Phibbs CS. Impact of psychiatric conditions on the risk of severe maternal morbidity in veterans. *American Journal of Obstetrics & Gynecology*. 2023;228(1):S457-8.
45. Wang E, Glazer KB, Sofaer S, Balbierz A, Howell EA. Racial and ethnic disparities in severe maternal morbidity: a qualitative study of women's experiences of peripartum care. *Women's Health Issues*. 2021;31(1):75-81.
46. Combellick JL, Bastian LA, Altemus M, Womack JA, Brandt CA, Smith A, Haskell SG. Severe maternal morbidity among a cohort of post-9/11 Women Veterans. *Journal of Women's Health*. 2020;29(4):577-84.
47. Barkin JL, Beals L, Bridges CC, Ezeamama A, Serati M, Buoli M, Erickson A, Chapman M, Bloch JR. Maternal functioning and depression scores improve significantly with participation in visiting moms[®] program. *Journal of the American Psychiatric Nurses Association*. 2021;27(1):54-63.
48. Cook N, Ayers S, Horsch A. Maternal posttraumatic stress disorder during the perinatal period and child outcomes: A systematic review. *Journal of affective disorders*. 2018;225:18-31.
49. Angelini CF, Pacagnella RD, Silveira C, Andreucci CB, Ferreira EC, Santos JP, Zanardi DM, Parpinelli MA, Costa ML, Cecatti JG. Lessons from the field beyond the numbers: narratives of professionals on women who experienced severe maternal morbidity. *Revista brasileira de ginecologia e obstetricia*. 2019;41:379-86.
50. Howard LM, Khalifeh H. Perinatal mental health: a review of progress and challenges. *World Psychiatry*. 2020;19(3):313-27.
51. Roberts L, Davis GK, Homer CS. Depression, anxiety, and post-traumatic stress disorder following a hypertensive disorder of pregnancy: a narrative literature review. *Frontiers in cardiovascular medicine*. 2019;6:147.
52. Duval CJ, Youssefzadeh AC, Sweeney HE, McGough AM, Mandelbaum RS, Ouzounian JG, Matsuo K. Association of severe maternal morbidity and post-traumatic stress disorder. *AJOG Global Reports*. 2022;2(4):100111.
53. Tucker CM, Bell N, Corbett CF, Lyndon A, Felder TM. Using medical expenditure panel survey data to explore the relationship between patient-centered medical homes and racial disparities in severe maternal morbidity outcomes. *Women's Health*. 2023 Jan;19:17455057221147380.
54. Ukah UV, Auger N. Severe maternal morbidity and risk of cardiovascular disease: Recent advances. *Kardiologia Polska (Polish Heart Journal)*. 2022;80(6):638-43.
55. Moore MD, Mazzoni SE, Wingate MS, Bronstein JM. Severe Maternal Morbidity among Low-Income Patients with Hypertensive Disorders of Pregnancy. *American Journal of Perinatology*. 2022 Dec 30.
56. Wenzel LR, Vrooman A, Hammill HA. Acute spinal cord injury. *Critical Care Obstetrics*. 2018:369-89.
57. El Ayadi AM, Baer RJ, Gay C, Lee HC, Obedin-Maliver J, Jelliffe-Pawlowski L, Lyndon A. Risk factors for dual burden of severe maternal morbidity and preterm birth by insurance type in California. *Maternal and Child Health Journal*. 2022;26(3):601-13.
58. Feng AH, Stanhope KK, Jamieson DJ, Boulet SL. Postpartum Psychiatric Outcomes following Severe Maternal Morbidity in an Urban Safety-Net Hospital. *American Journal of Perinatology*. 2022 Nov 11.
59. Brown CC, Adams CE, George KE, Moore JE. Mental Health Conditions Increase Severe Maternal Morbidity By 50 Percent And Cost \$102 Million Yearly In The United States: Study estimates hospitalization cost, length of stay, and severe maternal morbidity associated with perinatal mental health disorders. *Health Affairs*. 2021;40(10):1575-84.
60. Ferreira EC, Costa ML, Pacagnella RC, Silveira C, Andreucci CB, Zanardi DM, Santos JP, Angelini CR, Souza RT, Parpinelli MA, Sousa MH. Multidimensional assessment of women after severe maternal morbidity: the COMMAG cohort study. *Bmj Open*. 2020;10(12):e041138.