SYSTEMETIC REVIEW ARTICLE

Evidence-based interventions being done to reduce maternal mortality and morbidity across the world and in India: A Systematic Review

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ABSTRACT

Background: Maternal mortality remains a global concern, with 260,000 women dying in 2023 due to pregnancy-related causes. The majority of deaths occur in low- and middle-income countries, particularly in sub-Saharan Africa and South East Asia. While preventable, almost 700 women died daily from preventable causes related to pregnancy and childbirth in 2023. **Aim**: This article aims to review evidence-based interventions at both the community and clinical levels that have effectively reduced maternal mortality and morbidity globally, focusing on India. **Methods:** The review followed Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. A literature search was conducted using PubMed, Embase, and Cochrane Central Register of Controlled Trials. Inclusion criteria encompassed randomized controlled trials (RCTs) published in English from 2003 to 2023, focusing on interventions specifying types and durations. Exclusion criteria included unclear interventions, success reports over 20 years old, and interventions with more than 2 arms. **Result:** Among 26 selected clinical trials, diverse objectives, methods, and participant characteristics hindered formal meta-analysis. Most trials focused on hospital-based interventions, with pharmacological and non-pharmacological interventions showing efficacy. Risk of bias analysis revealed common uncertainties and challenges, particularly in blinding and participant/investigator accessors. Interventions to reduce maternal mortality and morbidity: Trials assessed pharmacological interventions such as Tranexamic acid, Misoprostol, Carbetocin, and others, alongside non-pharmacological interventions like uterine massage and nutritional management. While most interventions were effective, some studies reported non-significant differences. Risk of bias was present, emphasizing the need for rigorous methodologies. **Conclusion:** The review underscores the success of interventions in reducing maternal mortality and morbidity globally, with most trials conducted in low- and middle-income countries. Findings highlight the effectiveness of various interventions, from drugs like Tranexamic acid to community-based initiatives. The results suggest the feasibility of reducing maternal mortality by identifying underlying factors and implementing evidence-based interventions, emphasizing the importance of both clinical and community-level approaches.

KEYWORDS

Evidence-based, Hypertension, Intervention, Maternal Mortality, Morbidity

INTRODUCTION

Global maternal mortality remains alarmingly high even today. WHO data reports that in the year 2023, about 260,000 women died due to pregnancy and childbirth related causes worldwide. Out of all the maternal deaths, around 92% occurred in low- and middle-income countries. The sub-Saharan Africa and the South East Asian region are the major contributors and account for 87% (253,000) of the total maternal deaths. Most of these maternal deaths are preventable and almost 700 women died every day of preventable causes related to pregnancy and childbirth in 2023.(1)

Maternal death is defined as “the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes.” (ICD-10). (1) Majority of the maternal deaths

occur due to complications arising from severe bleeding or haemorrhage (27%), hypertension (pre-eclampsia and eclampsia) (14%), sepsis (10.7%), unsafe abortion (7.9%), and other direct and indirect causes.(2)

Apart from mortality, diseases and complications arising as a result of pregnancy and childbirth are important contributors to maternal morbidity. Each maternal death is accompanied by 100 women experiencing severe obstetric morbidity, receiving a critical diagnosis, or undergoing a life-saving procedure during their hospitalization for delivery. Severe morbidity also presents a significant risk to health and overall wellbeing of women.(3)

Governments, the World Health Organisation, UNICEF, and other organisations worldwide have made numerous attempts to provide high-quality care and other interventions. This has resulted in a decline in the Maternal Mortality Ratio over the last 20 years which has reduced by 70% in Eastern Europe, 67% in South East Asia and by about 34% worldwide between 200 and 2020.(1)

The SDG 3 which sets a goal to ensure healthy lives and promote well-being for all has kept the Target 3.1 to reduce the maternal mortality ratio to less than 70 per 100,000 live births by the year 2030.(4) The member countries are committed to achieve the target by adopting several strategies like community level intervention packages and improving antenatal, intrapartum and post-partum care.

Inclusive national strategies to reduce maternal mortality must incorporate medical interventions, as they are crucial. This involves directing high-risk individuals to receive urgent, life-saving medications and medical procedures at hospitals and clinics. A comprehensive nationwide initiative targeting maternal mortality should encompass assistance for interventions at both clinical and community levels. In this article, we review evidence-based interventions at the community and clinical level that have been effective in reducing maternal mortality and morbidity in India and across the world.

MATERIAL & METHODS

This review used the guidelines for Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (5). A comprehensive literature search for relevant articles was carried out from PubMed, Embase, and Cochrane Central Register of Controlled Trials. The following accessible terms were used for electronic searching: "maternal mortality," "morbidity," "interventions," and "randomized controlled trials. The last search was carried out on the 10th of September (Figure **1**).

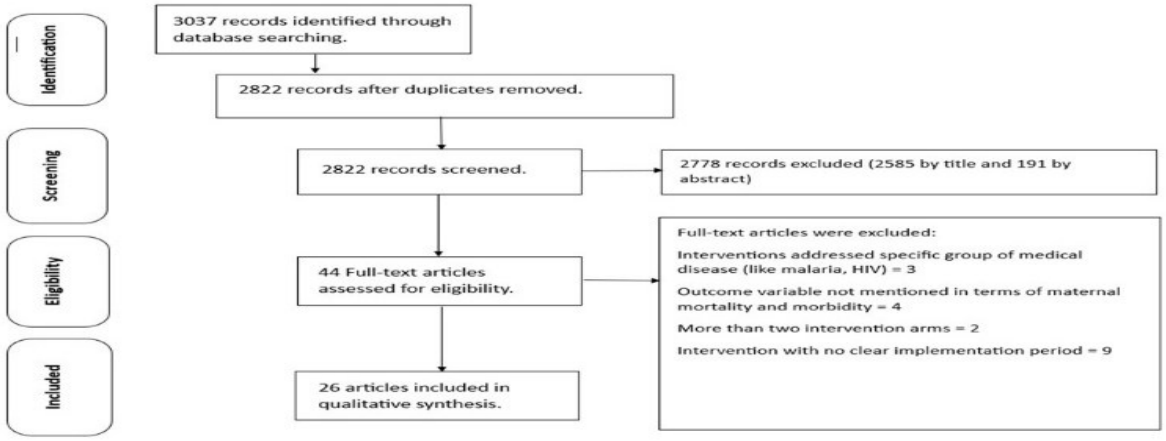
Inclusion criteria: We included only randomized controlled trials (RCTs) reported from different parts of the world, including India, published in the English language within the past 20 years (i.e., from 2003 to 2023). The decision to start in 2003 was arbitrary and based on the need to review recent data. We included in the analysis only articles that clearly specified types of interventions and duration of implementation and used either maternal mortality or maternal mortality ratio (MMR).

Exclusion criteria: We excluded articles reporting drug and procedural interventions addressing unique communities (like refugees and prisoners) and individual medical conditions arising from causes other than obstetrics or gynecology during pregnancy, like malaria, dengue, and already-diagnosed HIV. Articles having unclear interventions or implementation period or success stories over 20 years were also excluded. Interventions having more than 2 arms were also excluded. Those articles with restricted uses or copyright issues were also excluded after waiting for a response for one month from the time of contact with the author.

Quality and risk of bias assessment: The authors (PK and AC) identified the articles, imported them into Microsoft Excel, removed the duplicates, examined the titles, then abstracts, and retrieved the full text of relevant abstracts for further assessment. Two authors (PK and SP) independently assessed full texts for inclusion in the review and completed the data extraction form for those that were eligible for inclusion. Uncertainties were resolved through discussions (PK, AC and AK). The risk of bias in the included studies was assessed on the basis of "Cochrane Handbook for Systematic Reviews of Interventions" version 6.4. The risks were judged as low risk, unclear risk and high risk along with the reason for the judgement.(6)

Outcome Measures: The outcomes assessed were "maternal mortality" and "morbidity" (in terms of intra-operative blood loss, post-partum haemorrhage, elevation in blood pressure, pre-eclampsia and eclampsia, and haemoglobin level) in pregnant women post intervention in both the arms.

Figure 1: PRISMA flow diagram of the process of identifying and including articles for the systematic review.



RESULTS

The included studies were developed with diverse objectives, used various methods and different statistical techniques, and included participants with different characteristics and were widely distributed among countries. This diversity made formal meta-analysis almost impossible.

This systematic review study included articles with all types of clinical trials with outcomes as "Maternal mortality" as defined by WHO and "maternal morbidity" in terms of intra partum and post-partum haemorrhage, pre-eclampsia, eclampsia, post-partum thrombosis and pregnancy-induced hypertension.

Of the 26 selected clinical trials, ten were double blinded and rest were open label. Most of the literature evaluated the interventions in reducing maternal mortality and morbidity globally as well as in India. Moreover, the publications by countries show that almost all selected articles were published in either low- or lower-middle- or middle-income countries except for one conducted in France and one which included nineteen countries, including some developed nations. Among selected articles, four studies were conducted in Bangladesh, followed by Egypt, Iran, Nigeria, and Multinational with three each (Figure 2) and two in India and most of them were published after year 2010 (Figure 3)

Interventions to reduce maternal mortality and morbidity: Except for three studies that were conducted in the community, the majority of the chosen trials were conducted in hospitals. When comparing one medication as an intervention with a placebo or two medications, pharmacological agents were identified as the significant interventions. Tranexamic acid, carbetocin, oxytocin, syntometrine, dextrose, acetylsalicylic acid, ergometrine, misoprostol, magnesium sulphate, and inhalational oxygen were among the non-pharmacological interventions that were documented. Other non-pharmacological interventions included community-level interventions for pre-eclampsia (CLIP), CRADLE Vital Sign Alert and an education package, condom-catheter uterine balloon tamponade, and training of traditional birth attendants.

The outcomes were measured in terms of "Maternal Mortality" as defined by WHO or maternal morbidity, such as PPH, intrapartum hemorrhage, pre-eclampsia, eclampsia, and post-partum venous thromboembolism (Table 1 and Table 2)

Risk of Bias: The most commonly observed risk of bias which was present in all the studies was Unclear risk due to the absence of sufficient evidence to permit any judgement regarding the risk of bias. Further, a large number of studies were also having high risk of bias as there was no blinding of participants and investigators possible due to the nature of intervention and if it was present, blinding of accessors was not done. Attrition bias was low risk in more than half of the studies as the cause and number of participants lost in follow up was mentioned. **Error! Reference source not found.** demonstrates the risk of bias graph in which each risk is mentioned in terms of low risk, unclear risk and high risk.**Error! Reference source not found.**Figure 5 demonstrates the summary of the authors' judgement about risk of bias for each included study..

Figure 2 Country-wise distribution of the published articles

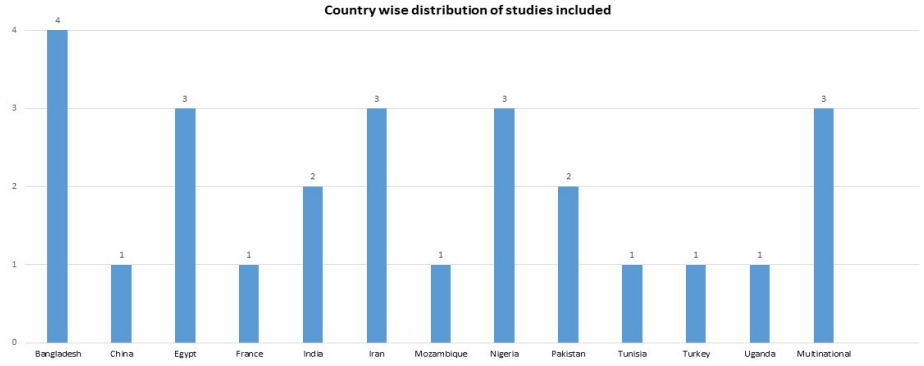


Figure 3 Year-wise distribution of the published articles.

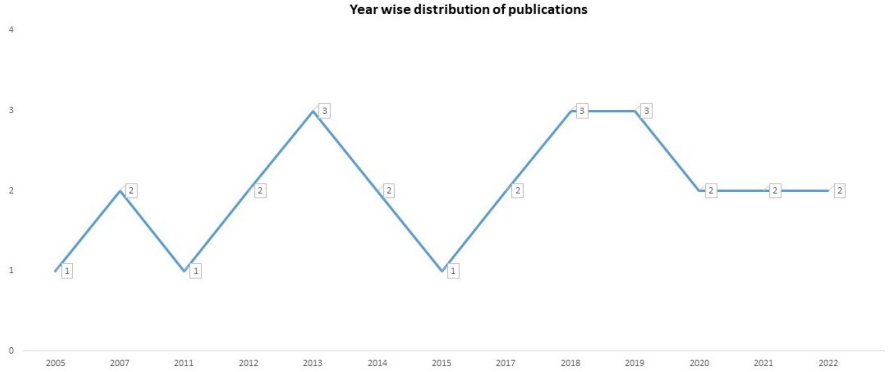


Table 1: Characteristics of the selected studies

Author	Year of study	Year of publication	Country	Sample size	Intervention group	Comparison group	Duration of study (months)	Outcome measure reported			
								Mortality	PPH	IPH	HB
Oseni RO et al.(7)	2017-18	2021	Nigeria	244	Tranexemic acid	Normal Saline	7	-	-	Yes	Yes
Nargis N et al.(8)	2016-17	2018	Bangladesh	120	Tranexemic Acid	Placebo	12	-	Yes	Yes	-
Dhivya Lakshmi SJ et al.(9)	2014-15	2016	India	120	Tranexemic Acid	Oxytocin	12	-	-	Yes	-
Ali MM et al.(10)	2020	2021	Egypt	92	Tranexemic acid	Oxytocin	10	-	Yes	-	-
Ducloy-Bouthors AS et al.(11)	2005-08	2011	France	144	Tranexemic acid	No antifibrinolytic treatment	48	-	Yes	-	-
Zgaya R et al.(12)	2012	2020	Tunisia	211	Misoprostol	Placebo	5	-	Yes	-	-
Tewatia R et al.(13)	2010-11	2014	India	100	Misoprostol	Oxytocin	12	-	Yes	-	-
Akpan U et al.(14)	2015-17	2021	Nigeria	154	Misoprostol	Placebo	24	-	-	Yes	-
Atukunda EC et al.(15)	2012-13	2014	Uganda	1140	Misoprostol	Oxytocin	12	-	Yes	-	-
Ghafoor S et al.(16)	2020-22	2022	Pakistan	100	Misoprostol	Oxytocin	26	-	Yes	-	-
Nahaer MK et al.(17)	2016-17	2018	Bangladesh	100	Carbetocin	Oxytocin	12	-	Yes	Yes	-
Salem MAA et al.(18)	2014-18	2019	Egypt	200	Carbetocin	Oxytocin	48	-	-	Yes	-
Yesmin S et al.(19)	2015	2020	Bangladesh	64	Carbetocin	Oxytocin	6	-	Yes	-	Yes
Samimi M et al.(20)	2011	2013	Iran	200	Carbetocin	Syntometrine	4	-	-	-	Yes
Alalfy M et al.(21)	2019	2021	Egypt	240	Cervical inversion techniques with hemostatic sutures	Only hemostatic sutures	5	-	-	Yes	-
Suhrabi Z et al.(22)	2012-13	2019	Iran	120	Dextrose	Oxytocin	11	-	Yes	-	-
Suhrabi Z et al.(23)	2012-13	2016	Iran	120	Oxytocin with oxygen through face mask	Oxytocin	20	-	Yes	-	-

Erkaya R et al.(24)	2018	2023	Turkey	176	Uterine massage with routine care	Routine care	7	-	Yes	-	-
Lei B et al.(25)	2017-19	2022	China	130	Intraoperative Cell Salvage	Allogenic RBC transfusion	29	-	-	-	Yes
Jago AA et al.(26)	2001-02	2007	Nigeria	510	Ergometrine	Oxytocin	24	-	-	Yes	-
Begum B et al.(27)	2008	2012	Bangladesh	50	Fluid therapy with routine care	Routine care	12	Yes	-	-	-
The Magpie Trial(28)	1998-2001	2007	Multinational	4782	Magnesium Sulphate	Placebo	36	Yes	-	-	-
Sevene E et al.(29)	2015-17	2020	Mozambique	15013	CLIP intervention	Routine care	24	Yes	-	-	-
Vousden N et al.(30)	2016-17	2019	Multinational	536223	CRADLE Vital sign alert	Existing equipments	20	Yes	-	-	-
Anger HA et al.(31)	2016-18	2019	Multinational	2394	Condom-catheter uterine balloon tamponade (UBT)	No UBT	18	Yes	-	-	-
Jokhio AH et al(32)	1998	2005	Pakistan	19557	ANC by trained personnels and use of safe delivery kits	Routine care	6	Yes	-	-	-

Table 2: Percentage of mortality in intervention group and control group in included studies:

Author	Intervention group	Control group	Intervention group mortality %	Control group mortality %
Begum B *et al*	Fluid therapy with routine care	Routine care	0	11.5
The Magpie Trial	Magnesium Sulphate	Placebo	1.1	1
Sevene E *et al.*	CLIP intervention	Routine care	0.2	0.1
Vousden N *et al.*	CRADLE Vital sign alert	Existing equipments	0.7	0.8
Anger HA *et al.*	Condom-catheter uterine balloon tamponade (UBT)	No UBT	11.6	6.7
Jokhio AH *et al.*	ANC by trained personnels and use of safe delivery kits	Routine care	0.27	0.34

Figure 4 Risk of bias graph: review authors" judgements about each risk of bias item presented as percentages across all include studies.

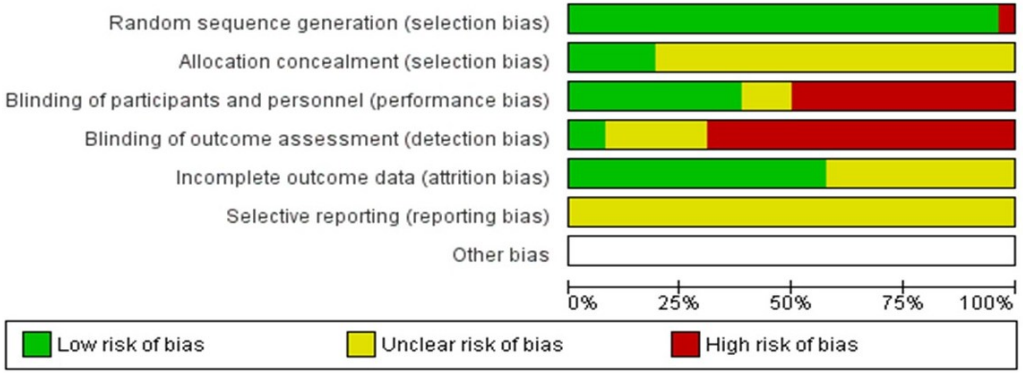
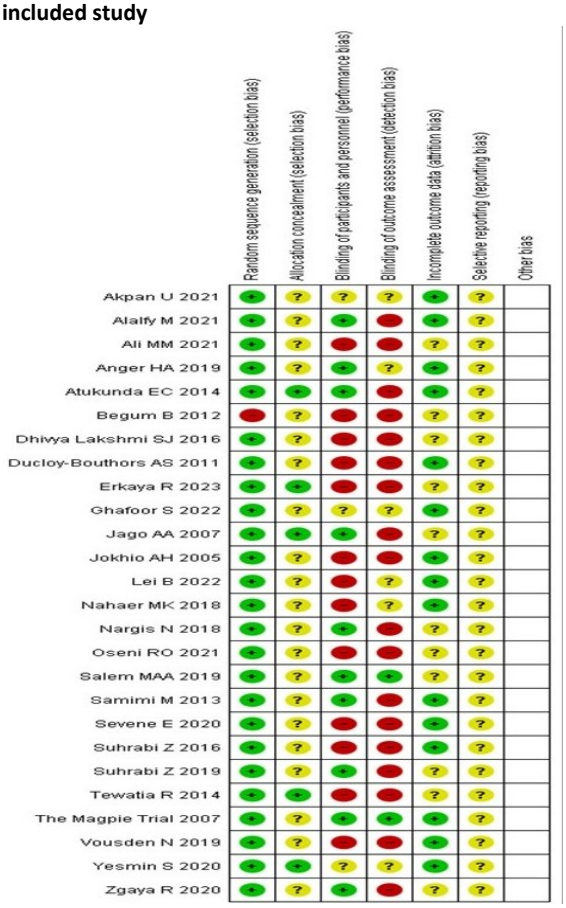


Figure 5 Risk of bias summary: review authors' judgements about each risk of bias item for each included study



DISCUSSION

This study aimed to review and overview different interventions aimed at reducing maternal mortality as well as maternal morbidity in the world and in India. For the purpose of focusing on intervention, only clinical trials were included in the study after going through rigorous scrutiny following inclusion and exclusion criteria.

As per the results of the trials included in this study, various interventions were studied like Tranexamic acid, oxytocin, inhalational oxygen, carbetocin, syntometrine, dextrose, acetylsalicylic acid, ergometrine, misoprostol, magnesium sulfate, modified cervical inversion technique as a tamponade, sustained uterine massage, intraoperative cell salvage, and nutritional management and almost all of them found to effective interventions at reducing mortality and morbidity significant except the study conducted by Yesmin S. et al. (19), Atukunda EC et al. (15), Sevene E et al. (29), and Jokhio HA et al. (32) found the difference to be non-significant.

Tranexemic acid (TXA) as an intervention was used in five out of the 26 included studies to measure its effect on intra partum and post-partum haemorrhage. Dhivya Lakshmi SJ et al (9) and Ali MM et al (10) compared the effect of tranexamic acid with oxytocin and both of the studies concluded that there has been a significant reduction in loss of blood when TXA was used and the reduction was statistically significant in the study conducted by Dhivya Lakshmi SJ et al (9). Oseni RO et al (7) compared the effect of tranexamic acid with normal saline on intra partum haemorrhage and concluded that there was a statistically significant difference in intra operative blood loss in the two groups and the number of participants having blood loss in excess of 1000 ml was significantly less of those receiving tranexamic acid. Nargis N et al (8) compared the effect of Tranexemic acid and placebo on intra and post-partum haemorrhage and reported that blood loss during and after c-section in the patients receiving tranexamic acid was significantly less than those receiving placebo and the difference is statistically significant. Ducloy-Bouthors AS et al (11) compared the effect of Tranexemic acid in women with PPH > 800 mL with no antifibrinolytic treatment and found that bleeding duration was shorter and progression to severe PPH and PRBC transfusion was less frequent in patients receiving Tranexemic acid and the difference was statistically significant.

Apart from Tranexemic acid, Misoprostol as an intervention to reduce intrapartum and post-partum haemorrhage was used in another five of the 26 included studies in the review. Tewatia R et al. (13), Atukunda EC et al (15) and Ghafoor S et al (16) compared the effect of Misoprostol against Oxytocin for prevention of blood loss intra or post-partum. Tewatia R et al. (13) in their study concluded that administration of oxytocin was related to significantly lower mean blood loss post-partum (114.28 ± 26.75 mL) as compared to Misoprostol (149.5 ± 30.78 mL) and was statistically significant with a p value of 0.00. A similar finding was reported by Atukunda EC et al (15) in their study where post-partum blood loss of >500 mL occurred in 17.4% of the participants who were given oxytocin compared to 28.6% of the participants administered with misoprostol and the difference is also statistically significant with a p value of <0.001. In contrast to the findings of these studies, Ghafoor S et al (16) in their study found that misoprostol was effective in prevention of post-partum haemorrhage in 94% participants while oxytocin was effective for the same in 78% participants and the difference was also statistically significant with a p value of 0.021.

Zgaya R et al (12) compared misoprostol with a placebo for prevention of post-partum haemorrhage and found that PPH rate was lower in the group where misoprostol was administered (5.5%) as compared to the placebo group (15%) and the difference between the two was also statistically significant. Akpan U et al (14) also concluded a similar finding on the base of their study that severe PPH (> 1500 mL) was considerably lower when misoprostol was administered, with a statistically significant p value.

Another pharmacological intervention, the administration of Carbetocin, was assessed in 4 of the 26 included studies for reduction in intra-partum and post-partum haemorrhage, and for a smaller reduction in post-partum haemoglobin levels. Three studies by Nahaer MK et al (17), Salem MAA et al (18) and Yesmin S et al (19) compared carbetocin with oxytocin for reduction in intra and post-partum haemorrhage. Nahaer MK et al (17) concluded that there was no massive blood loss, 2% participants required blood transfusion and 4% required

additional uterotonics in the carbetocin group while in the oxytocin group 6% had massive blood loss, 20% required blood transfusion and 36% needed additional uterotonics. All these findings were statistically significant as well. Similar findings were reported in a study conducted by Salem MAA et al (18) in which they found that the mean blood loss was lower (435 ± 290 mL) in the patients given carbetocin as compared to that in those give oxytocin (533 ± 385 mL) and was statistically significant. This study also reported that the post-partum change in haemoglobin concentration was much less in the carbetocin group and it was also statistically significant. Another study, conducted by Yesmin S et al (19) also reported similar findings where post-partum haemorrhage did not occur in any patient who were administered carbetocin but it occurred in 9.4% patients administered with oxytocin. However, the difference was not statistically significant in this study. Samimi M et al (20) compared carbetocin with syntometrine for prevention of postpartum haemorrhage and reported that the mean fall in haemoglobin in carbetocin group (0.41 ± 0.36) was much lower than that in syntometrine group (1.04 ± 0.78) and was also statistically significant with a p value of <0.001.

A study conducted by Suhrabi Z et al (22) compared dextrose as an intervention with oxytocin to reduce post-partum haemorrhage. The findings reported that the amount of bleeding in the first hour was significantly less in the group administered dextrose solution (142.17 ± 61.15 mL) than in the oxytocin administered group (196.27 ± 56.24 mL) with a statistically significant p value of 0.001. Many trials support oxytocin as standard care for the prevention of PPH (33)(34), though this is a subject of further trials on larger participants. Another study by Jago AA et al (26) compared the effect of Ergometrine with that of oxytocin on the blood pressure of normotensive parturients and concluded that ergometrine caused elevation of blood pressure in 52.6% patients while oxytocin in only 11.3% with a statistically significant difference.

Another study conducted to compare the effect of oxygen inhalation plus oxytocin with oxytocin alone on post-partum haemorrhage by Suhrabi Z et al (23) found that the mean blood loss at two hours post-partum was less in the group which was administered inhalational oxygen along with oxytocin as compared to the group which was administered oxytocine alone and the difference was statistically significant. Erkaya R et al (24) conducted a trial in which one group received uterine massage every 15 minutes for 2 hours till the uterus got hardened and it was concluded that the uterine massage group had a mean blood loss lesser than the group without receiving the massage and the difference was statistically significant as well.

Six trials out of the 26 included in this review reported their outcome measure in terms of maternal mortality. Out of these six, three were community-based trials and three were conducted in hospital settings. Begum B et al (27) compared eclampsia patients treated with fluid therapy of 0.9% sodium chloride, 25% glucose, 5% amino acids along with hydrocortisone and regular medications with patients treated with regular hospital management. There was no mortality in the group treated with fluid therapy as compared to 3 deaths among the patients treated with regular hospital management. Another study, The Magpie Trial (28), which was conducted in 33 countries compared magnesium sulphate with placebo for pre-eclampsia. It found that 3.5% women allocated magnesium sulphate died or had serious morbidity related to pre-eclampsia compared with 4.2% women allocated placebo. Anger HA et al (31) conducted a trial to assess the effectiveness and safety of introducing condom-catheter uterine balloon tamponade for postpartum haemorrhage. It was found that maternal death due to PPH or invasive procedures for PPH occurred in 19 women during control period whereas in 37 women in the intervention period. It was concluded that Introduction of condom-catheter UBT in these settings was associated with an increase in the combined incidence of PPH-related surgery and maternal death.

The community-based trials included in this review comprise of a study done by Sevene E et al (29) in which community level interventions for pre-eclampsia (CLIP) were introduced which consisted of community engagement, community health worker-provided mobile health-guided clinical assessment, initial treatment, and referral to facility either urgently (<4hrs) or non-urgently (<24hrs), dependent on algorithm-defined risk. The primary outcome which was a composite of maternal mortality, morbidity, perinatal mortality occurred lesser in the intervention group as compared to the control group. However, the difference was not statistically significant. In an another community based trial conducted by Vousden N et al (30), CRADLE devices replaced the existing equipments in randomly selected clusters. The semiautomated device measures blood pressure and heart rate and calculates shock index (heart rate divided by systolic blood pressure). It was found that there was a 8% decrease in the primary outcome (which was a composite of maternal deaths, eclampsia or hysterectomy) from pre intervention to post intervention and the reduction was also statistically significant with a p value of 0.0056. Another community-based trial conducted by Jokhio AH et al (32) assigned to the intervention group, trained birth attendants, disposable delivery kits and outreach clinics for antenatal care. Maternal mortality in the intervention group was lower (268 per 1 lakh pregnancies) as compared to the people who were provided usual care (360 per 1 lakh pregnancies).

CONCLUSION

In conclusion, lowering maternal mortality and morbidity is still a top concern for global health, requiring a diversified strategy. The necessity of determining and resolving the underlying causes of unfavorable maternal outcomes has been highlighted by our research. We have identified practical insights that can direct policy and intervention initiatives by analyzing the socioeconomic, healthcare access, and systemic challenges that pregnant women experience.

Our review revealed that evidence-based interventions, such as the use of pharmacological agents like Tranexamic acid and Misoprostol, have been effective in reducing intra-partum and post-partum hemorrhage, which are significant contributors to maternal mortality.

Studies have shown that these interventions significantly reduce blood loss and the need for additional medical treatments. Similarly, it has been discovered that carbetocin is superior to oxytocin in preventing postpartum bleeding and lowering postpartum hemoglobin decreases.

Community-based interventions, such as the training of traditional birth attendants and the use of CRADLE devices for monitoring blood pressure and heart rate, have been effective also shown promise. These interventions have led to reductions in maternal mortality and morbidity by ensuring timely and appropriate care for pregnant women. For instance, the introduction of community health worker-provided mobile health-guided clinical assessment has shown a reduction in adverse maternal outcomes.

Furthermore, our findings underscore the importance of integrating these interventions into healthcare systems, especially in low- and middle-income countries where the majority of maternal deaths occur. Programs that address socioeconomic inequality and emphasize women's education and empowerment have been shown to improve maternal health outcomes.

To reduce global maternal mortality to less than 70 per 100,000 live births by 2030, the Sustainable Development Goals (SDGs) call for strengthening health infrastructure, training healthcare staff, and promoting community engagement. In spite of many challenges, our findings demonstrate that reduction in maternal morbidity and mortality is feasible through appropriate use of resources Through the prioritization of evidence-based interventions and the targeting of underlying determinants, stakeholders have the potential to significantly enhance maternal health outcomes globally.

Recommendation

- To prevent and treat PPH, pre-eclampsia/eclampsia, and other major causes of maternal mortality at all levels of care (sub-centre, PHC, CHC, district hospital, tertiary care), national and state health systems should place a high priority on providing universal, timely access to essential, evidence-based interventions.
- To ensure that women with obstetric problems receive definitive care within a specified time limit, referral links should be strengthened.
- Policies should focus on lowering social and geographic disparities in pregnancy outcomes by providing more staff, resources, and community involvement initiatives to high-risk districts or blocks.

Limitation of the Study

One significant limitation is that formal meta-analysis was not possible due to the extreme heterogeneity of the included studies' objectives, settings, participant characteristics, interventions, and outcome measures.

Relevance of the Study

By compiling recent randomised controlled trials on maternal mortality and morbidity interventions from India and other nations, with an emphasis on data from the previous 20 years, this work advances our understanding. It offers a helpful summary of the interventions that seem to be working, the areas where the data are still conflicting, and the areas that require more extensive, thorough trials.

Authors Contribution

All authors have contributed equally.

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Nil

Conflict of Interest

There are no conflicts of interest.

Declaration of Generative AI and AI Assisted Technologies in the Writing Process

The authors haven't used any generative AI/AI assisted technologies in the writing process.

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