



Perceived Stress, Quality of Life and Pregnancy Outcomes Among Women with Hypertensive Disorders of Pregnancy (HDP) And Role of Midwives in It: A Systematic Review

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Article History	Abstract
Received: 06 June 2023 Revised: 05 Sept 2023 Accepted: 01 Dec 2023	<p>Hypertensive disorders during pregnancy are one of the leading causes of maternal & newborn death across the world. Many of the hypertensive antenatal women often end up with admission to ICU due to severe pre-eclampsia and eclampsia, or delivering dead babies of term pregnancy, even if live baby delivered, they mostly admitted to NICU due to respiratory distress and prematurity. Hence, they need continuous educational intervention and follow up by healthcare personnel. And a midwife is the right person for this. Midwives play an important role in encouraging pregnant mothers to adhere to treatment through various education and follow up resulting in safe pregnancy outcome among these mothers. But in Indian scenario in many places the role of midwives are often ignored while managing pregnancy complications. Therefore, current paper aimed to explore the expanded role of midwives in identifying the affected quality of life and its impact on pregnancy outcome among women with HDPs. The empirical research papers of various countries were searched through the electronic databases like Pro-Quest, Embase, Research Gate, Science direct, PUBMED, MEDLINE, CINAHL-EBSCO, web of science, Google Scholar etc and the references were also searched of those primary articles. A total of 15 out of 275 studies including both RCTs, Systematic & narrative review papers were analysed. In this paper 4 relevant points were analyzed, like- perceived stress, quality of life (QOL), pregnancy outcomes and role of midwife in GHTN management in rural India. The research papers on pregnancy outcomes as well as stress and QOL secondary to gestational outcome were plenty, but very less studies were retrieved on role of midwives. Mother's with GHTN has more stress regarding the fetal wellbeing which ultimately affects the quality of life. Interventional studies revealed reduction in stress and improved perinatal outcome secondary to some integrated midwifery management approach. More research on addressing quality of life and exploring the stressors and interventional programs by midwives are recommended to bring solution to this problem. The result of this review can be incorporated into nursing research to empower the women with gestational hypertension to have a positive pregnancy experience.</p>
CC License CC-BY-NC-SA 4.0	Keywords: Gestational Hypertension, Midwives, QOL, Perceived Stress

1. Introduction

Gestational hypertension is still an unsolved problem in many developing countries including India affecting about 7-8 % all pregnancies. Global picture being 12%. This usually appears in the second half of the pregnancy and mostly disappears after the baby is born. But it is not the same case for all

mothers. Various factors which increase the risk of gestational hypertension are: multi-fetal pregnancy, presence of diabetes, excessive weight gain during pregnancy and advanced age of mother.¹

According to “International Society for the Study of Hypertension in Pregnancy” (ISSHP) hypertension in pregnancy can be classified as chronic HTN, gestational hypertension (GHTN), pre-eclampsia (PE)/superimposed on chronic hypertension or white coat hypertension. ISSHP in 2014 defined that any new onset of hypertension with systolic BP ≥ 140 mmHg and/ or diastolic BP ≥ 90 mmHg beyond 20 weeks in patients without any previous record of high BP should be considered as gestational hypertension.²

It is the second in the triad as leading cause to maternal mortality after Obstetrics haemorrhage and sepsis.³ A study conducted on 4,314 pregnant women to establish a relation between psychological stress and chronic hypertension revealed that life time stress, perceives stress increase the risk of pre-eclampsia by 20-fold. This study finding supports the importance of prevention, screening and stress management among those women. ⁴

In continuation to the above study, another group of researchers also suggested that perceived maternal prenatal stress contributes to various adverse pregnancy outcomes including hypertensive disorders if pregnancy. This study uses perceived stress scale on 4161 women. This study also highlights that perceived stress can cause complications years after delivery also. ⁵

Many-times the distress is more among pregnant women with hypertensive disorders when compared to other obstetric complications. The reason could be the sudden change in the maternal and fetal health status and the development of the risk factors for both of them. This is said by Leeners B and group while studying on connection between psychological distress and pregnancy hypertension on 738 women.⁶

Furthermore, there are various risk factors are responsible for progression of gestational hypertension to preeclampsia-eclampsia. However healthy nulliparous women can also be the pray for pre-eclampsia. Though not clear the emerging data suggest that the genetic origin is responsible for development of pre-eclampsia.⁷ An Indian study on incidence and factors affecting gestational hypertension found that the incidence was 7.4% and presence of high LDL level in blood was associated with severity like preeclampsia and LBW babies during delivery.⁸

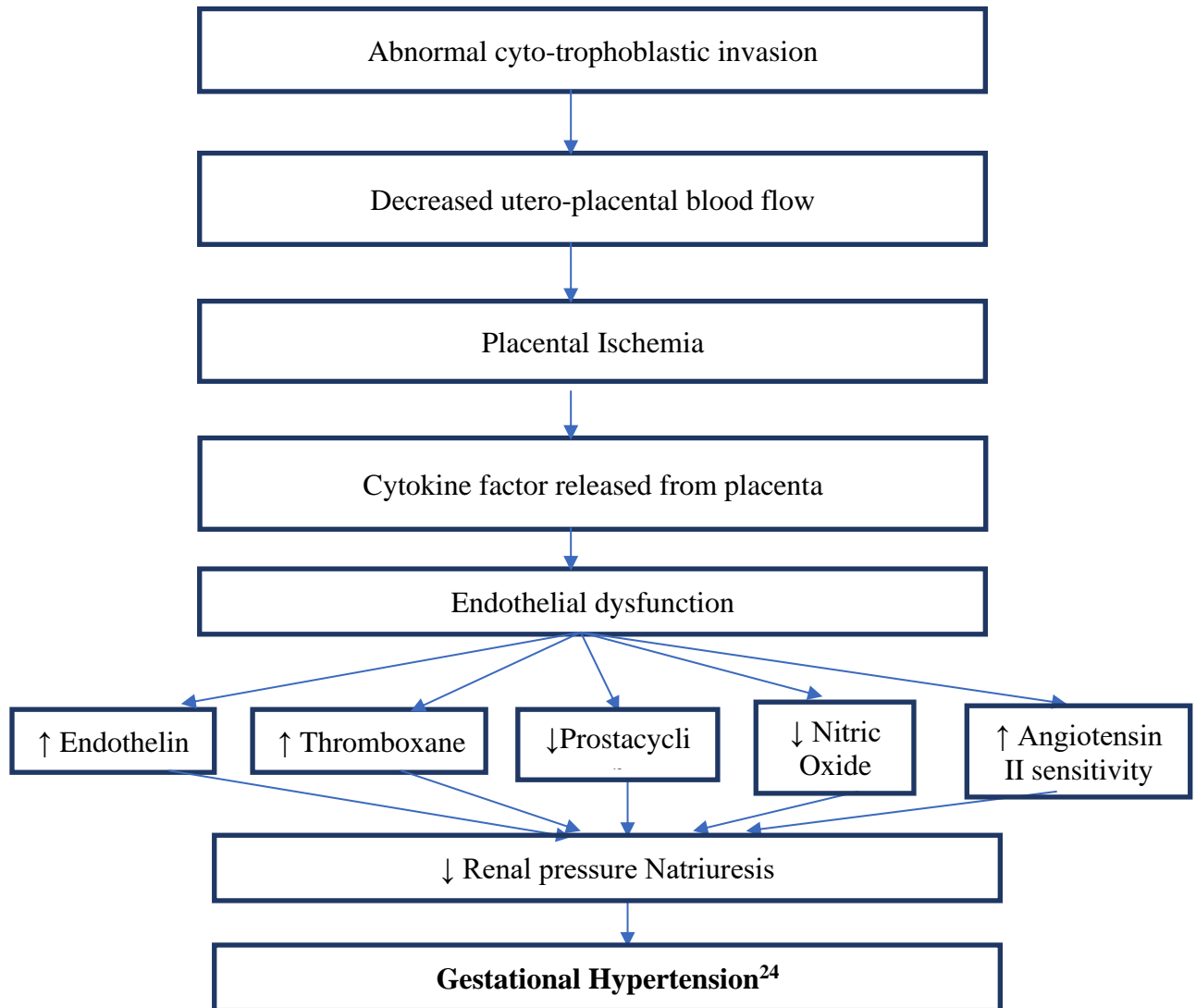
Apart from the problem of perceived stress, the quality of life and quality of sleep is also affected among high-risk pregnancies like pregnancy hypertension. As per a study conducted on women with gestational hypertension and diabetes, the result showed the prevalence of sleep disturbance as 96.4%. hence the study raised the concern regarding the need of training by midwives to improve the sleep quality as well as quality of life. ⁹

A comparative study between the normotensive and hypertensive women conducted to see the effect of hypertension on quality of life. Same study undertook on 194 hypertensive antenatal mothers and 195 normotensive mothers and quality of life was assessed. The result revealed that the hypertensive women got low score on quality of life i.e 17.63. This may be concluded that hypertensive pregnancy highly interferes with quality of life of mothers. ¹⁰

Further a prospective observational study conducted on 112 mothers with pregnancy-related hypertension revealed that the most occurring disorders were preeclampsia/ PE (n=28; 25.23%) and eclampsia (n=48; 43.24%). The study also resulted, common factors associated with maternal complications are placental abruption and PPH (n=31; 27.6%). Similarly, The common risks associated to fetal complications were meconium aspiration syndrome, followed by preterm birth, IUGR, and LBW as well. Therefore, the study emphasized on efforts to made at both level of community and hospital to raise awareness regarding hypertensive disorder of pregnancy (HDP) and reduce its associated morbidity and mortality. This also adds the importance of midwives in management. ¹¹ Additionally the optimum treatment of such pregnant mothers is not possible due to shortage of specialists like obstetricians, anaesthetists, paediatricians and skilled nurses in the remote areas.¹²

There are many treatment protocols and preventive measures available but as far as the success rate of any treatment option is concerned no individual therapy is found hundred percent effective. Hence more steps for preventing gestational hypertension and its progress to pre-eclampsia/eclampsia, among general antenatal population should be taken. The important pillars of such approaches include, close antenatal monitoring of pregnancy and timely delivery to prevent subsequent morbidity and mortality. Therefore, the purpose of this paper is to review extensively about the possibility of integrated management by skilled midwives in rural India for the prevention of complications secondary to gestational HTN and to ensure a safe child birth.

Etiopathogenesis of Gestational Hypertension



(Fig-1 Showing the etiopathogenesis of gestational hypertension)

2. Materials And Methods

This narrative review is based on the analysis of similar articles published in last 5 years i.e 2017-2021. This paper includes both original and review studies from various countries focusing on subjects like perceived stress, quality of life, pregnancy outcome and midwife's role in pregnancy hypertension. The databases searched are pub-med, science direct, research gate, CINAHL-EBSCO, web of science, google scholar and med-line. The mesh-terms for search were 'gestational Hypertension/GHTN', 'pregnancy induced hypertension', 'pregnancy outcome', 'role of midwife', 'educational interventions', 'perceived stress', 'quality of life' in combination with 'randomized control trials', 'narrative reviews', 'systematic reviews. The references of primary articles were searched and analyzed. Three relevant points were identified for analysis like- perceived stress in HDPs, quality of life of women with HDPs, It's effect on pregnancy outcome (Table 1) and role of midwife in GHTN management in rural India. Total 15 studies included (Fig-2). Abundant studies were found on perceived stress, quality of life and pregnancy outcome but a very little got regarding midwives' role in managing HDPs.

Inclusion criteria

1. Research studies directly related to perceive stress, quality of life, pregnancy outcome and midwife's role in pregnancy hypertension.
2. The paper should be freely accessible with full text available in online mode
3. All studies must be in English language
4. Articles of last 5 years (2017-2021) were included.

Exclusion criteria

1. Research papers with no ISSN number
2. Poor quality of publication
3. Only abstract is available
4. Papers published in local language

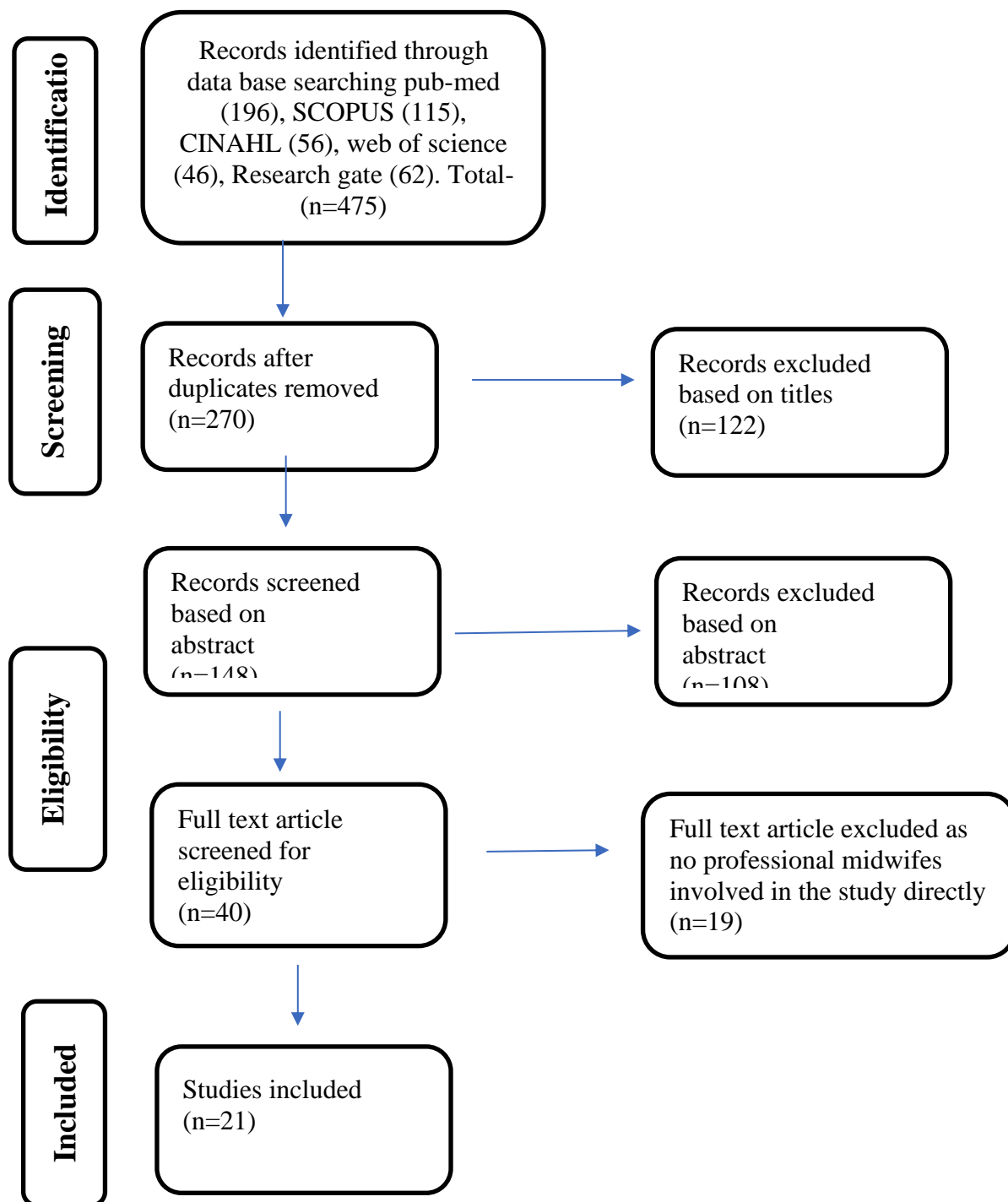


Figure 1: PRISMA flow diagram.

3. Results and Discussion

A total of 475 articles were found from search engines like pub-med (196), SCOPUS (115), CINAHL (56), web of science (46), Research gate (62). Considering the exclusion criteria 205 duplicate articles were rejected, 122 based on title, 108 based on abstract. The retrieved articles were 40 numbers. Next the retrieved articles were screened for eligibility and 19 full text article were removed based on inclusion criteria. Finally, 21 articles were included in this narrative review. The PRISMA flow of the selected article is presented in Figure 1.

Table 1: summary of study characteristics: perceived stress in HDPs

Author & Date	Title of article	Country	Sample details	Result
Chapuis-de-Andrade S etal 2022 [13]	“Psychological factors and coping strategies in pregnancies complicated by hypertension: A cluster-analytic approach”	South Brazil	Cross-sectional study recruiting 552 pregnant women, out of which 343 have HDP. Participants with comorbidities were excluded. Instruments for data collection are Jalowiec’s Coping Inventory, DASS-21 and Mini Mental State Examination. All ethical requirements followed.	The result showed that high blood pressure is associated with high degree of depression (t (537) = 10.10; p<.01), stress (t(543) = 23; p<.01) and anxiety (t (545) = 12.4; p<.01 when compared with control, so as the coping strategy. When sub classified according to different groups of hypertension, it is also seen that pre-eclamptic women more easily develops symptoms of stress and worse coping strategy. Hence they are more vulnerable to future mental health problems. The study revealed that all mental disorders increases the risk of HDPs. Current study found anxiety as biggest factor which consistently increases the risk of gestational hypertension (GHTN) (adjusted odds ratio (aOR) 1.324, 95% CI 1.255-1.397), preeclampsia (PE) (aOR 1.522, 95% CI 1.444-1.604), with the strongest association with eclampsia (E) (aOR 1.813, 95% CI 1.260-2.610).
Raina J, El-Messidi A, Badeghiesh A, Tulandi T, Nguyen TV, Suarhana E. 2021 [14]	Pregnancy hypertension and its association with maternal anxiety and mood disorders: A population-based study of 9 million pregnancies	Canada	Population-based retrospective study on 9,097,355 pregnant women by using data from Healthcare Cost and Utilization Project (HCUP) from 2004-2014. ICD-9 code was used to identify various types of pregnancy hypertension.	
Kehler S, Rayens MK, Ashford K. 2022 [15]	Determining psychological distress during pregnancy and its association with the development of a hypertensive disorder	USA	It is a case control secondary data analysis study (1:3) on 29 (25%) women with hypertension and 87 women (75%) without the one. The data taken from EMPOWR. The average age of the women were 23. Instruments for data collection were CESD-R-10, PSS-4, and GAD-7.	No significant difference was found between the two groups in terms of psychological stress. High BMI found to be the only risk factor for hypertension in pregnancy (OR = 1.13; 95% CI: 1.04–1.23, p = .003).

Table 2: summary of study characteristics: quality of life in HDPs

Author & Date	Title of article	Country	Sample details	Result
Patrícia Medeiros Falcão K etal 2017 [16]	“Association between hypertension and quality of life in pregnancy”	Brazil	Two group of antenatal mothers taken, one with hypertension (194) and another without it (195). Quality of life (QOL) was measured using Ferrans & Powers Quality of Life Index. The aim is to see the variation in QOL over different trimesters.	Hypertensive women group present with 20mmhg more BP than the normotensive group. The QOL score is low with average 17.63 in hypertensive group.

Machado MS etal 2017 [17]	“Assessment of quality of life of women with preeclampsia compared with healthy pregnant women”	Brazil	This is a case control study recruiting 28 women with preeclampsia and 30 were healthy. All responded to WHO-QOL brev questionnaire having 4 sub-aspects like physical, psychological, social and environmental.	Mann–Whitney test applied for comparison of data between two groups. The variability was found in age ($p < 0.01$) and gestational age ($p < 0.01$). Lastly the quality of life (QOL) was found low among the participants with hypertensive pregnancy.
Machado MD etal 2020 [18]	“Multi-professional care promotes of quality of life (QOL) in pregnant women with preeclampsia: a cross-sectional study”	Brazil	cross-sectional observational study conducted at university hospital at Brazil among hospitalized women with and without preeclampsia or hypertension with superimposed preeclampsia. Ethical committee approval number 6500/2010. All were introduced with QOL questions.	Result showed a significant difference in age of mother (PE 27.8 ± 6.2 x HG 23.0 ± 6.6 , $p < 0.01$) and gestational age (GA) (PE 224 ± 28.1 x HG 253.8 ± 43.7 , $p < 0.01$) when compared with clinical and obstetric data. Data shows no significant difference between various subcomponents of WHO QOL questions.

Table 3: summary of study characteristics: pregnancy outcomes in GHTN

Author & Date	Title of article	Country	Sample details	Result
Badon SE etal 2021[19]	“Gestational weight gain and adverse pregnancy outcomes by pre-pregnancy BMI category in women with chronic hypertension: A cohort study”	US	Study identified 14,369 samples having chronic hypertension. The data extracted using electronic health records from 3 integrated health care delivery systems (2005–2014).	women with moderate to high gestational weight gain associate with risk of preterm delivery, small-for-gestational age (SGA), preeclampsia large-for-gestational age (LGA) including preeclampsia and delivery by cesarean section.
Nzulu D etal 2019 [20]	“Pregnancy outcomes in women with previous gestational hypertension: A cohort study to guide counselling and management”	London	This is a observational study done retrospectively. The setting was Antenatal Hypertension Clinic (AHC), Kings College Hospital, London. The samples were 773 pregnant women who were booked their pregnancies between 2011 to 2016 with GHTN. Inclusion criteria involves normotensive women at the time of booking and all the chronic hypertension cases were excluded.	Total 49% developed complications of pregnancy that includes 72% developed HDP, 25.8% preeclampsia (PE), 25% Gestational DM and 19% FGR. Overall 12.5% is considered as the recurrence rate for preeclampsia.
Bone JN etal 2021 [21]	"Blood-pressure (BP) thresholds during pregnancy for identifying maternal and infant risk: a secondary analysis of Community-Level Interventions for Pre-eclampsia (CLIP) trial data”	India, Canada, Mozambique, Pakistan (Multicentric)	secondary data analysis from 22 intervention clusters in CLIP cluster randomized trials (NCT01911494) in India (6067), Mozambique (4163), and Pakistan (10 839). 15–49 years women included who have data on BP measurements and outcomes	103 679 blood pressure measurements across the three CLIP trials. dose-response relationships were observed between increasing thresholds and adverse outcomes, data with severe stage two hypertension showed significant maternal nervous system symptoms and perinatal death particularly stillbirth.

Dhillon P et al 2021 [22]	“Pregnancy-induced hypertension (PIH): Role of drug therapy and nutrition in the management of hypertension”	India	Searched databases like Web of Science, PubMed, Science Direct, Embase, Medline, and Google-scholar to find-out factors associated with pregnancy-induced hypertension and its effect on maternal-fetal health.	Result shown that HDP has a direct link with an high risk of cardiovascular complications in the later life of both mother and infants.
Das s etal 2018 [23]	“Pregnancy Induced Hypertension and Fetal-Maternal Outcome in a Tertiary Care Hospital in Eastern India: A Prospective Study”	India	prospective observation used and all PIH cases were analysed for maternal(HELLP syndrome, Abruptio placentae, PPH, neurological complications, ICU admissions and maternal death.)and foetal(still birth, NICU admission and incidence of low birth weight) outcome	Results found, the occurrence of PIH as 7% and 0.77% has eclampsia out of 5139 pregnancies hence the authors concluded that PIH is more prevalent in primi-gravidas. Maternal complication was present in 6.5% cases. NICU admissions & LBW incidences also increased
Getaneh T etal 2020 [24]	“The impact of pregnancy induced HTN on LBW babies in Ethiopia: systematic review and meta-analysis”	Ethiopia	The Joanna Briggs Institute Meta-Analysis of Statistics Assessment and Review Instrument (JBI-MASARI) was used for critical appraisal. For checking the To check the heterogeneity I ² statistic used. Similarly funnel plot and Egger's test computed to evaluate Publication bias. For ovrall pooled prevalence of LBW, random effect model used.	The pooled prevalence of Low Birth Weight was 2 times higher among women with PIH than pooled estimate of all reproductive aged women.

Table 1 depicts the study summary of pregnancy outcomes in gestational hypertension.

Table 4: summary of study characteristics: Role of Midwives in GHTN management

Author & Date	Title of article	Country	Sample details	Result
Kalafat E etal 2019 [25]	Outcome of child birth following home-blood pressure monitoring (HBPM) in GHTN	London, UK	In between Dec, 2013 and Aug, 2018, a cohort study undertaken. Identified and diagnosed hypertensive cases of pregnancy, undertaken counselling and training by a specialist midwife. Those women were given an automated Microlife® “WatchBP Home” BP machine for the purpose of home based BP monitoring. Whereas Control group only received routine care and treatment.	Result demonstrated the frequency of mother attending OPD was significantly reduced among intervention (HBPM) group. Also there is significant lower percentage of antenatal visits when adjusted for the length of monitoring in intervention arm, when compared with control group.
Magro-Malosso ER etal 2017 [26]	“Exercise during childbearing period and risk of GHTN disorders: a systematic review and meta-analysis”	Italy	Electronic databases searched from Feb, 2017. Only RCTs conducted on uncomplicated cases were selected for sample. Women before 23 weeks gestation were exposed to aerobic exercise. The idea was women will be exposed to aerobic exercise for up to 1 hour and the frequency will be 2-7 times/ week.	The intervention group had a significant lower incidence of gestational HTN disorders

Bellad MB etal 2020 [27]	Community level interventions for pre-eclampsia (CLIP) in India: A cluster randomised controlled trial	India	open-label cluster randomised controlled trial (NCT01911494) recruited 14,783 pregnant women in 12 clusters The CLIP intervention consisted of community engagement, community health workers (CHW) and midwives provided mobile-health guided clinical assessment (MHCH), <i>initial treatment</i> , and referral to facility.	There were no intervention-related safety concerns following administration of either methyldopa or MgSO ₄ , and 401 facility referrals. Compared with intervention arm women without CLIP contacts suffered fewer stillbirths.
Smith CA etal 2020 [28]	The safety and effectiveness of mind body interventions for women with pregnancy induced hypertension and or preeclampsia: A systematic review and meta-analysis	Australia	databases from inception to 2019 for randomised and quasi randomised controlled trials taken. 121 studies were identified and eight studies were included in this review. These included mind body interventions examining yoga, guided imagery, relaxation, music, and acupuncture for HDP.	2 relaxation and 1 yoga study found a reduction in systolic (SBP) and diastolic blood pressure (DBP) along with stress. One trial of guided imagery found a reduction in mean arterial blood-pressure (MBP) compared to the control. 3 cases of acupuncture reported some adverse outcomes like placental abruption. Hence Safety issues are not clear and calls for further research.
Amanak K etal 2019 [29]	The impact of prenatal education based on the Roy adaptation model on gestational hypertension, adaptation to pregnancy and pregnancy outcomes.	Turkey	quasi-experimental case-control study taking sample 132 was randomised into education and control groups with the former receiving informative education and the latter receiving due medical care alone. This adopted Roy Adaptation Model to evaluate the effect of prenatal education.	Postintervention, 11 women in the education group and 37 in the control group developed severe preeclampsia. Subsequently, 44 in the education group had no preeclampsia.
Raney JH etal 2019 [30]	Simulation-enhanced nurse mentoring to improve preeclampsia and eclampsia care: an education intervention study in Bihar, India, 2019	India	mixed methods approach conducted at primary health clinics among 94 nurses regarding simulated PE/E births program.	Simulation training improved the use of evidenced-base practice (EBP) on pre-eclampsia and eclampsia simulated case scenarios. This shows the potential to increase nurse competency and confidence in diagnosing and managing complicated conditions of childbearing mothers like PE/E
White AH etal 2019 [31]	Supporting rural midwifery practice for managing PIH using a mobile health (mHealth) intervention: a qualitative descriptive study	Scotland	qualitative descriptive approach adopted and Rural and remote practicing community midwives (n=18) were recruited to participate in three focus groups. Data collected regarding difficulties in managing PIH & other high risk pregnancy.	m-health interventions support continuous professional development in areas with no internet connectivity for hypertensive mothers.
Rastegari Z etal 2019 [32]	“A comprehensive home-care program for health promotion of mothers with preeclampsia (PE): protocol for a	Iran	mixed method approach used to develop the program by Delphi method (10-15 expert).	Developed home care program found beneficial for maternal health care especially for high risk pregnancy.

	mixed method study”		a narrative review of published literature.	Outcomes improved by timed birth between 38 0/7 and 39 6/7 weeks based on observational literature; confirmatory trial 63 evidence is pending. The study also suggested that most of the antihypertensives drugs were found safe for use when breastfeeding is on.
Magee LA etal 2020 [33]	Toward personalized management of chronic hypertension in pregnancy	UK	Compared with normotensive women, women with chronic hypertension are at an increased risk of maternal and perinatal complications towards personalized management of ch. hypertension	

Table 2 depicts the study summary of role of midwives in gestational hypertension management.

Discussion

Perceived stress in HDPs

A Cross-sectional study carried out at south Brazil to determine the change in psychological factor and coping strategy in pregnant women having hypertension. Total 552 sample have recruited, having 343 mothers with hypertension. The exclusion criteria include the participants with co-morbidities. The study resulted a high score of depression, stress and anxiety among hypertensive group and worse among pre-eclamptic group.¹³ In continuation another study also conducted with the same aim at Canada to see the association of maternal anxiety and mood disorder among hypertensive group when compared to normotensive one. It recruited total 9,097,355 pregnant women. And the study resulted that mental health disorders incusing anxiety increases the risk of hypertension in pregnancy (adjusted odds ratio (aOR) 1.324, 95% CI 1.255-1.397) and its severity.¹⁴ Whereas an USA based case control study with secondary data on psychological distress and its association with development of HTN in pregnancy showed a opposite outcome, that no significant difference was seen in both hypertensive and normotensive group as far as the stress is concerned. There are very rare studies with such findings. This may be due to less sample size (29 in hypertensive group and 87 were healthy women) for drawing the conclusion.¹⁵

Quality of life in HDPs

Quality of life is presumed to be low among the mothers with hypertensive disorders. For this, various studies conducted to establish an association between the pregnancy induced hypertension among antenatal mothers and the impact on quality of life. In every study the result revealed a low score of quality of life among hypertensive group when compared with a group without it. The questionnaires used are WHOQOL questions, Ferrans & Powers Quality of Life Index. The average score of QOL was 17.6.¹⁶ Mann–Whitney test done to compare between 2 groups and variability found in both age of the mother (PE 27.8±6.2 x HG 23.0±6.6, p<0.01) and gestational age (PE 224±28.1 x HG 253.8±43.7, p<0.01).¹⁸ But one study showed no difference in quality-of-life score among hypertensive and normotensive group. The mean values between the two groups are equivalent; this can be explained because the PE pregnant women were hospitalized and receive multidisciplinary care.¹⁷

Pregnancy outcome in HDPs

Gestational weight gain and adverse pregnancy outcome are interrelated. This is revealed when a study identified 14,369 women with chronic hypertension having more gestational weight gain. Those cases later developed preterm delivery, small-for-gestational age, preeclampsia large-for-gestational age including preeclampsia and cesarean delivery.¹⁹ In a observational study of London on pregnancy outcome among women with gestational hypertension shows total 49% of the sample have pregnancy complication and out of that 72% developed HDP including preeclampsia (25.8%).²⁰ Mostly gestational hypertension results in adverse pregnancy outcome. Bone JN etal in 2021 conducted a multi-centric study on Community-Level Interventions for Pre-eclampsia (CLIP). The investigators took BP measurement of 103 679 samples across 3 trials. The result reveal that the antenatal mothers with stage 2 HTN developed severe maternal CNS symptoms and events of perinatal death including stillbirth as well.²¹ Additionally two numbers of study of India also coincides with the previous finding. One study based on cardiovascular risk to mother having pregnancy hypertension resulted that hypertensive pregnancy increases the prevalence of cardiovascular complication among them.²² Second study on relation between maternal hypertension and development of fetomaternal complication done at a tertiary care center of India, revealed that out of 5139 pregnancies, 338 (6.57%) had PIH, 40 (0.77%)

had eclampsia. PIH shows more prevalence among primigravidas. Maternal complication was present in 6.5% cases. NICU admissions & LBW incidences are also increased.²³ Lastly an Ethiopian study on influence of PIH on LBW babies shows that the prevalence of LBW babies among PIH mothers were 2 fold higher than those without it.²⁴

Role of midwives in HDPs management

Midwives play an important role in managing hypertensive mothers, especially counselling, compliance with the treatment and follow up. An UK based study observes a change in BP after home blood pressure monitoring. For this they have recruited trained midwives who gave training to mother how to measure BP at home. The aim was to avoid sudden complication and to act fast in case of emergency by identifying the warning signs. The result showed significantly lower BP among the intervention group.²⁵ Another study on effect of exercise during pregnancy and risk of gestational hypertension done at Italy revealed lower BP among those who have done aerobic exercise for about 30-60 min two to seven times per week.²⁶ Again a community level intervention of India recruited 14,783 pregnant women under 12 clusters and midwives to provide them mobile health (mHealth)-guided clinical assessment, initial treatment, and referral to facility. The result demonstrated that the treatment group suffered with less feto-maternal complication than control group including still birth.²⁷ Similarly a study of Australia researched on impact of mind body intervention on PIH and pre-eclampsia. It included 2 relaxation exercise and 1 yoga seem to reduce both systolic and diastolic BP along with stress, one trial of guided imagery reduced significantly the mean arterial BP. Except for 3 acupuncture cases reported some adverse outcome. This implies that relaxation exercises to have positive effect when it is carried out under controlled condition with special focus on safety.²⁸ A prenatal education program arranged in Turkey for women with gestational hypertension as an intervention. It is a quasi-experimental case control study carried out among 132 randomized sample. Here the treatment group received prenatal informative education on hypertension care through Roy's adaptation model. The result shows that less number of women in treatment group (11) developed pre-eclampsia in comparison to control group (37) and 44 subjects of intervention group had no pre-eclampsia.²⁹ Additionally a simulation enhanced nursing mentoring program on preeclampsia and eclampsia care at Bihar, India also proved effective in preventing serious complications among women with GHTN. Here samples were 94 nurses.³⁰ In a Scotland study on mobile health intervention was done to support rural midwifery practice in management of PIH. Here 18 numbers of midwives were taken as sample, where the focus was on difficulty in managing PIH and effectiveness of m-health application. Result shows that in difficult to reach areas the m-health application give continuous professional help.³¹ A Iranian study also conducted to see the success of a comprehensive home based care program for health promotion of mothers with preeclampsia. The result of this mixed method approach, showed that the designed and applied intervention is beneficial for the health of the mother including high risk pregnancies like PIH.³² Lastly a UK based study did a narrative review to check the benefits of personalized care in the management of chronic HTN. The outcomes were improved by timed birth between 38 0/7 and 39 6/7 weeks based on observational literature and compliance with anti-hypertensive drug, which can be followed up by midwives.³

4. Conclusion

This is an extensive narrative review, where the authors tried to bring light on the various factors affected by Gestational hypertension and roles of midwives in the same. It can be observed that, there are very limited studies on stress, quality of life and management by midwives. Through this review it is certain that hypertensive mothers develop stress and their quality of life also getting affected. But still there are controversial study results, which needs further investigation. Secondly, the cases which is included here were not independently carried out by midwives. Also no programs were implemented in this regard, rather most of them are in the planning stage. Hence this paper provides an insight to focus more into the development of a real time integrated program package which would work perinatally starting with the early identification, home based BP monitoring, carrying out physical activity and dietary management, safe delivery and postpartum follow up altogether. Moreover this should be carried out by the midwives as they are the primary caregivers at community level and also by doing so the duplication of work by obstetrician can be reduced as they can focus more on referred cases.

Conflict of interest: None

References:

1. Magee LA, Sharma S, Nathan HL, Adetoro OO, Bellad MB, Goudar S, Macuacua SE, Mallapur A, Qureshi R, Sevene E, Sotunsa J. The incidence of pregnancy hypertension in India, Pakistan, Mozambique, and Nigeria: a prospective population-level analysis. *PLoS medicine*. 2019 Apr 12;16(4):e1002783. PMID: 30978179

2. Brown MA, Magee LA, Kenny LC, Karumanchi SA, McCarthy FP, Saito S, Hall DR, Warren CE, Adoyi G, Ishaku S. Hypertensive disorders of pregnancy: ISSHP classification, diagnosis, and management recommendations for international practice. *Hypertension*. 2018 Jul;72(1):24-43.
3. Malik R, Kumar V. Hypertension in Pregnancy. *Adv Exp Med Biol*. 2017;956:375-393. doi: 10.1007/5584_2016_150. PMID: 27957708.
4. Yu Y, Zhang S, Wang G, Hong X, Mallow EB, Walker SO, Pearson C, Heffner L, Zuckerman B, Wang X. The combined association of psychosocial stress and chronic hypertension with preeclampsia. *Am J Obstet Gynecol*. 2013 Nov;209(5):438.e1-438.e12. doi: 10.1016/j.ajog.2013.07.003. Epub 2013 Jul 11. PMID: 23850528; PMCID: PMC3825759.
5. Monk C, Webster RS, McNeil RB, Parker CB, Catov JM, Greenland P, Bairey Merz CN, Silver RM, Simhan HN, Ehrenthal DB, Chung JH, Haas DM, Mercer BM, Parry S, Polito L, Reddy UM, Saade GR, Grobman WA; NICHD nuMoM2b and NHLBI nuMoM2b Heart Health Study Networks. Associations of perceived prenatal stress and adverse pregnancy outcomes with perceived stress years after delivery. *Arch Womens Ment Health*. 2020 Jun;23(3):361-369. doi: 10.1007/s00737-019-00970-8. Epub 2019 Jun 29. PMID: 31256258; PMCID: PMC6935433.
6. Leeners B, Stiller R, Neumaier-Wagner P, Kuse S, Schmitt A, Rath W. Psychosocial distress associated with treatment of hypertensive diseases in pregnancy. *Psychosomatics*. 2008 Sep 1;49(5):413-9.
7. Fox R, Kitt J, Leeson P, Aye CYL, Lewandowski AJ. Preeclampsia: Risk Factors, Diagnosis, Management, and the Cardiovascular Impact on the Offspring. *J Clin Med*. 2019 Oct 4;8(10):1625. doi: 10.3390/jcm8101625. PMID: 31590294; PMCID: PMC6832549.
8. Sevene E, Sharma S, Mungambe K, Sacoer C, Vala A, Macuacua S, Boene H, Ansermino JM, Augusto O, Bique C, Bone J. Community-level interventions for pre-eclampsia (CLIP) in Mozambique: a cluster randomised controlled trial. *Pregnancy hypertension*. 2020 Jul 1;21:96-105.
9. Saadati F, Sehhatiei Shafaei F, Mirghafourvand M. Sleep quality and its relationship with quality of life among high-risk pregnant women (gestational diabetes and hypertension). *J Matern Fetal Neonatal Med*. 2018 Jan;31(2):150-157. doi: 10.1080/14767058.2016.1277704. Epub 2017 Jan 23. PMID: 28110597.
10. Patrícia Medeiros Falcão K, Pedrozo Campos Antunes T, do Nascimento Andrade Feitosa A, Victor EG, Nunes Alves de Sousa M, de Abreu LC, Vilar de Asis E, Barros de Quental O, Pinheiro Bezerra IM, Azevedo de Freitas Junior H. Association between hypertension and quality of life in pregnancy. *Hypertens Pregnancy*. 2016 Aug;35(3):306-14. doi: 10.3109/10641955.2016.1143485. Epub 2016 Mar 1. PMID: 26930125.
11. Un Nisa S, Shaikh AA, Kumar R. Maternal and Fetal Outcomes of Pregnancy-related Hypertensive Disorders in a Tertiary Care Hospital in Sukkur, Pakistan. *Cureus*. 2019 Aug 28;11(8):e5507. doi: 10.7759/cureus.5507. PMID: 31667040; PMCID: PMC6816637.
12. Raney JH, Morgan MC, Christmas A, Sterling M, Spindler H, Ghosh R, Gore A, Mahapatra T, Walker DM. Simulation-enhanced nurse mentoring to improve preeclampsia and eclampsia care: an education intervention study in Bihar, India. *BMC pregnancy and childbirth*. 2019 Dec;19(1):1-9. PMID: 30674286
13. Chapuis-de-Andrade S, Moret-Tatay C, de Paula TA, Irigaray TQ, Antonello IC, da Costa BE. Psychological factors and coping strategies in pregnancies complicated by hypertension: A cluster-analytic approach. *Journal of Affective Disorders*. 2022 Jan 1;296:89-94.
14. Raina J, El-Messidi A, Badeghiesh A, Tulandi T, Nguyen TV, Suarhana E. Pregnancy hypertension and its association with maternal anxiety and mood disorders: A population-based study of 9 million pregnancies. *Journal of Affective Disorders*. 2021 Feb 15;281:533-8.
15. Kehler S, Rayens MK, Ashford K. Determining psychological distress during pregnancy and its association with the development of a hypertensive disorder. *Pregnancy Hypertension*. 2022 Jun 1;28:81-7.
16. Patrícia Medeiros Falcão K, Pedrozo Campos Antunes T, do Nascimento Andrade Feitosa A, Victor EG, Nunes Alves de Sousa M, de Abreu LC, Vilar de Asis E, Barros de Quental O, Pinheiro Bezerra IM, Azevedo de Freitas Junior H. Association between hypertension and quality of life in pregnancy. *Hypertens Pregnancy*. 2016 Aug;35(3):306-14. doi: 10.3109/10641955.2016.1143485. Epub 2016 Mar 1. PMID: 26930125.
17. Machado MS, Bertagnolli TV, Machado JS, Ferreira CH, Duarte G, Cavalli RC. [239-POS]: Assessment of quality of life of women with preeclampsia compared with healthy pregnant women. *Pregnancy Hypertension: An International Journal of Women's Cardiovascular Health*. 2015 Jan 1;5(1):120-1.
18. Machado MD, Bertagnolli TV, Veiga EC, Ferreira CJ, Duarte G, Machado JD, Carvalho R. Multiprofessional care promotes of quality of life in pregnant women with preeclampsia: a cross-sectional study. *Clinics*. 2020 Nov 11;75.
19. Badon, S.E., Dublin, S., Nance, N., Hedderson, M.M., Neugebauer, R., Easterling, T., Cheatham, T.C., Chen, L., Holt, V.L. and Avalos, L.A., 2021. Gestational weight gain and adverse pregnancy outcomes by pre-pregnancy BMI category in women with chronic hypertension: a cohort study. *Pregnancy Hypertension*, 23, pp.27-33.
20. Nzelu D, Dumitrascu-Biris D, Hunt KF, Cordina M, Kametas NA. Pregnancy outcomes in women with previous gestational hypertension: A cohort study to guide counselling and management. *Pregnancy hypertension*. 2018 Apr 1;12:194-200.
21. Bone JN, Magee LA, Singer J, Nathan H, Qureshi RN, Sacoer C, Sevene E, Shennan A, Bellad MB, Goudar SS, Mallapur AA. Blood pressure thresholds in pregnancy for identifying maternal and infant risk: a

- secondary analysis of Community-Level Interventions for Pre-eclampsia (CLIP) trial data. *The Lancet Global Health*. 2021 Jul 5.
22. Dhillon P, Kaur I, Singh K. Pregnancy-induced hypertension: Role of drug therapy and nutrition in the management of hypertension. *PharmaNutrition*. 2021 Jan 10;100251.
 23. Das S, Sahu M, Mohapatra S, Padmavati VM, Panigrahi PK. Pregnancy Induced Hypertension and Feto-Maternal Outcome in a Tertiary Care Hospital in Eastern India: A Prospective Study. *Journal of Clinical & Diagnostic Research*. 2018 Nov 1;12(11).
 24. Getaneh T, Negesse A, Dessie G, Desta M. The impact of pregnancy induced hypertension on low birth weight in Ethiopia: systematic review and meta-analysis. *Italian Journal of Pediatrics*. 2020 Dec;46(1):1-1.
 25. Sevene E, Sharma S, Munguambe K, Sacoor C, Vala A, Macuacua S, Boene H, Ansermino JM, Augusto O, Bique C, Bone J. Community-level interventions for pre-eclampsia (CLIP) in Mozambique: a cluster randomised controlled trial. *Pregnancy hypertension*. 2020 Jul 1;21:96-105.
 26. Magro-Malosso ER, Saccone G, Di Tommaso M, Roman A, Berghella V. Exercise during pregnancy and risk of gestational hypertensive disorders: a systematic review and meta-analysis. *Acta obstetrica et gynecologica Scandinavica*. 2017 Aug;96(8):921-31.
 27. Bellad MB, Goudar SS, Mallapur AA, Sharma S, Bone J, Charantimath US, Katageri GM, Ramadurg UY, Ansermino JM, Derman RJ, Dunsmuir DT. Community level interventions for pre-eclampsia (CLIP) in India: a cluster randomised controlled trial. *Pregnancy hypertension*. 2020 Jul 1;21:166-75. PMID: 32554291
 28. Smith CA, Tuson A, Thornton C, Dahlen HG. The safety and effectiveness of mind body interventions for women with pregnancy induced hypertension and or preeclampsia: A systematic review and meta-analysis. *Complementary Therapies in Medicine*. 2020 Aug 1;52:102469.
 29. Amanak K, Sevil U, Karacam Z. The impact of prenatal education based on the Roy adaptation model on gestational hypertension, adaptation to pregnancy and pregnancy outcomes. *J Pak Med Assoc*. 2019 Jan 1;69(1):11-7.
 30. Raney JH, Morgan MC, Christmas A, Sterling M, Spindler H, Ghosh R, Gore A, Mahapatra T, Walker DM. Simulation-enhanced nurse mentoring to improve preeclampsia and eclampsia care: an education intervention study in Bihar, India. *BMC pregnancy and childbirth*. 2019 Dec;19(1):1-9.
 31. White AH, Crowther SA, Lee SH. Supporting rural midwifery practice using a mobile health (mHealth) intervention: a qualitative descriptive study. *Rural and remote health*. 2019 Aug 26;19(3):5294-.
 32. Rastegari Z, Yarmohammadian MH, Mohammadi F, Kohan S. A comprehensive home-care program for health promotion of mothers with preeclampsia: protocol for a mixed method study. *Reproductive health*. 2019 Dec;16(1):1-6.
 33. Magee, Laura A.; Khalil, Asma; Kametas, Nikos; von Dadelszen, Peter (2020). Towards personalized management of chronic hypertension in pregnancy. *American journal of obstetrics and gynecology*, (), s0002937820307456-. Doi:10.1016/j.ajog.2020.07.026