

Effectiveness of Nursing Interventional Package on Vascular Symptoms, Quality Of Life and Perinatal Outcome among Pregnant Women with Pregnancy Induced Hypertension: A Pilot Interventional Study

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Abstract

Background

Pregnancy-induced hypertension (PIH) is a major contributor to maternal and neonatal morbidity and mortality, associated with vascular symptoms, reduced quality of life, and adverse perinatal outcomes. Structured nursing interventions play a vital role in managing these complications and improving overall maternal well-being.

Objective

To evaluate the effectiveness of a structured nursing interventional package on vascular symptoms, quality of life, and perinatal outcomes among pregnant women with PIH.

Methods

A quantitative quasi-experimental pre-test and post-test control group design was adopted. Twenty pregnant women with PIH were selected using convenience sampling and randomly assigned into study (n = 10) and control (n = 10) groups. The intervention included education on symptom management, foetal well-being assessment, warning signs, and relaxation techniques. Data were collected using a vascular symptom assessment scale, WHOQOL-BREF QOL-GRAV questionnaire, and perinatal outcome checklist. Post-test was conducted after 4 weeks, and perinatal outcomes were assessed after delivery.

Results

Post-intervention, the study group showed significant improvement in quality of life (mean difference = 7.94) compared to the control group, which showed no improvement. Significant reductions were observed in blood pressure, oedema, headache, and epigastric pain ($p < 0.05$), while proteinuria and weight gain showed no significant change. Perinatal outcomes such as Apgar scores and NICU admissions were better in the study group but not statistically significant.

Conclusion

The structured nursing interventional package was effective in reducing vascular symptoms and improving quality of life among pregnant women with PIH. However, its effect on perinatal outcomes was not statistically significant, indicating the need for further research with larger samples.

Relevance for Clinical Practice:

This study demonstrates that a structured nursing interventional package can effectively reduce vascular symptoms and improve the quality of life among pregnant women with pregnancy-induced hypertension. Incorporating standardized nursing education on symptom management, fetal well-being assessment, recognition of warning signs, and relaxation techniques into routine antenatal care may enhance maternal health outcomes and support early identification of disease progression. Although improvements in perinatal outcomes were not statistically significant, the positive clinical trends suggest that such interventions have the potential to improve neonatal well-being when implemented on a larger scale. These findings support the integration of evidence-based nursing interventions into antenatal care protocols and highlight the need for larger multicentre studies to establish their impact on maternal and neonatal outcomes.

Key Points

- A structured nursing interventional package significantly reduced vascular symptoms and improved the quality of life among pregnant women with pregnancy-induced hypertension.
- Nursing education focusing on symptom management, fetal well-being assessment, warning signs, and relaxation techniques enhanced maternal health outcomes over a 4-week intervention period.
- Although the intervention showed favourable trends in perinatal outcomes, including higher Apgar scores and fewer NICU admissions, larger studies are needed to confirm these effects statistically.

Introduction

A healthy pregnancy usually involves coordinated physiological change that support healthy foetal development by creating an optimal intrauterine environment for foetal development, while preserving maternal wellbeing (Williams, 2020). The maternal body undergoes cardiovascular, metabolic, immune and endocrine adaptations during this phase with increase in blood volume, cardiac output and urine flow, alongside a reduction in systemic vascular resistance (Ijaz et al., 2025; Williams, 2020)). Such changes are largely influenced by placental hormones, namely oestrogen and progesterone, which promote vasodilation and thus facilitate vascular remodelling, which provides the foetus with a safe intrauterine environment (Napso et al., 2018; Ijaz et al., 2025). When these physiological outcomes are successful, pregnancy usually ends with delivery at term with low rates of maternal and neonatal complications and minimal need for intensive neonatal care (Gupta and Verma, 2024; Vinnars, Bixo and Damdimopoulou, 2023). However, pregnancy induced hypertension (PIH) arises when these processes fail, often due to abnormal placental development or inadequate blood flow after 20 weeks of gestation, triggering endothelial dysfunction and widespread vasoconstriction (Qi et al., 2022).

Globally, hypertensive disorders of pregnancy, including PIH, affects roughly 5–10% of pregnancies, making them one of the three leading causes of maternal morbidity and mortality worldwide (Sun et al., 2025; Wang et al., 2021). Large multi country community studies in India, Pakistan, Mozambique and Nigeria report pregnancy hypertension incidences around 9–11% (Magee et al., 2019). However, national

and regional surveys revealed marked geographic variation as pooled analysis from Ethiopia estimate PIH prevalence around 6.07% (Berhe et al., 2018), while facility-based studies in Ethiopia and Southern Africa have reported prevalence of about 13–21% in certain districts (Argago, Dereje, and Philip, 2025; Muti et al., 2015; Mulenga, Jacobs, and Simbeye, 2024). In South Asia, cross sectional hospital studies describe PIH prevalence of 6–9% in India and Bangladesh (Lakhute et al., 2021; Haque and Sarkar, 2020). Notably, obesity has been identified as significant risk factor for PIH, with studies showing that obese women constitute a high-risk group for PIH, nearly accounting for 40% of pregnancies in tertiary care settings (Achakzai et al., 2025).

In most pregnancies, maternal physiological changes support normal foetal growth and result in delivery of healthy term infant without serious complications (Gupta and Verma, 2024). However, even uncomplicated pregnancies can be affected by conditions like mild anaemia, urinary or genital tract infections or gestational diabetes, which may increase the risk of preterm birth, caesarean delivery, and neonatal admission, but are manageable with timely care (McNestry et al., 2023). The risk profile increases when pregnancy deviates from this normal pattern, particularly through pregnancy induced hypertension and preeclampsia. Large hospital based and cohort studies show that hypertensive disorders during pregnancy are associated with maternal complications like HELLP syndrome (Haemolysis, Elevated liver enzymes, and Low platelets), placental abruption, acute kidney injury, postpartum haemorrhage, ICU admissions and maternal death in minority of cases (Anh, Thang, and Huong, 2024; Halder et al., 2024; Lugobe et al., 2020). These complications also have significant foetal consequences such as preterm birth, intrauterine growth restrictions, low birth weight, birth asphyxia, still birth, and increased perinatal mortality (Anh, Thang, and Huong, 2024; Parmar and Vaja, 2017). Beyond the immediate perinatal period, pregnancies complicated by gestational hypertension may have a long-term risk of chronic hypertension and cardiovascular disease in mothers, underscoring that complications during pregnancy have consequences that extend well beyond childbirth, which ultimately affects the quality of life (McNestry et al., 2023; Williams et al., 2022; Melchiorre et al., 2020).

Pregnancy induced hypertension is characterised by vascular manifestations resulting from endothelial dysfunction and intense vasospasm affecting major organ systems including uterine, renal, placental, and cerebral circulations. These vascular disturbances give rise to symptoms such as oedema, dizziness and visual disturbances which can significantly have an impact on maternal quality of life by reducing physical comfort and psychological well-being (Gomathi, Anuchithra, and Nautiyal, 2019; Khadari et al., 2024). In addition to maternal effects, these complications influence perinatal outcomes, increasing the risk of preterm birth, low birth weight, as well as neonatal morbidities such as necrotising enterocolitis and respiratory distress syndrome (Moura et al., 2021; Bromfield et al., 2023; H M, 2024). Moreover, untreated or severe PIH with vascular involvement can lead to higher rates of caesarean delivery, neonatal ICU admissions and neonatal mortality further affecting family well-being (Bromfield et al., 2023; H M, 2024).

Pregnancy induced hypertension is strongly associated with adverse perinatal outcomes, including increased risk of low birth weight, preterm delivery, birth asphyxia, small for gestational age, and higher

rates of NICU admissions (Pathan et al., 2023; Berhe et al., 2018; Paul et al., 2025). Studies confirm that neonates born to mothers with PIH have significantly higher incidence of perinatal death and stillbirth compared to those born to normotensive mothers (Pembe et al., 2025; Berhe et al., 2018; Singh et al., 2023). The severity and timing of PIH onset influence these outcomes, with early onset and severe preeclampsia linked to greatest risks for perinatal mortality and complications like intrauterine growth restriction and preterm birth (Pathan et al., 2023; Pembe et al., 2025). Early diagnosis, close monitoring and timely intervention are critical to improve both maternal and neonatal outcomes in pregnancies complicated by PIH (Berhe et al., 2018; Singh et al., 2023).

Nursing interventional packages typically include education on symptom management, relaxation techniques such as diaphragmatic breathing and muscle stretching, foetal wellbeing assessments and guidance on recognising warning signs and maintaining compliance with the treatment (Gomathi, Anuchithra, and Nautiyal, 2019; Gomathi and Nautiyal, 2020). These interventions have demonstrated to improve quality of life by reducing vascular symptoms and enhancing physiological wellbeing including reduced insomnia and depression (Manjula and Sarathi, 2024), while nursing care contributes to better clinical outcomes, including lower blood pressure and fewer maternal and neonatal complications (Tumkaya, Şen, and Eroğlu, 2025). In this context, the present study aimed to evaluate the impact of structured nursing interventional package on vascular symptoms, quality of life, and perinatal outcomes among pregnant women with pregnancy-induced hypertension.

Materials and Methods

Research Design and Approach

A quantitative research approach and quasi-experimental pre and post-test with control group design was used to assess the effectiveness of nursing interventional package on vascular symptoms, quality of life, and perinatal outcome among pregnant women with pregnancy induced hypertension.

Pictorial representation of research design

Random Assignment	Group	Pre-test	Intervention	Post-test after 4 weeks	Post –test after delivery
	C	O1	-	O2	O3
	S	O1	X	O2	O3

C-Control group

S – Study group

O1 – Assessment of the pretest level of vascular symptoms, perinatal outcomes and Quality of life of pregnant women with pregnancy induced hypertension in study and control group

O2- Assessment of the post-test level of vascular symptoms, perinatal outcomes and Quality of life of pregnant women with pregnancy induced hypertension in study group after administration of nursing interventional package.

O3 - Assessment of the perinatal outcome of pregnant women with pregnancy induced hypertension in study group and control group after administration of nursing interventional package.

X- Application of nursing interventional package on vascular symptoms, quality of life and perinatal outcome of pregnant women with pregnancy induced hypertension in study group.

Study setting

The study was conducted in maternal centres in Coimbatore district, Tamil Nadu, India. Raja Street and Meenakshi Maternity Centres were randomly assigned to study group, whereas CTM and Jail Road Maternity Centres were assigned to the control group. Raja street maternity Centre is located 1.2 kms away from the centre of Coimbatore. Meenakshi maternity centre is located about 3 kms near Coimbatore. CTM and Jail Road maternity centres are located about 3-4 kms away from the centre of Coimbatore. These health centres has well-established infrastructure, which provide free and low-cost maternity care to urban and semi-urban population. These facilities are dedicated to providing comprehensive maternal and child healthcare services to the underserved communities.

Population

Target population

The target population for this study comprised all pregnant women diagnosed with pregnancy-induced hypertension who are receiving care at maternity centres in Coimbatore district, Tamil Nadu, India.

Accessible population

The accessible population included pregnant women with PIH who met the inclusion criteria and were registered at the selected maternity centres in Coimbatore district, Tamil Nadu, India.

Sample, Sample Size Calculation and Sampling Technique

The sample includes pregnant mothers with pregnancy-induced hypertension from selected maternity centers in Coimbatore district, Tamil Nadu, India. Twenty pregnancy women diagnosed with PIH were selected from the target population using non-probability convenience sampling technique. The

participants were then randomly assigned to either study or control group, with 10 women in each group.

Eligibility criteria

Inclusion Criteria

The study included pregnant women who were diagnosed with pregnancy-induced hypertension; were registered in the selected maternity centres; had gestational age between 26 and 30 weeks; were experiencing at least three vascular symptoms; were willing to provide informed written consent and were able to understand and speak the Tamil language.

Exclusion criteria

The study excluded those who were not willing to participate in the study and those who did not meet the inclusion criteria.

Study variables

Independent variable

The independent variable in this study was structured nursing interventional package delivered in two structured sessions.

Dependent variables

The dependent variables include vascular symptoms, quality of life and perinatal outcome of pregnant women with pregnancy induced hypertension.

Development and description of tool

The items of the blue print regarding structured questionnaire on vascular symptoms, quality of life and perinatal outcome of pregnant women with pregnancy induced hypertension was prepared based on an extensive review of literature. (Rajeswari and Reddy, 2020; Madkar et al. 2018; Vachkova et al., 2013;

Mazuchová et al., 2023; Kresht et al., 2023). The structured questionnaire included five sections.

Section A Demographic Characteristics, Clinical Variables, and Obstetrical History

This section comprises items related to the pregnant woman's demographic characteristics, clinical variables, and obstetrical history. Demographic data include age, religion, residential area, level of education, and employment status. Clinical variables consist of measurements such as height, weight, body mass index, and blood pressure. The obstetrical history encompasses details of gravidity, obstetrical score, past obstetrical history, present pregnancy history, and relevant family history.

Section B Vascular Symptom Assessment Scale

This section consists of vascular symptom assessment scale and is used to identify and evaluate the presence and severity of vascular symptoms among pregnant women with pregnancy-induced hypertension. The scale includes items related to blood pressure, proteinuria, edema, weight gain (per week), headache, epigastric pain, insomnia, and depression. The items are interpreted as;

Blood pressure

<140/90 mmHg (Normal)

140/90–149/99 mmHg (Mild)

150/100–159/109 mmHg (Moderate)

>160/110 mmHg (Severe)

Proteinuria

Absent (Normal)

+1 (Mild)

+2 (Moderate)

+3 and above (Severe)

Edema

Grade +1

Grade +2

Grade +3

Grade +4

Weight gain (per week)

<0.5 lb (Normal)

0.5 (250 g)–1 lb (500 g) (Mild)

1 lb (500 g)–2 lbs (1 kg) (Moderate)

>2 lbs (1 kg) (Severe)

Headache

0 (No pain)

1–3 (Mild pain)

4–6 (Moderate pain)

7–10 (Severe pain)

Epigastric pain

0 (No pain)

1–3 (Mild pain)

4–6 (Moderate pain)

7–10 (Severe pain)

Insomnia

Absent

Present

Depression

Absent

Present

Section C WHOQOL-BREF (The World Health Organization Quality of Life) tool

This section includes the WHOQOL-BREF is a 26-item instrument that assesses quality of life across four domains: physical health, which includes 7 items (3, 4, 10, 15, 16, 17, and 18); psychological health, comprising 6 items (5, 6, 7, 11, 19, and 26); social relationships, with 3 items (20, 21, and 22); and environmental health, consisting of 8 items (8, 9, 12, 13, 14, 23, 24, and 25). In addition to these domains, the instrument also includes items that evaluate overall quality of life and general health. These four domain scores denote an individual's perception of quality of life in each particular domain. Domain scores are scaled in a positive direction (i.e. higher scores denote higher quality of life). The mean score of items within each domain is used to calculate the domain score. Each individual item of the WHOQOL-BREF is scored from 1 to 5 on a response scale, which is stipulated as a five-point ordinal scale. The scores are then transformed linearly to a 0–100- scale. The four domain scores

denote an individual's perception of quality of life in each particular domain. Domain scores are scaled in a positive direction (i.e. higher scores denote higher quality of life). The mean score of items within each domain is used to calculate the domain score.

Section D Quality of Life-Gravidarum (QOL-GRAV)

It consists of the QOL-GRAV questionnaire, developed by Vachkova et al. (2013), using the WHO quality of life short-form questionnaire. It is a 9-item instrument designed to assess the quality of life of pregnant women. Each item is scored on a five-point ordinal scale ranging from 1 to 5, and the total scores are linearly transformed to a scale ranging from 9 to 45 points. Based on the total score, quality of life was categorized as follows: Excellent (9–18 points), Very good (19–27 points), Good (28–36 points), and not very good (37–45 points).

Section E Perinatal Outcome Checklist

This section consists of a perinatal outcome checklist comprising 15 items related to complications of pregnancy-induced hypertension. Each item is scored with a “Yes” or “No” response option.

Reliability and Validity of the Data Collection Instruments

Content validity was determined by six nursing experts, two Gynaecologist, one statistician, and one psychologist. The experts suggested certain modifications in the tool. Suggestions were incorporated in the tool. The tools were pretested and found reliable.

Data collection Procedure

After obtaining ethical consent from the authorities, informed written consent was obtained from each participant. Samples were selected according to the inclusion and exclusion criteria of the study. Data collection took place in the consultation rooms where privacy was maintained. The researcher collected the demographic data on the 1st day in the outpatient department-using questionnaire and assessed the vascular symptoms with a vascular symptoms assessment scale from pregnant mothers with pregnancy-induced hypertension. Out of the vascular symptoms proteinuria, blood pressure, oedema, weight gain, headache, epigastric pain, insomnia, and depression, the samples were selected based on minimum of 3 vascular symptoms from the above list.

The first session of intervention was given for 10 minutes regarding instructions on strategies to manage each vascular symptom, foetal well-being assessment, warning signs of complications, and the importance of compliance to interventions on the same day. The second session of intervention included demonstration of systematic muscle relaxation techniques like mindful breathing, progressive muscle relaxation, and mild stretching exercises for 15-20 minutes. This section included Edmund Jacobson technique, which involves exercise to hands, arms, facial muscles, chest, neck and shoulders, stomach, thighs and buttocks, lower legs and toes. Upon completion of the above exercises, complete relaxation techniques for whole body were taught for ten minutes. Phone calls and weekly meetings

were conducted to ensure adherence to the prescribed practice. Post assessment done after 4 weeks. Mothers were followed until immediate puerperium and the perinatal outcome was assessed.

Ethical consideration

Ethical approval for the study was obtained from the Institutional Ethical Committees, XXX. Permission was also secured from administrative authorities of the selected maternity centres. Informed written consent were received from the participants after providing a clear explanation regarding the purpose and procedure of the study. Anonymity of participants were strictly maintained and the collected data were accessible only to the researcher. Participants were informed about their right to withdraw anytime from the study without the quality of care getting affected.

Data analysis

The collected data were analysed using descriptive and inferential statistics. Frequencies and percentages were used to summarise demographic and clinical characteristics, as well as magnitude of vascular symptoms. Pre-test and post-test quality of life scores were compared within and between the study and control group using mean, standard deviation and mean differences. Significance level was set at $p \leq 0.05$, to determine the effectiveness of nursing interventional package on improving QOL among pregnant women with PIH.

Results

The findings show that most participants in both groups were aged 27 years and below (80% in the study group and 90% in the control group), with 20% in each group aged 28–37 years. The majority were Hindus in the study group (60%), while the control group had equal representation of Hindu and Muslim participants (40% each), followed by Christians (10% and 20%). Most women belonged to urban areas (70% in the study group and 60% in the control group), with the remaining from semi urban areas and none from rural region. In terms of education, the highest proportion were graduated (40% in the study group and 30% in the control group), followed by had higher secondary education (30% in both groups). Most participants were homemakers (80% in the study group and 60% in the control group). BMI assessment showed that 40% of women in the study group were overweight and 40% had normal BMI, whereas in the control group, 60% had normal BMI. Half of the participants in both groups were between 28–30 weeks of gestation (50%), while 50% in study group and 30% in the control group were between 31–33 weeks. Regarding gravida, multigravida women were higher in the study group (60%), whereas the control group had equal distribution of primigravida and multigravida mothers (50% each). Overall, both groups were comparable with minor variations (Table 1).

The table 2 presents the frequency and percentage distribution of the magnitude of vascular symptoms among pregnant women with pregnancy-induced hypertension ($n = 20$). The findings indicate that the majority of women (55%) had mild blood pressure levels (140/90–149/99 mmHg), while 35% had normal blood pressure and only 10% had moderate hypertension and none had severe hypertension. Regarding

proteinuria, half of the participants (50%) had no proteinuria, whereas 30% had mild and 20% had moderate levels, with no cases of severe proteinuria. In terms of oedema, most women (60%) had grade +1 oedema and 40% had Grade +2, with no higher grades observed. For weekly weight gain, 60% of the women had mild weight gain, while 20% each had normal and moderate weight gain, and none had severe weight gain.

Concerning headache, 60% of the participants reported mild pain and 40% reported moderate pain, with no cases of severe headache. Epigastric pain was absent in 30% of women, while 40% experienced mild pain and another 30% reported moderate discomfort, with no severe cases. Insomnia was present in 60% of participants, indicating a common complaint. Notably, all participants (100%) reported the presence of depression. Overall, the table shows that most vascular symptoms among the study participants were predominantly mild to moderate in severity, with very few severe manifestations.

The table 3 presents the pretest level of quality of life among pregnant women with PIH in both the study and control groups (n = 20). None of the participants in either group reported excellent or very good QOL. In the study group, 20% of women had a good level of QOL, while 80% had not very good QOL. Similarly, in the control group, 40% of participants had a good level of QOL, whereas 60% fell under the not very good category. Overall, the findings indicate that before the intervention, most pregnant women in both groups experienced a lower level of quality of life, highlighting the need for supportive interventions to improve their well-being.

The table 4 presents the post-test level of quality of life among the study and control groups. In the study group, 60% of the women had a “good” level of QOL, 20% had a “very good” level, and 20% remained in the “not very good” category, while none reported an “excellent” level. In contrast, in the control group, 50% of the women had a “good” level of QOL and the remaining 50% were in the “not very good” category, with none achieving “very good” or “excellent” levels. Overall, the findings indicate that the study group demonstrated better improvement in QOL compared to the control group, as evidenced by the presence of participants in the “very good” category and a lower proportion in the “not very good” category. In addition, the mean pre-test QOL score in the study group was 92.03 (SD = 9.28), while in the control group it was slightly higher at 96.13 (SD = 8.9), with a mean difference of 4.1. This suggests that both groups were comparable in terms of quality of life before the intervention.

In the study, the mean post-test QOL score in the study group was 99.97, which is higher than the control group mean of 94.23, with a mean difference of 5.74, indicating that the difference is statistically significant at the 0.05 level. This suggests that the nursing interventional package was effective in improving the quality of life among the study group compared to the control group. The table 5 shows the comparison of pre-test and post-test QOL scores among the study group (n = 10). The mean QOL score increased from 92.03 in the pre-test to 99.97 in the post-test, with a mean difference of 7.94, indicating highly statistically significant (***) improvement after the administration of nursing interventional package. This demonstrates that the nursing interventional package was effective in enhancing the quality of life among pregnant women with PIH in the study group. In the control group,

the mean QOL score slightly decreased from 96.13 in the pre-test to 94.23 in the post-test, with a mean difference of 1.90, indicating a minimal improvement in quality of life over time. This suggests that, in the absence of the nursing interventional package, there was no meaningful improvement in the quality of life among pregnant women with PIH in the control group.

Table 6 demonstrates the effectiveness of nursing interventional package on pretest and posttest vascular symptoms among pregnant women with pregnancy induced hypertension in study group. Mean scores for blood pressure, edema, headache, and epigastric pain showed noticeable reductions from pre-test to post-test, with statistically significant differences observed in both paired *t*-test and Wilcoxon signed-rank test analyses ($p < 0.05$), suggesting that the intervention was effective in alleviating these symptoms. Although proteinuria and weight gain also demonstrated slight decreases in mean values after the intervention, these changes were not statistically significant ($p > 0.05$), indicating a limited effect in these areas. Overall, the results support the effectiveness of the nursing intervention in improving several key clinical manifestations associated with pregnancy-induced hypertension.

The table 7 compares post-test perinatal outcomes between the study and control groups to evaluate the effect of the nursing interventional package. The Apgar scores were slightly higher in the study group than in the control group; however, this difference was not statistically significant. Similarly, NICU admission rates were lower in the study group compared to the control group, but this difference was also not statistically significant. Overall, although the study group demonstrated better perinatal outcomes, the differences were not significant, suggesting that the nursing intervention did not have a measurable effect on these outcomes in this study.

Discussion

The present study was undertaken to evaluate the effectiveness of structured nursing interventional package on vascular symptoms, quality of life, and perinatal outcomes among pregnant women with pregnancy induced hypertension. The finding clearly demonstrates significant improvements in quality of life among women in study group following intervention, along with betterment of vascular symptoms compared to control group. These results highlight the significant role of structured nursing care intervention in addressing both the physiological and psychological challenges associated with pregnancy-induced hypertension. The following discussion focusses on interpreting the findings of the current study in relation to its objectives and existing literature evidence.

The present study found that 55% of women with pregnancy induced hypertension, had mild blood pressure levels, 35% normal and 10% moderate hypertension, aligns with existing evidence showing the predominance of mild to moderate PIH cases in similar population (Zorab, 2023; Haque and Sarkar, 2020). Similarly, findings that half of participants had no proteinuria and rest had mild to moderate levels in current study is consistent with previous studies reporting that moderate proteinuria is common, but severe proteinuria remains less frequent in early or well managed PIH (Gomathi, Anuchithra, and Nautiyal, 2019). Oedema was predominantly observed at grade I and II in the current study, while weight

gain and headache severity were in mild to moderate range, which is commonly reported in other studies where such symptoms are frequent but rarely occur in a severe form unless the condition progresses to eclampsia or preeclampsia (Gomathi, Anuchithra, and Nautiyal, 2019). However, the high prevalence of insomnia and the findings of depression among all participants included in the present study, differ from other research demonstrating lower rates of depression (around 20%), indicating variations due to contextual factors or differences in methods used to assess psychological symptoms (Gomathi, Anuchithra, and Nautiyal, 2019).

In the current study, none of the participants in study or control group reported excellent or very good quality of life pre intervention, which is consistent with the existing research indicating that pregnancy induced hypertension have a negative impact on physical and mental health dimension of quality of life (Khadari et al., 2024), which highlights that these populations require targeted interventions. Interventions as guided imagery therapy and comprehensive nurse care have shown to have significant improvements in quality-of-life post intervention, highlighting the importance of supportive care to enhance wellbeing in this group (Jesy et al., 2025; Zhu, 2019). Overall, these findings reinforce the critical role of nursing and psychosocial interventions in improving QOL among pregnant women affected by PIH.

Multiple nurses led or enhanced nursing models have reported significant post intervention improvements in quality of life among women with hypertensive disorders during pregnancy, which is consistent with the 7.94-point increase in study group of the current study. Comprehensive nursing for gestational hypertension has been shown to improve scores across physical, psychological, environmental, and social quality of life domains compared to routine care (Zhu, 2019). Similarly, a vascular symptom management package for PIH produced a clear rise in QOL scores in study group compared to control group, paralleling the results of current study (Gomathi and Nautiyal, 2020). Furthermore, systematic reviews on nursing and health related QOL in PIH, support that structured, nurse delivered packages can mitigate QOL deterioration typically seen in hypertensive pregnancies (Khadari et al., 2024; Nayak et al., 2023).

The findings of current study demonstrate that structured nursing intervention significantly improved key clinical manifestations of pregnancy-induced hypertension including reduction in blood pressure, oedema, headache and epigastric pain. These results are consistent with the growing evidence supporting the effectiveness of nurse led and educational interventions as previous studies those evaluating vascular symptom management packages (VSMP) have reported significant reductions in vascular symptoms along with improvements in quality of life and perinatal outcomes (Gomathi, Anuchithra, and Nautiyal., 2019; Gomathi and Nautiyal, 2020). Likewise, recent systematic reviews and meta-analysis have shown that diverse nursing interventions such as health education, case management, and comprehensive nursing care consistently lead to better control of systolic and diastolic pressure, as well as enhanced psychological wellbeing among affected women (Tumkaya, Şen, and Eroğlu, 2025). Furthermore, various structured nurse led models, including IKAP (Information-Knowledge- Attitude- Practice) health education combined with cluster care, goal management based

targeted nursing, smartphone assisted life style coaching, and network based educational platform, have demonstrated improved blood pressure control and reduced maternal and neonatal complications (Wen and Liu, 2023; Guo et al., 2025; Changling, Ruan, & Tang, 2020).

However, similar to previous research, the current study did not observe significant improvement in proteinuria, which may be attributed to underlying physiological mechanism of PIH, where proteinuria reflects renal endothelial dysfunction that might be less responsive to behavioural and supportive interventions alone (Pan, Yu, and Liu, 2018; Armaly et al., 2018). In addition, the intervention had minimal effect on weight gain, consistent with previous research demonstrating that nursing interventions are effective in controlled weight gain rather than achieving a measurable reduction as weight changes are influenced by complex physiological and metabolic processes (Pan, Yu, and Liu, 2018; Wen and Liu, 2023).

The pattern observed in the present study with regard to perinatal outcomes, which showed better Apgar scores and NICU outcomes in the intervention group without statistical significance, is partly consistent and partly divergent from the available evidence. For example, a quasi-experimental study of women at risk of preterm labour found highly significant improvements in foetal outcomes (higher 1-minute Apgar, higher birthweight, markedly fewer NICU admissions, and less respiratory distress) in the intervention versus control group (Kareem et al., 2023). Likewise, a midwifery-led comprehensive care RCT in gestational hypertension reported significantly higher Apgar scores and reduced need for neonatal resuscitation and foetal mortality in the intervention arm (Nayak et al., 2025). These variations may be attributed to differences in sample size, duration and intensity of intervention, suggesting the need for further extensive research to establish stronger evidence on effect of nursing interventions on perinatal outcomes.

Conclusion

In conclusion, the findings of the present study highlight the important role of structured nursing interventions in the management of pregnancy-induced hypertension, particularly in improving vascular symptoms and enhancing the overall quality of life among affected women. The observed improvements in physical, psychological, and social domains suggest that comprehensive, nurse-led nursing care approaches can effectively address both the clinical and psychosocial aspects of the condition. Although better perinatal outcomes, such as improved Apgar scores and reduced need for intensive neonatal care were noted in the intervention group, these differences were not statistically significant, indicating the need for further research with larger sample sizes and longer follow-up periods. Overall, the study supports the integration of evidence-based nursing care models into routine maternal healthcare to optimize maternal well-being and potentially improve neonatal outcomes.

Limitations

The study was limited to a small sample size, which may reduce the statistical power and generalizability of the results. The short duration of follow-up might not have been sufficient to detect significant changes in perinatal outcomes. Self-reported measures, particularly for quality of life and psychological symptoms, may be subject to response bias. Furthermore, the study was confined to selected maternity centers in a single district, limiting the applicability of findings to wider populations.

Recommendations

Future studies should be conducted with larger sample sizes and in multiple settings to improve the generalizability of findings. Incorporating a longer follow-up period may help in better assessing the sustained impact of nursing interventional packages on both maternal and perinatal outcomes. Integration of structured nursing interventional packages into routine antenatal care, along with training programs for nurses, can enhance early identification and management of pregnancy-induced hypertension.

Declarations

Conflict of Interest

The authors declare no conflict of interest in publishing this manuscript.

Funding

No external funding was received for conducting this study.

Ethical Statement

Ethical approval for the study was obtained from the Institutional Ethical Committees, Vinayaka Mission Annapoorna Nursing College, Salem, India. Permission was also secured from administrative authorities of the selected maternity centres. Informed written consent were received from the participants after providing a clear explanation regarding the purpose and procedure of the study. Anonymity of participants were strictly maintained and the collected data were accessible only to the researcher. Participants were informed about their right to withdraw anytime from the study without the quality of care getting affected.

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Author Contribution Statements

Nithya Natarajan: Formulation of overarching research goals and aims; Development of methodology; conducting the investigation process, specifically data collection; writing the initial draft

Selvanayaki Venkatesan: Oversight and leadership responsibility for the research activity planning and execution, including mentorship; critical review, commentary of the manuscript

Judie Arulappan: Supervision of the research work; critical review, commentary of the manuscript in pre- or post-publication stages

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Tables

Tables 1 to 7 are available in the Supplementary Files section.

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