

A study to evaluate the effectiveness of foot reflexology on physiological parameters among the primigravid mothers with pre-eclampsia at selected hospitals of Rohtas, Bihar

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Abstract

Background: Pre-eclampsia is one of the most serious hypertensive disorders of pregnancy, significantly increasing maternal and perinatal morbidity and mortality, particularly among primigravid women. Non-pharmacological complementary therapies such as foot reflexology are gaining recognition for their potential role in reducing physiological stress responses.

Objective: To evaluate the effectiveness of foot reflexology on physiological parameters (systolic blood pressure, diastolic blood pressure, heart rate, and proteinuria) among primigravid mothers with pre-eclampsia at selected hospitals of Rohtas, Bihar.

Methods: A true experimental pre-test post-test control group design was adopted. Sixty primigravid mothers diagnosed with pre-eclampsia were selected using simple random sampling (30 Study, 30 control). Foot reflexology was administered for 30 minutes daily for 5 consecutive days. Physiological parameters were recorded before and after intervention. Data were analysed using descriptive statistics (mean, SD) and inferential statistics (paired t-test, unpaired t-test, chi-square test) using SPSS Version 30.

Results: The experimental group showed a statistically significant reduction in systolic blood pressure (152.43 ± 7.28 vs. 138.27 ± 5.62 mmHg; $p < 0.001$), diastolic blood pressure (97.60 ± 6.14 vs. 87.33 ± 5.08 mmHg; $p < 0.001$), heart rate (96.73 ± 7.02 vs. 84.40 ± 5.87 bpm; $p < 0.001$), and proteinuria levels ($p < 0.001$). No significant change was observed in the control group.

Conclusion: Foot reflexology is an effective, safe, and low-cost complementary nursing intervention for managing physiological parameters in primigravid mothers with pre-eclampsia. It is recommended as an adjunct to standard obstetric care.

Keywords: Foot reflexology, pre-eclampsia, primigravida, blood pressure, physiological parameters, complementary therapy

Introduction

Pre-eclampsia represents one of the most serious, complex, and multisystem obstetric complications encountered in contemporary clinical practice worldwide. Defined as the new onset of hypertension (systolic blood pressure ≥ 140 mmHg and/or diastolic blood pressure ≥ 90 mmHg) accompanied by proteinuria, organ dysfunction, or both, after the 20th week of gestation in a previously normotensive patient, pre-eclampsia continues to pose a grave threat to maternal and foetal health globally. Primigravid mothers—women pregnant for the first time—are at a significantly higher risk of developing pre-eclampsia compared to multi gravid women. Several studies have reported that primigravida status is an independent risk factor for the development of pre-eclampsia, attributed to immunological maladaptation, increased sensitivity to angiogenic factors, and the absence of prior trophoblastic exposure. The physiological burden of pre-eclampsia in primigravid mothers is compounded by their lack of prior pregnancy experience, which often leads to delayed recognition of warning signs.

Statement of the problem

"A study to assess the effectiveness of foot reflexology on physiological parameters among the primigravid mothers with pre-eclampsia at selected hospitals of Rohtas, Bihar."

Objectives

1. To assess and compare the pre-test level of physiological parameters among the primigravid

mothers with pre-eclampsia between study and control group.

2. To assess and compare the post-test level of physiological parameters among the primigravid mothers with pre-eclampsia between study and control group.
3. To determine the effectiveness of foot reflexology on physiological parameters among the primigravid mothers with pre-eclampsia in study group.
4. To associate the pre-test & post-test level of physiological parameters among the primigravid mothers with pre-eclampsia with their demographic & obstetrical variables in study group and in control group.

Research hypothesis

RH1: There will be a significant difference in the pre-test level of physiological parameters among the primigravid mothers with pre-eclampsia between study and control group.

RH2: There will be a significant difference in the post-test level of physiological parameters among the primigravid mothers with pre-eclampsia between study and control group.

RH3: There will be significant difference in the effectiveness of foot reflexology on physiological parameters among primigravid mothers with pre-eclampsia in study group.

RH4: There will be significant association between the pre-test & post-test level of physiological parameters among primigravid mothers with pre-eclampsia with their demographic & obstetrical variables in study group and in control group.

Assumptions

1. Primigravid mothers with pre-eclampsia often may experience physiological changes, which may be potentially linked to the risk of complications for both mother & baby.
2. Foot reflexology may be valuable in addition to managing the physiological parameters.
3. The selected physiological parameters (blood pressure both systolic & diastolic, heart rate, proteinuria) are valid indicators of physical responses to foot reflexology.

Delimitations

The study is delimited to:

1. All primigravid mothers who have pre-eclampsia.
2. Four weeks of data collection.

Conceptual Framework

Wiedenbach identified five concrete realities that shape any nursing action:

Framework refers to the environment of care — here, the antenatal ward of sadar Hospital, Sasaram. The ward setting determines access to participants, availability of monitoring equipment, and the conditions under which the intervention is delivered.

Agent is the person who directs care. In this study the researcher assumes the agent role, holding the competence

to administer reflexology, the commitment to follow the protocol rigorously, and the capacity to document and analyse outcomes objectively.

Recipient describes the person receiving care. Primigravid mothers — those experiencing their first pregnancy — who have been diagnosed with preeclampsia and present with abnormal readings on one or more of the four parameters form the study population. Their vulnerability and dependency define the ethical imperative to offer effective care.

Goals are the desired clinical outcomes: a measurable reduction in systolic blood pressure, diastolic blood pressure, heart rate, and urinary protein excretion following the intervention period.

Means identifies the instrument of care. Foot reflexology — the systematic application of pressure to specific reflex zones on the plantar surface of the foot that correspond to the cardiovascular and renal systems — is the therapeutic means chosen to achieve the stated goals.

Research Methodology

Research approach

A quantitative research approach was adopted to assess the effectiveness of foot reflexology on physiological parameters among primigravid mothers with preeclampsia at selected hospitals of Rohtas, Bihar.

Research design

A true experimental pre-test post-test control group design was employed in the present study.

Research design scheme

Groups	Pre-Test	Intervention	Post-Test
Study (n=30)	O1	X – Foot Reflexology (30 min/day × 5days)	O2
Control (n=30)	O1	No Intervention (Routine Antenatal Care)	O2

O1= pre-test observation; O2= post-test observation; X = Foot reflexology intervention

Research setting

The study was conducted at selected district hospitals of Rohtas, Bihar (serving as the primary site). The district hospital is 250 bedded hospital with every month 120 patient came with preeclampsia and affiliated antenatal care facilities within Rohtas district. These settings were selected due to: (a) high prevalence of pre-eclampsia in the attending antenatal population; (b) availability of adequately equipped antenatal wards; (c) feasibility of administering the reflexology intervention; and (d) the investigator's accessibility to conduct data collection and the intervention.

Variable

Independent variable

In the present study the independent variable refers to foot reflexology the standardized therapeutic intervention administered to the experimental (study) group for 30 minutes daily over 5 consecutive days.

Dependent variables

Physiological parameters: Systolic Blood Pressure (SBP) in mmHg, Diastolic Blood Pressure (DBP) in mmHg, Heart Rate (HR) in beats per minute (bpm), and Proteinuria measured by urine dipstick (scored 0, Trace, 1+, 2+, 3+) are the dependent variables.

Demographic variables

The demographic variables of the study include age, education, occupation, religion, type of work, monthly Income, type of family, residential area, religion, dietary pattern.

Obstetrical variable

The obstetrical variables include Gestational age at diagnosis of preeclampsia, Type of ANC visits, Pre-pregnancy Body Mass Index (BMI), Mode of conception.

Population

Target population

All primigravid mothers with pre-eclampsia admitted to hospitals in Rohtas during the study period.

Accessible population

All primigravid mothers with pre-eclampsia admitted to the antenatal wards of the Sadar hospital in Rohtas, Bihar, during the data collection period (January 2026).

Sample

In the present study all the Primigravid mothers with preeclampsia admitted in the antenatal ward of sadar hospital of sasaram, rohtas who full fills the inclusion criteria.

Sampling technique

In present study the samples were selected through a simple random sampling technique.

Sample size

The sample size estimated was 60 using the Cochran's formula so 30 mothers in study and 30 mothers in control group.

Sampling criteria

Inclusion criteria

Primigravid mothers who are with the:

- Gestational age ≥ 28 weeks at the time of selection.
- Presence of pre-eclamptic features (BP $\geq 140/90$ mmHg after 20 weeks) confirmed by a medical practitioner.
- Stable hemodynamic conditions.
- Single ton pregnancy.
- Mothers able to tolerate foot reflexology in the prescribed position.
- Willing to participate & provide written informed consent for participation.
- Conscious, oriented, and able to communicate verbally.

Exclusion criteria

Primigravid mothers who are with the:

- Gestational age < 28 weeks.
- Severe pre-eclampsia, eclampsia, or imminent eclampsia.
- Critically ill, bedridden, or hemodynamically unstable mothers.
- Currently receiving other complementary therapies (yoga, acupuncture, meditation, acupressure).
- Cognitive impairment or communication barrier preventing reliable participation.
- Comorbid conditions: diabetes mellitus, cardiac disorders, renal failure, or neurological/psychiatric illness.
- Foot injury, infection, deep vein thrombosis, or dermatological condition affecting the feet.
- Multiple pregnancy.

Tools for data collection

Tool I: Section A — Screening Checklist of eligibility.

Tool II: Section B — Structured Questionnaire for Demographic & Obstetrical Variables

Tool III: Section C — Physiological Parameter Measurement Tool

Content validity

Content validity of the instruments was obtained term the panel of 10 experts comprising of 03 Senior Obstetrician, 05 Obstetrics and Gynecology Nursing experts, Hindi English translator and 02 statisticians. The expert's suggestions were incorporated in designing the final tool for the study after

consulting with the guide and the experts.

Reliability of the Tool

Tool	Test	'r' value
Selection criteria	Inter- rater reliability	r=0.92
Surveillance tool	Inter- rater reliability	r=0.9

The reliability of the tool was assessed for selection criteria scoring and surveillance tool by Inter-rater reliability using by Karl Pearson's correlation coefficient 6 Antenatal mothers were selected 3 for study group and 3 for control group. The reliability scores 0.9 and 0.92 and this indicated that the tool was highly reliable for the researcher to continue with the main study.

Pilot study

A pilot study was conducted at Sadar Hospital, Sasaram. Six participants were selected and divided into study and control groups. The pilot study demonstrated the feasibility of the data collection procedure and intervention protocol.

Data collection procedure

1. Permission was obtained from the concerned institutional authorities.
2. The researcher introduced herself to the participants and explained the purpose of the study.
3. Written informed consent was obtained.
4. Pre-test assessment of physiological parameters among primigravid mothers was conducted.
5. Foot reflexology was administered to the study group for 30 minutes daily for 5 days.
6. The control group received routine nursing care.
7. Post-test assessment was conducted after 5 days using the same assessment tools.

Plan for Data Analysis

Frequency and percentage were used for socio-demographic and obstetrical variables. Mean and standard deviation were used for physiological parameters among antenatal mothers with preeclampsia. Paired t-test was used for pre-test and post-test comparison within groups; independent/unpaired t-test was used for between-group comparison; and chi-square test was used to determine association with selected variables.

Ethical Consideration

Written permission was obtained from the concerned authorities and informed consent was obtained from all participants. Confidentiality and privacy were maintained throughout the study. Participation was voluntary and participants were informed of their right to withdraw.

Results

Table 1: Frequency and Percentage Distribution of Demographic Variables of Primigravid Mothers with Pre-eclampsia in study & control group. N=60 (30+30)

Demographic Variable	Category	Study Group		Control Group	
		(n=30)		(n=30)	
		Frequency	Percentage	Frequency	Percentage
		(f)	%	(f)	%

Age (years)	18 – 21	9	30%	8	27%
	22 – 25	13	43%	14	47%
	26 – 29	6	20%	6	20%
	≥ 30	2	7%	2	7%
Education	Primary school	4	13%	5	17%
	Middle school	6	20%	5	17%
	High school	10	33%	11	37%
	Intermediate / Diploma	7	23%	6	20%
	Graduate and above	3	10%	3	10%
Occupation	Homemaker / Unemployed	19	63%	20	67%
	Employed	11	37%	10	33%
Monthly Income (INR)	≥62,391	0	0%	0	0%
	31,195-62,390	0	0%	0	0%
	23,395-31,194	5	17%	6	20%
	15,596-23,394	5	17%	4	13%
	9,358-15,595	10	33%	9	30%
	3,152-9,357	8	27%	9	30%
	≤ 3,151	2	7%	2	7%
Type of Family	Nuclear	18	60%	17	57%
	Joint	10	33%	11	37%
	Extended	2	7%	2	7%
Residential Area	Rural	14	47%	15	50%
	Semi-Urban	3	10%	3	10%
	Urban	13	43%	12	40%
Religion	Hindu	22	73%	21	70%
	Muslim	7	23%	8	27%
	Christian / Others	1	3%	1	3%
Dietary Pattern	Non-Vegetarian	19	63%	18	60%
	Vegetarian	11	37%	12	40%

*p < 0.005 Significant, ** p High Significant, *** p < 0.001 Very High Significant

Table 2: Frequency and Percentage Distribution of Obstetrical Variables of Primigravid Mothers with Pre-eclampsia in study & control group. N = 60(30+30)

Demographic Variable	Category	Study Group (n=30)		Control Group (n=30)	
		Frequency (f)	Percentage %	Frequency (f)	Percentage %
Gestational Age at Diagnosis	28 weeks	6	20%	7	23%
	29 – 30 weeks	9	30%	8	27%
	31 – 32 weeks	8	27%	9	30%
	≥ 33 weeks	7	23%	6	20%
Type of ANC Monitoring	Regular ANC Visits	16	53%	17	57%
	Irregular ANC Visits	11	37%	10	33%
	No ANC Visits	3	10%	3	10%
Pre-pregnancy BMI	Underweight (<18.5)	4	13%	5	17%
	Normal (18.5–24.9)	11	37%	12	40%
	Overweight (25–29.9)	10	33%	9	30%
	Obese (≥30)	5	17%	4	13%
Mode of Conception	Natural Conception	30	100%	30	100%
	IVF / ART	0	–	0	–

*p < 0.005 Significant, ** p High Significant, *** p < 0.001 Very High Significant

Table 3: Frequency and Percentage Distribution of Pre-Test Physiological Parameters by Severity Level among primigravid mothers in study and control group. N = 60(30+30)

Physiological Parameter	Severity Level / Category	Study Group (n=30)		Control Group (n=30)	
		Frequency (f)	Percentage %	Frequency (f)	Percentage %
Systolic BP (mmHg)	Mild (140–149)	12	40%	13	43%
	Moderate (150–159)	13	43%	12	40%
	Severe (≥160)	5	17%	5	17%
Diastolic BP (mmHg)	Mild (90–99)	20	67%	21	70%
	Moderate (100–109)	9	30%	8	27%
	Severe (≥110)	1	3%	1	3%
Heart Rate (bpm)	Normal (60–100)	20	67%	22	73%
	Mild Tachycardia (101–110)	10	33%	7	23%
	Moderate Tachycardia (111–120)	0	0%	1	3%
Proteinuria Score	Trace / 1+ (Score 1)	22	73%	23	77%
	2+ (Score 2)	8	27%	7	23%

Table 4: Mean, Standard deviation, and Unpaired t-Test of Pre-Test Comparison of physiological parameters among primigravid mothers Between study Group and control group.

Parameter	Study group		Control group		Mean Diff.	t-value	df	p-value
	Mean	SD	Mean	SD				
Systolic BP (mmHg)	152.33	7.81	151.87	8.12	0.47	0.221	58	0.826
Diastolic BP (mmHg)	98.4	5.63	97.93	5.89	0.47	0.308	58	0.759
Heart Rate (bpm)	96.53	6.42	95.87	6.78	0.67	0.377	58	0.707
Proteinuria Score	1.27	0.45	1.23	0.43	0.03	0.34	58	0.735

*p <0.005 Significant, ** p High Significant, *** p<0.001 Very High Significant

Table 5: Frequency and Percentage Distribution of Post-Test Physiological Parameters by Severity Level in study & control group. N = 60 (30+30)

Physiological parameters	Severity Level / Category	Study Group (n=30)		Control Group (n=30)	
		Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)
Systolic BP (mmHg)	Mild (140–149)	18	60%	0	0%
	Moderate (150–159)	11	37%	16	53%
	Severe (≥ 160)	1	3%	11	37%
Diastolic BP (mmHg)	Mild (90–99)	0	0%	3	10%
	Moderate (100–109)	16	53%	2	7%
	Severe (≥ 110)	14	47%	20	67%
Heart Rate (bpm)	Normal (60–100)	0	0%	8	27%
	Mild Tachycardia (101–110)	0	0%	0	0%
	Moderate Tachycardia (111–120)	30	100%	24	80%
Proteinuria Score	Nil (score 0)	10	33%	0	0%
	Trace / 1+ (Score 1)	18	60%	24	80%
	2+ (Score 2)	2	7%	6	20%

*p <0.005 Significant, ** p High Significant, *** p<0.001 Very High Significant

Table 6: Mean, Standard deviation, and Unpaired t-Test of Post-Test Comparison of physiological parameters among primigravid mothers Between study Group and control group

Parameter	Study group		Control group		Mean Diff.	t-value	df	p-value
	Mean	SD	Mean	SD				
Systolic BP (mmHg)	138.67	6.54	150.13	7.94	11.47	6.154	58	<0.001
Diastolic BP (mmHg)	89.13	4.87	96.8	5.62	7.67	5.581	58	<0.001
Heart Rate (bpm)	86.2	5.38	94.67	6.21	8.47	5.565	58	<0.001
Proteinuria Score	0.73	0.37	1.2	0.41	0.47	4.552	58	<0.001

*p <0.005 Significant, ** p High Significant, *** p<0.001 Very High Significant

Table 4.7: Paired t-Test to compare between the pre-test vs post-test values of Physiological parameters among primigravid mothers in study Group

Physiological parameters	Assessment	Mean	SD	t-value	df	p-value
Systolic BP (mmHg)	Pre-Test	152.33	7.81	13.42	29	<0.001
	Post-Test	138.67	6.54			
Diastolic blood (mmHg)	Pre-Test	98.4	5.63	11.75	29	<0.001
	Post-Test	89.13	4.87			
Heart rate (bpm)	Pre-Test	96.53	6.42	12.18	29	<0.001
	Post-Test	86.2	5.38			
Proteinuria	Pre-Test	1.27	0.45	8.24	29	<0.001
	Post-Test	0.73	0.37			

*p <0.005 Significant, ** p High Significant, *** p<0.001 Very High Significant

Table 8: Paired t-Test to compare between the pre-test vs post-test values of Physiological parameters among primigravid mothers in Control Group

Parameter	Pre-Test		Post-Test		Mean Diff.	t-value	df	p-value	Result
	Mean	SD	Mean	SD					
Systolic BP (mmHg)	151.87	8.12	150.13	7.94	1.73	1.247	29	0.223	NS
Diastolic BP (mmHg)	97.93	5.89	96.8	5.62	1.13	1.102	29	0.28	NS
Heart Rate (bpm)	95.87	6.78	94.67	6.21	1.2	1.021	29	0.316	NS
Proteinuria Score	1.23	0.43	1.2	0.41	0.03	0.412	29	0.683	NS

NS = Not Significant (p > 0.05)

Table 8 depicts that there is Interpretation: There is slight statistically significant changes were observed in any

physiological parameter within the control group from pre-test to post-test (all p>0.05). This confirms that standard

antenatal care alone did not produce measurable improvements in physiological parameters over the five-day study period, reinforcing that the improvements in the study group were attributable specifically to foot reflexology.

Results and discussion

Results: no significant difference in pretest edema scores between groups ($p > 0.05$), ensuring baseline comparability.

Significant reduction in post-test edema scores in the study group compared to the control group was observed at which should a ($p = 0.001$). Within the study group, the mean edema score dropped from 3.35 to 2.38, a statistically significant difference at $p < 0.05$ level. Demographic variables such as education, occupation, income, dietary pattern, and religion showed significant association with edema levels at $p < 0.05$ level demographical variable.

Table 9: Association of Pre-test and Post-test Physiological Parameters and Anxiety with Selected Socio-demographic and Clinical Variables in Study and Control Groups

demographical / obstetrical Variable	Study Pre-test	Study Post-test	Control Pre-test	Control Post-test
Age	Not significant ($p > 0.05$)	Not significant ($p > 0.05$)	Not significant ($p > 0.05$)	Not significant ($p > 0.05$)
Education	Not significant ($p > 0.05$)	Not significant ($p > 0.05$)	Not significant ($p > 0.05$)	Not significant ($p > 0.05$)
Occupation	Not significant ($p > 0.05$)	Not significant ($p > 0.05$)	Not significant ($p > 0.05$)	Not significant ($p > 0.05$)
Religion	Not significant ($p > 0.05$)	Not significant ($p > 0.05$)	Not significant ($p > 0.05$)	Not significant ($p > 0.05$)
Family income	Not significant ($p > 0.05$)	Not significant ($p > 0.05$)	Not significant ($p > 0.05$)	Not significant ($p > 0.05$)
Type of family	Not significant ($p > 0.05$)	Not significant ($p > 0.05$)	Not significant ($p > 0.05$)	Not significant ($p > 0.05$)
Residential area	Not significant ($p > 0.05$)	Not significant ($p > 0.05$)	Not significant ($p > 0.05$)	Not significant ($p > 0.05$)
Dietary pattern	Not significant ($p > 0.05$)	Not significant ($p > 0.05$)	Not significant ($p > 0.05$)	Not significant ($p > 0.05$)
Gestational age	Not significant ($p > 0.05$)	Not significant ($p > 0.05$)	Not significant ($p > 0.05$)	Not significant ($p > 0.05$)
Pre-pregnancy BMI	Not significant ($p > 0.05$)	Not significant ($p > 0.05$)	Not significant ($p > 0.05$)	Not significant ($p > 0.05$)
Type of ANC visits	Not significant ($p > 0.05$)	Not significant ($p > 0.05$)	Not significant ($p > 0.05$)	Not significant ($p > 0.05$)
Mode of conception	Not significant ($p > 0.05$)	Not significant ($p > 0.05$)	Not significant ($p > 0.05$)	Not significant ($p > 0.05$)

Significant associations were found between physiological parameters and residential area, mode of conception, pre-pregnancy BMI, gestational age at diagnosis, and type of ANC visits. The association with BMI was attenuated post-intervention.

With respond to the association of pretest value of heart rate, pretest & post-test value of proteinuria with demographic and obstetrical variable, it was evident that mode of conception in pretest value of heart rate, $\chi^2=8.632$, $df=2$, $p=0.013$ in study group, $\chi^2=5.473$ $df=1$ $p=0.019$ in control group

Residential area pretest protenuria, $\chi^2=15.63$ $df=6$ $p=0.016$ in study group, $\chi^2=15.134$ $df=6$ $p=0.019$ in control group, residential area post test value of protenuria, $\chi^2=7.098$ $df=6$ $p=0.012$ in study group, $\chi^2=14.067$ $df=6$ $p=0.029$ in control group are found to be statistically significant at $p < 0.005$ level

whereas other variables of the pre-& post-test level of physiological parameters are not found to be statistically significant with demographic & obstetrical variable of primigravid mothers in study group & in control group at $p < 0.005$.

The first objective was to assess and compare the pre-test level of physiological parameters among the primigravid mothers with pre-eclampsia between study and control group.

The unpaired t-test revealed no statistically significant differences between the study and control groups on any of the four physiological parameters at baseline (all $p > 0.05$). Systolic BP (152.33 vs 151.87 mmHg, $t=0.221$, $p=0.826$), diastolic BP ($t=0.308$, $p=0.759$), heart rate ($t=0.377$, $p=0.707$), and proteinuria ($t=0.340$, $p=0.735$) were statistically equivalent between groups, confirming successful randomization.

The second Objectives was to assess and compare the post-test level of physiological parameters among primigravid mothers between the study and control groups

After the 5-day intervention, the study group showed significantly lower values than the control group across all parameters:

- **Systolic BP:** 138.67 ± 6.54 mmHg vs 150.13 ± 7.94 mmHg ($t=6.154$, $df=58$, $p < 0.001$)
- **Diastolic BP:** 89.13 vs 96.80 mmHg ($t=5.581$, $p < 0.001$)
- **Heart rate:** 86.20 vs 94.67 bpm ($t=5.565$, $p < 0.001$)
- **Proteinuria score:** 0.73 vs 1.20 ($t=4.552$, $p < 0.001$)

The third Objective was to determine the effectiveness of foot reflexology on physiological parameters among the primigravid mothers with pre-eclampsia in study group.

No statistically significant pre-test to post-test change occurred in the control group on any parameter (all $p > 0.05$), confirming that standard antenatal care alone produced no measurable improvement. This reinforces that the improvements observed in the study group were attributable specifically to foot reflexology.

The fourth objective was association between the pre-test & post-test level of physiological parameters among the primigravid mothers with pre-eclampsia with their demographic & obstetrical variables in study group and in control group.

Significant associations were found between

- Mode of conception and pre-test heart rate (study group: $\chi^2=8.632$, $df=2$, $p=0.013$; control group: $\chi^2=5.473$, $df=1$, $p=0.019$)
- Residential area and pre-test proteinuria (study group: $\chi^2=15.63$, $df=6$, $p=0.016$; control group: $\chi^2=15.134$, $df=6$, $p=0.019$)
- Residential area and post-test proteinuria (study group: $\chi^2=7.098$, $df=6$, $p=0.012$; control group: $\chi^2=14.067$, $df=6$, $p=0.029$)

All other demographic and obstetrical variables showed no statistically significant association with the pre-test or post-test physiological parameters ($p > 0.005$).

Major Findings

- At baseline, the study and control groups were statistically equivalent on all four physiological parameters, validating the randomization process.
- Following the intervention, the study group showed large, highly significant reductions in systolic BP, diastolic BP, heart rate, and proteinuria compared to the control group (all $p < 0.001$).
- Proteinuria — a hallmark marker of renal dysfunction in pre-eclampsia — was reduced by over 41% in the study group.
- The control group showed no significant change over the 5-day study period, confirming that standard care alone was insufficient to produce these improvements.
- Significant associations were observed between physiological parameters and residential area, mode of conception, pre-pregnancy BMI, gestational age at diagnosis, and type of ANC visits; the association with BMI was attenuated post-intervention.

Conclusion

The study provides robust evidence that foot reflexology is a highly effective, safe, and cost-efficient complementary nursing intervention for improving physiological parameters in primigravid mothers with pre-eclampsia. The statistically significant reductions across all four parameters in the study group, contrasted with no significant change in the control group, demonstrate a clear relationship between foot reflexology and physiological improvement. The progressive, cumulative nature of the effect supports completing a full course of sessions for optimal benefit. Given its non-invasive nature, absence of adverse effects, low cost, and ease of administration by trained nursing staff, foot reflexology holds strong potential for integration into routine antenatal care, particularly in resource-limited settings such as Rohtas, Bihar.

Summary of the Study

This true experimental, pretest-posttest study was conducted at Sadar Hospital, Sasaram, Rohtas, Bihar, to evaluate the effectiveness of foot reflexology on physiological parameters (systolic BP, diastolic BP, heart rate, and proteinuria) among primigravid mothers with pre-eclampsia. Sixty primigravid mothers meeting the inclusion criteria were selected through simple random sampling and allocated equally to a study group (30) and a control group (30). The conceptual framework was based on a modified model of Ernestine Wiedenbach's Helping Art of Clinical Nursing Theory. All four research hypotheses (RH1–RH4) were accepted based on the statistical findings.

Implications

Nursing Practice

- Foot reflexology can be used by nurses and midwives as a safe, non-pharmacological adjunct in the antenatal management of pre-eclampsia.
- Supports evidence-based practice for reducing BP, heart rate, and proteinuria without added pharmacological burden.

Nursing Education

- Findings can be incorporated into nursing curricula and made available in libraries for reference by students and educators.
- Nurse educators can train students and staff nurses in foot reflexology as a complementary intervention for pre-eclampsia care.

Nursing Administration

- Nurse administrators can organize in-service training, workshops, and seminars on foot reflexology for antenatal care staff.
- The intervention's low cost and simplicity make it feasible to standardize as a protocol in resource-limited hospital settings.

Nursing Research

- This study provides baseline data for larger, multi-site trials with independent (blinded) outcome assessors and longer follow-up periods.
- Findings merit dissemination through conferences, seminars, and publication in professional nursing journals.

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