Effectiveness of Aromatherapy on Lowering Blood Pressure among Mothers with Pre- Eclampsia

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Abstract

Quasi experimental research was conducted among 60 pre – eclampsia mothers and were assigned equally in both interventional and placebo group. Self-structured questionnaire was used to collect the demographic and clinical data. The pre test level of blood pressure and the proteinuria level was assessed followed by that, the study participants were administered with Lavender aroma therapy in the interventional group and a routine hospital care was initiated in the placebo group for 3 days. Blood pressure level was monitored in three sessions per day for 3 days before and after the intervention in both interventional and placebo groups. Followed by that the proteinuria level was reassessed only on Day -3 sin both groups. The results revealed that the pretest and post test mean score of systolic BP in the interventional group was 146.73±1.40 and 135.83±3.01. The mean difference score was 10.89 with 't' test value of t = 20.091 was statistically significant at p<0.001 level. The pretest and post-test mean score of diastolic BP in the interventional group was 76.81±3.09 and 73.16±2.82. The mean difference score was 3.65 with 't' test value of t = 4.625 was statistically significant at p<0.001 level. The pretest and post-test mean score of proteinuria in the interventional group was 2.90±0.66 and 2.33±0.84. The mean difference score was 0.57 with 't' test value of t = 2.664 was statistically significant at p<0.05 level. This clearly infers that administering aromatherapy was found to be effective in lowering blood pressure among mothers with pre- eclampsia.

Keywords: *Aromatherapy, Blood Pressure Pre-Eclampsia.*

Introduction

In the life of every woman, pregnancy is the pleasing and attractive moment that prepares her for motherhood resulting from changes both physiologically and physically [1]. It has been estimated that 200 million females of reproductive age become pregnant [2] out of which 6- 10% of women suffer from hypertensive disorders during the pregnancy period [3] which serves as a major cause for the occurrence of both maternal and fetal morbidity and mortality [4]. It has been estimated that 1 in 14 pregnant women are suffering from hypertension [5]. Around 1.5 deaths per 100,000 live births occur every year due to hypertensive disorders during the prenatal period [6]. PIH occurs after 20 weeks of gestation which results from the development of hypertension, edema and proteinuria [7]. leading to complications like antepartum haemorrhage, disseminated intravascular coagulation and multiple organ failure [8]. The associated risk factors that induce hypertension during the prenatal period are nulliparity, advanced maternal age, irregular antenatal visits inadequate supervision during the antenatal period, and family history of hypertension and obesity [9].

The prevalence of PIH is more common among young, aged group women [10] Due to abnormal invasion of the cytotrophoblastic arterioles diminishes uteroplacental perfusion leading to dysfunction of maternal vascular endothelium which enhances endothelin and thromboxane formation and raising vascular sensitivity to angiotensin II and decreased formation of nitric oxide [11]. A recent meta-analysis research studies identified that women suffering from hypertensive disorders during their prenatal period tend to develop stroke, ischemic heart diseases, and venous thromboembolic disorders after 5- 15 years and the risk of developing hypertension among women with a previous history of pre-eclampsia increases to four-fold [12]. The preventive measures of pre-eclampsia include a healthy diet, regular exercise, apt weight gain and stress reduction [13]. The first choice of pharmacological drugs to treat PIH includes labetalol, hydralazine, methyl dopa and nifedipine [14].

Aromatherapy consumes essential oils that take the initiative of curative agents, which consider particular concentrated substances derived from flowers, leaves, stalks, fruits, roots, and resins. These substances are colourless by nature with a pleasant smell [15]. Research studies have proven that administering aroma therapy reduces blood pressure [16]. There are various types of aromatherapies available and the most commonly used aromatherapy for declining blood pressure are lavender, rosemary and sage [17]. The investigators were interested in implementing aroma therapy for antenatal mothers who developed hypertension as a part of nursing care to verify the results among the South Indian population.

Therefore, the objectives of the current study were 1. To assess and compare the Pre and posttest levels of physiological and biochemical Parameters among antenatal mothers between the interventional and placebo group. 2. To determine the effectiveness of aroma therapy on physiological and biochemical Parameters among antenatal mothers and to find out the association between the posttest levels of physiological and biochemical parameters among antenatal mothers in the interventional group with their selected demographic variables.

Material and Methods

Study Design

Quasi quasi-experimental pretest-posttest control group research design was adopted to investigate the effectiveness of aromatherapy on lowering blood pressure among mothers with pre-eclampsia

Study Setting

The current study was conducted for 3 months from March 2023 to June 2023 in the antenatal clinic of the host institution.

Ethical Approval

After obtaining ethical clearance from the Institutional Ethical Committee (IEC) of Saveetha Institute of Medical and Technical Sciences and formal permission from the departmental head of Obstetrics and Gynecology, the study was conducted.

Study Participants

A total of 60 antenatal mothers who fulfilled and met the inclusion criteria were recruited as study participants by using a purposive sampling technique. Pregnant women with 20 weeks of gestational age and above who are diagnosed with pre-eclampsia, who are willing to participate and who can read and speak Tamil or English were included in the current study. Pregnant women with eclampsia, severe maternal medical illness, bleeding disorders, psychiatric disorders, previous bad obstetric history, allergic to lavender oil, and those who follow alternative therapies including

reflexology, acupressure, acupuncture, and non-co-operative were excluded.

Sampling Technique

After recruiting the pre-eclamptic women through a non-probability purposive sampling technique, all 60 study participants were equally divided for both the interventional group (aroma therapy) and the placebo group.

Informed Consent

The purpose of the study was explained in depth to each of the study participants and written informed consent was obtained from them.

Pre-Assessment

The demographic and clinical information was gathered by using a self-structured questionnaire, followed by, the level of blood pressure was monitored by using a digital sphygmomanometer and the proteinuria level was assessed using a urine dipstick.

Intervention Details: For Interventional Group

On Day 1 the study participants were administered Lavender aroma therapy.

Method of Administering Aroma Therapy

5 drops of lavender oil with 20 ml of water were mixed in the diffuser effuses steam, was given in three sessions per day (morning, afternoon and at bed time) for 3 days.

For placebo group- On Day-1 routine hospital care was initiated from Day-1 to Day -3 **Post Assessment:** The level of blood pressure was monitored in three sessions per day (morning, afternoon and at bedtime) for 3 days before and after the intervention in both interventional and placebo groups followed by that the proteinuria level alone was reassessed by using urine dipstick only on Day -3 in both interventional and placebo groups.

Results and Discussion

Demographic and Clinical Characteristics

With regards to the age of the study participants, 12(40%) in the interventional group and 10(33.3%) in the placebo group were aged above 30 years. With regards to the educational qualification, 17(56.7%) in the interventional group and 9(30%) in the placebo group had high school education. With regards to occupational status, 22(73.4%) in the interventional group and 19(63.3%) in the placebo group were housewives. With regards to the family income per month,19(63.4%) in the interventional group and 14(46.6%) in the placebo group had an income of Rs.5000 – 10,000. With regards to the family type, 22(73.3%) in the interventional group and 18(60%) in the placebo group belonged to the nuclear family. With regards to the type of residential living, 22 (73.3%) in the interventional group and 18 (60%) in the placebo group live in urban area. With regards to the type of marriage, 20(66.7%) in the interventional group and 21(70%) in the placebo group had non-consanguineous marriage.

With regards to the gravid status of our study participants, 22(73.3%) in the interventional group and 23(76.7%) in the placebo group were primi mothers. With regards to the history of previous abortion 26(86.7%) in the interventional group and 24(80%) in the placebo group had no history of previous abortion. With regards to the history of previous pregnancy complications, 27(90%) in the interventional group and 25(83.3%) in the placebo group had no history of complications in previous pregnancy. With regards to the history of multiple gestation, 30(100%) in the interventional group and 28(93.3%) in the placebo group had no history of multiple pregnancies. With regards to the history of pre-eclampsia, 28(93.3%) in the interventional

group and 25(83.3%) in the placebo group had no history of pre-eclampsia. With regards to BMI,11(36.6%) in the interventional group and 13(43.4%) in the placebo group were obese. With regards to the pregnancy interval duration, 17(56.7%) in the interventional group and 18(60%) in the placebo group had pregnancy interval of <3 years. With regards to regular visits to the antenatal clinic during pregnancy, 29(96.7%) in the interventional group and 27(90%) in the placebo group had a history of regular antenatal visits during pregnancy. With regards to the gestational age of our study participants, 30(100%) in the interventional group and 28(93.3%) in the placebo group were between 20 – 25 weeks of gestation.

Assessment of Blood Pressure and Proteinuria among Mothers with Pre-Eclampsia in the Interventional and Placebo Group

In the pretest of the interventional group, 30(100%) had stage 1 hypertension and in the post-test, 28(93.33%) had prehypertension and 2(6.67%) had stage 1 hypertension. In the pretest of the control group, 30(100%) had stage I hypertension and in the posttest 29(93.3%) had stage 1 hypertension and 1(3.3%) had prehypertension. In the pretest and posttest of the interventional and placebo group, 30(100%) had prehypertension (as depicted in Table 1, Table 2 and Figure 1, Figure 2).

In the pretest of interventional group 17(56.6%) had protein urea score 3+, 8(26.7%) had 2+ and 5916.67%) had 4+ score whereas in the post test after the intervention, 14(46.7%) had 3+, 9(30%) had 2+, 6(20%) had 1+ and 1(3.3%) had 4+ score. In the pretest placebo group, 20(66.7%) had 3+ score, 8(26.7%) had 2+ score and 4(13.3%) had 4+ score and in the post test, 18(60%) had 3+ score, 8(26.7%) had 2+ score and 4(13.3%) had 4+ score. (as depicted in Table 3 and Figure 3).

Table 1. Frequency and Percentage Distribution of Systolic Bp Among Mothers with Pre-Eclampsia in the Interventional and Placebo Group N = 60(30+30)

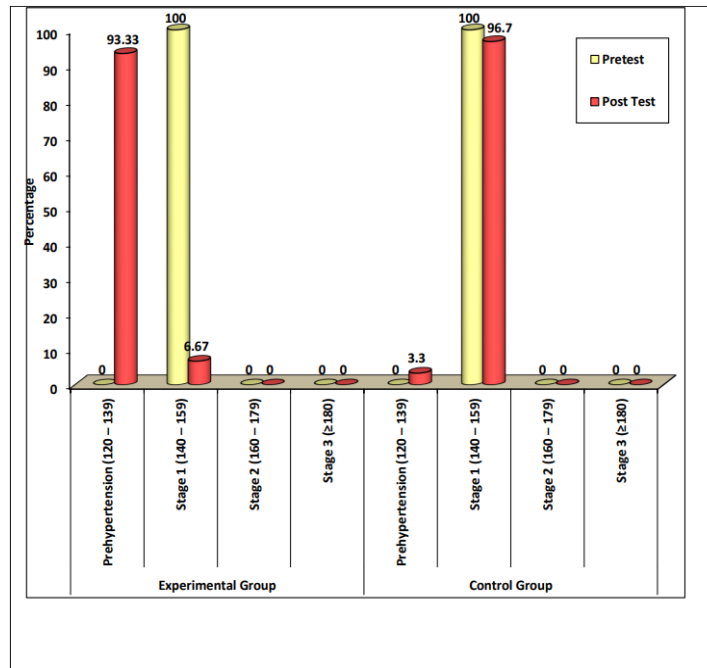| Systolic BP | Interventional Group | | | | Placebo Group | | | |
| | Pretest | | Post Test | | Pretest | | Post Test | |
	No.	%	No.	%	No.	%	No.	%
Prehypertension (120 – 139)	0	0	28	93.33	0	0	1	3.3
Stage 1 (140 – 159)	30	100.0	2	6.67	30	100.0	29	93.3
Stage 2 (160 – 179)	0	0	0	0	0	0	0	0
Stage 3 (≥180)	0	0	0	0	0	0	0	0

Figure 1. Percentage Distribution of Systolic BP among Mothers with Pre-Eclampsia in the Interventional and Placebo Group

Table 2. Frequency and Percentage Distribution of Diastolic BP among Mothers with Pre-Eclampsia in the Interventional and Placebo Group N = 60(30+30)

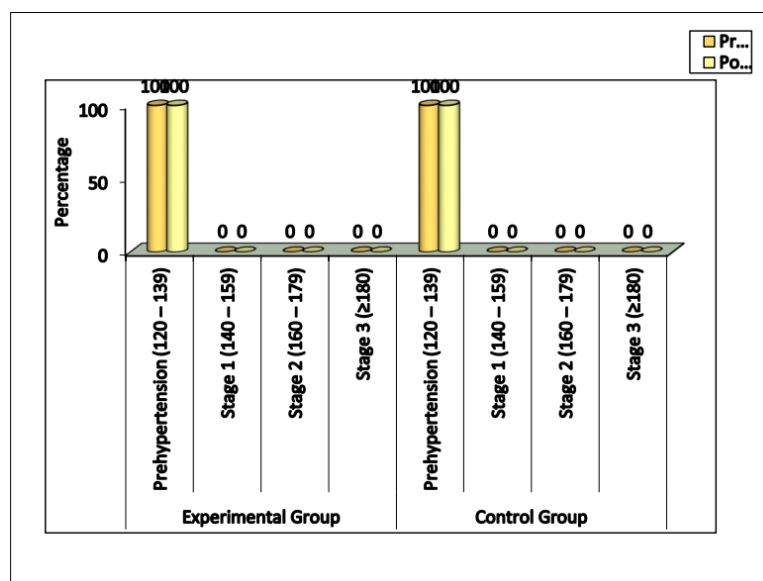| Diastolic BP	Interventional Group				Placebo Group			
	Pretest		Post Test		Pretest		Post Test	
	No.	%	No.	%	No.	%	No.	%
Prehypertension (80 – 89)	30	100.0	30	100.0	30	100.0	30	100.0
Stage 1 (90 – 99)	0	0	0	0	0	0	0	0
Stage 2 (100 – 109)	0	0	0	0	0	0	0	0
Stage 3 (≥110)	0	0	0	0	0	0	0	0

Figure 2. Percentage Distribution of Diastolic BP among Mothers with Pre-Eclampsia in the Interventional and Placebo Group

Table 3. Frequency and Percentage Proteinuria of Diastolic BP among Mothers with Pre-Eclampsia in the Interventional and Placebo Group N = 60(30+30)

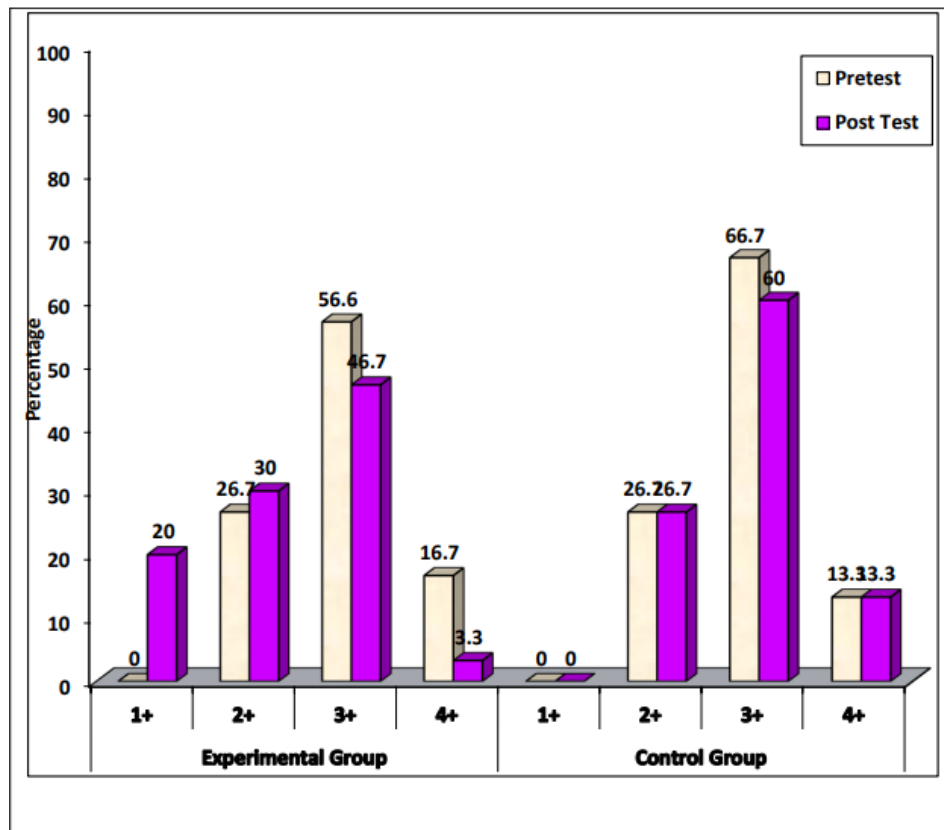| Proteinuria	Interventional Group				Placebo Group			
	Pretest		Post Test		Pretest		Post Test	
	No.	%	No.	%	No.	%	No.	%
1+			6	20.0				
2+	8	26.7	9	30.0	8	26.7	8	26.7
3+	17	56.6	14	46.7	20	66.7	18	60.0
4+	5	16.7	1	3.3	4	13.3	4	13.3

Figure 3. Percentage Distribution of Proteinuria among Mothers with Pre-Eclampsia in the Interventional and Placebo Group

The elevated levels of blood pressure of more than 140/90mmof Hg accompanied by uteroplacental dysfunction proteinuria, or multiple organ dysfunction can be recognized as pre-eclampsia [18]. From the above statement it was proven that, in our current study, the study participants had an increased blood pressure and proteinuria during the second trimester of pregnancy which resulted in pre-eclampsia among them. The majority of our study participants were obese, and their ages were above 30 years (advanced maternal age) which would have been the risk factors for the occurrence of hypertension among these clients. The investigators failed to identify the exact aetiology that provoked pre-eclampsia among these antenatal mothers. As a midwifery nurse, it is necessary to take remedial measures at an early stage to prevent complications both for the mother as well as the unborn child. There are multiple ways to manage and prevent these issues so that we can maintain optimal health for the mother and fetus.

A quasi-experimental study was conducted by Maisi, S (2017) aiming to evaluate the impact of lowering blood pressure among pre-eclampsia mothers and the results concluded that there was a significant reduction in the level of blood pressure after the administration of aroma therapy [19]. A similar study was conducted by Hwang, J. H (2006) to identify the effect of aromatherapy on reducing blood pressure among hypertension clients. By the method of inhalation, administration of aromatherapy was initiated using lavender oil once a day for 28 days and the study results identified and reported that the application of aromatherapy showed a significant reduction in blood pressure and proved to be a simple and effective intervention in controlling blood pressure among these clients. [20].

In humans, relaxation is associated with the central nervous system with the involvement of both sympathetic as well as parasympathetic nerves. During the relaxed state, the human body produces nitric oxide (NO), which has an effect on the veins of the blood vessels which declines the level of blood pressure [21]. Aromatherapy is a simple, cost-effective traditional medicine that has no side effects and lasts even today. According to many research studies, many factors influence blood pressure, one among which is administering lavender aromatherapy which has a good influence on hypertensive clients. Lavender aromatherapy uses essential oils which soothe individuals both physically and emotionally. It is a method that involves the use of evaporating oil directly with the olfactory organ which triggers the nerve cells thereby affecting the limbic system ending up with a relaxed feeling which has an impact on the blood pressure by making the heart function slowly pumping blood all over the body resulting in diminishing the blood pressure in the human beings [22].

Similarly in our current study, adding 5 drops of lavender oil in 20 ml of water in a diffuser and inhaling in three sessions per day, the level of blood pressure and proteinuria levels were lowered. The outcome of the study result concluded that aromatherapy has a positive effect in reducing blood pressure among mothers with pre-eclampsia.

Effectiveness of Aromatherapy in Reducing Blood Pressure and proteinuria among Mothers with Pre-Eclampsia in the Interventional Group and Comparison in the Placebo Group

The pretest mean score of systolic BP in the interventional group was 146.73±1.40 and the posttest mean score was 135.83±3.01. The mean difference score was 10.89. The calculated paired 't' test value of t = 20.091 was statistically significant at p<0.001 level. This clearly shows that after administered with aromatherapy the systolic BP was significantly reduced among the mothers with pre-eclampsia in the interventional group.

The pretest mean score of systolic BP in the placebo l group was 146.64±1.95 and the posttest mean score was 145.64±2.81. The mean difference score was 1.0. The calculated paired 't' test value of t = 2.032 was not statistically significant at p<0.05. This infers that there was no statistically significant difference between the pretest and post-test levels of systolic BP in the placebo l group who had undergone normal hospital routine measures. The calculated student independent 't' test value of t = 0.198 in the pretest shows that there was no statistically significant difference between the pretest level of systolic BP between the two groups. The calculated student independent 't' test value of t = 13.016 in the post-test shows that there was a statistically significant difference between the post-test level of systolic BP between the two groups. (As depicted in Table 4 and Figure 4).

Table 4. Effectiveness of Aromatherapy in Reducing Systolic Blood Pressure among Mothers with Pre-Eclampsia in the Interventional Group and Comparison of Pretest and Post-Test Level of Systolic Blood Pressure in the Placebo Group. N = 60(30+30)

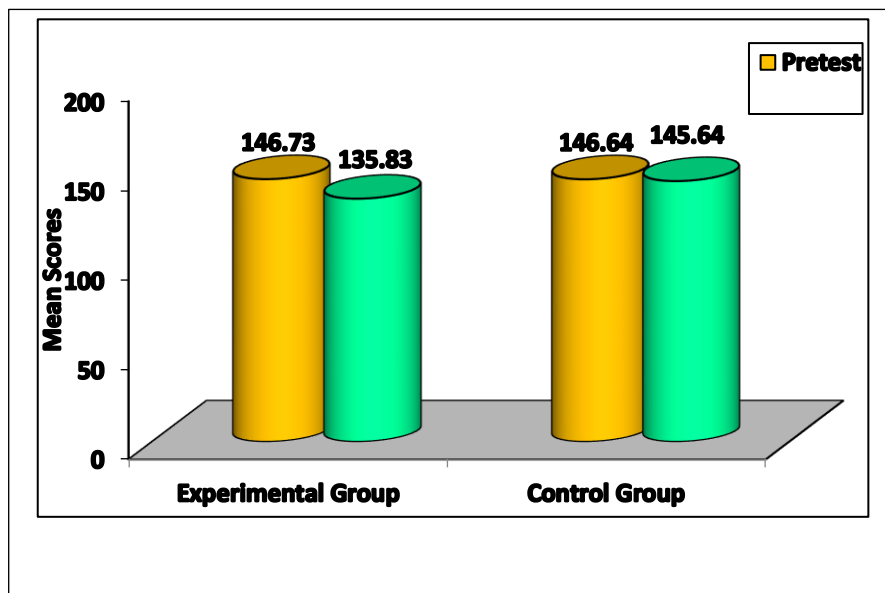| Group	Pretest		Post Test		Mean Difference score	Paired 't' test & p-value
	Mean	S. D	Mean	S. D		
Interventional Group	146.73	1.40	135.83	3.01	10.89	t = 20.091 p=0.0001, S***
Placebo Group	146.64	1.95	145.64	2.81	1.00	t = 2.032 p=0.051, N. S
Mean Difference score	0.09		9.81		***p<0.001 S – Significant N.S – Not Significant	
Student Independent 't' test value	t = 0.198 p=0.844 N. S		t = 13.016 p=0.0001 S***			

Figure 4. Comparison of Pretest and Post Test Level of Systolic BP among Mothers with Pre-Eclampsia in the Interventional and Placebo Group

The pretest mean score of diastolic BP in the interventional group was 76.81±3.09 and the posttest mean score was 73.16±2.82. The mean difference score was 3.65. The calculated paired 't' test value of t = 4.625 was statistically significant at p<0.001 level. This clearly shows that after administered with aromatherapy the diastolic BP was significantly reduced among the mothers with pre-eclampsia in the interventional group. The pretest mean score of diastolic BP in the placebo group was 75.63±3.08 and the posttest mean score was 75.59±3.13. The mean difference score was 0.04. The calculated paired 't' test value of t = 0.641 was not statistically significant at p<0.05. This infers that there was no statistically significant difference between the pretest and post-test levels of diastolic BP in the placebo group who had undergone normal hospital routine measures. The calculated student independent 't' test value of t = 1.481 in the pretest shows that there was no statistically

significant difference between the pretest level of diastolic BP between the two groups. The calculated student independent 't' test value of t = 3.152 in the post-test shows that there was a statistically significant difference between the post-test level of diastolic BP between the two groups (As depicted in Table 5 and Figure 5).

Table 5. Effectiveness of Aromatherapy in Reducing Diastolic Blood Pressure among Mothers with Pre-Eclampsia in the Interventional Group and Comparison of Pretest and Post Test Level of Diastolic Blood Pressure in the Placebo Group N = 60(30+30)

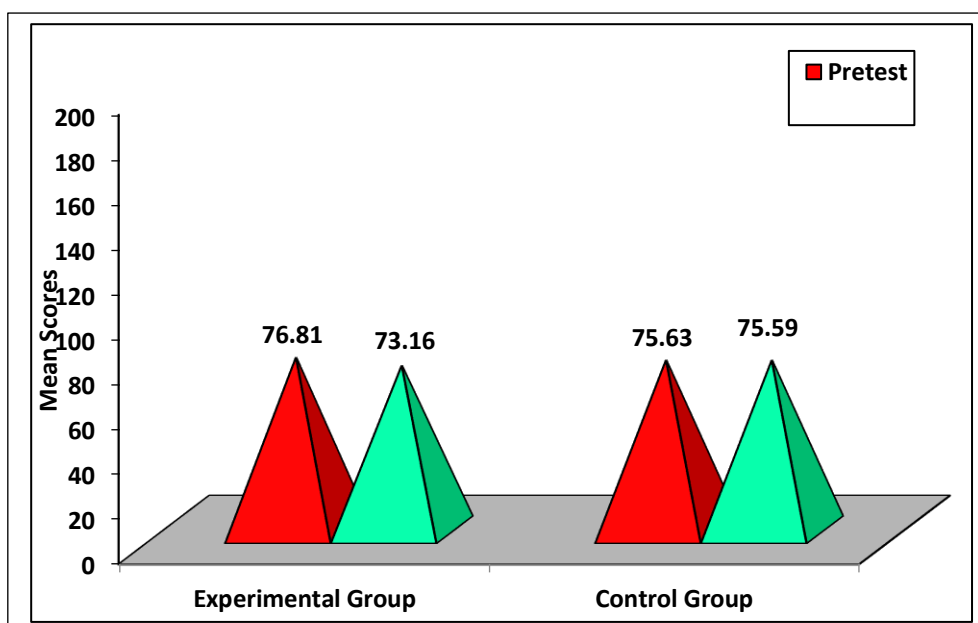| Group	Pretest		Post Test		Mean Difference score	Paired 't' test & p-value
	Mean	**S. D**	**Mean**	**S. D**		
Interventional Group	76.81	3.09	73.16	2.82	3.65	t = 4.625 p=0.0001, S***
Placebo Group	75.63	3.08	75.59	3.13	0.04	t = 0.641 p=0.527, N. S
Mean Difference score	1.18		2.43		***p<0.001 S – Significant	
Student Independent 't' test value	t = 1.481 p=0.144 N. S		t = 3.152 p=0.003 S**		N.S – Not Significant	

Figure 5. Comparison of Pretest and Post Test Level of Diastolic BP among Mothers with Pre-Eclampsia in the Interventional and Placebo Group

The pretest mean score of proteinuria in the interventional group was 2.90±0.66 and the post-test mean score was 2.33±0.84. The mean difference score was 0.57. The calculated paired 't' test value of t = 2.664 was statistically significant at p<0.05 level. This clearly shows that after administered with aromatherapy the protein urea was significantly reduced among the mothers with pre-eclampsia in the interventional group. The pretest mean score of proteinuria in the placebo group was 2.93±0.58 and post post-test mean score was 2.86±0.62. The mean difference in score was 0.07. The calculated paired 't' test value of t = 1.439 was

not statistically significant at p<0.05. This infers that there was no statistically significant difference between the pretest and post-test levels of proteinuria in the placebo group who had undergone normal hospital routine measures. The calculated student independent 't' test value of t = 0.207 in the pretest shows that there was no statistically significant difference between the pretest level of proteinuria between the two groups. The calculated student independent 't' test value of t = 2.775 in the post-test shows that there was a statistically significant difference between the post-test level of protein urea between the two groups. (As depicted in Table 6 and Figure 6).

Table 6. Effectiveness of Aromatherapy in Reducing Proteinuria Among Mothers with Pre-Eclampsia in The Interventional Group and Comparison of Pretest and Post Test Level of Diastolic Blood Pressure in The Placebo Group. **N = 60(30+30)**

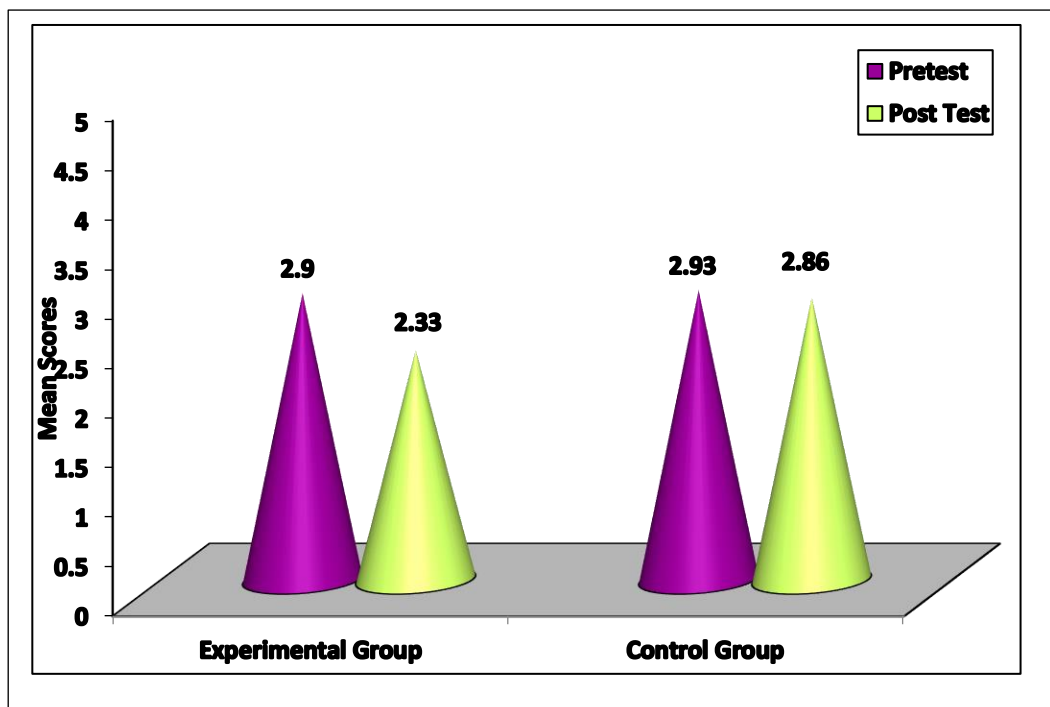| Group	Pretest		Post Test		Mean Difference score	Paired 't' test & p-value
	Mean	**S. D**	**Mean**	**S. D**		
Interventional Group	2.90	0.66	2.33	0.84	0.57	**t = 2.664** **p=0.012, S***
Placebo Group	2.93	0.58	2.86	0.62	0.07	**t = 1.439** **p=0.161, N. S**
Mean Difference score	0.03		0.53		***p<0.001 S – Significant	
Student Independent 't' test value	t = 0.207 p=0.837 N. S		**t = 2.775** **p=0.008** **S***		N.S – Not Significant	

Figure 6. Comparison of Pretest and Posttest Level of Proteinuria among Mothers with Pre-Eclampsia in the Interventional and Placebo Group

Association of Post Test Level of Blood Pressure and Proteinuria among Mothers with Pre-Eclampsia with Selected Demographic Variables in the Interventional Group

The demographic variable history of pre-eclampsia (χ^2=6.467, p = 0.011) had shown statistically significant association with the post-test level of systolic BP among mothers with pre-eclampsia at p<0.05 level and the other demographic variables had not shown statistically significant association with the post-test level of systolic BP among mothers with pre-eclampsia in the interventional group. The demographic variable educational qualification (χ^2=8.380, p = 0.039) had shown a statistically significant association with the post-test level of diastolic BP among mothers with pre-eclampsia at p<0.05 level and the other demographic variables had not shown statistically significant association with the post-test level of diastolic BP among mothers with pre-eclampsia in the interventional group. The demographic variable BMI in a previous pregnancy (χ^2=21.318, p = 0.011) had shown a statistically significant association with the post-test level of proteinuria among mothers with pre-eclampsia at p<0.05 level and the other demographic variables had not shown statistically significant association with the post-test level of proteinuria among mothers with pre-eclampsia in the interventional group.

Association of Post Test Level of Blood Pressure and Proteinuria among Mothers with Pre-Eclampsia with Selected Demographic Variables in the Placebo Group

The demographic variables did not show a statistically significant association with post-test levels of systolic and diastolic BP among mothers with pre-eclampsia in the placebo group. The demographic variable weeks of gestation (χ^2=13.929, p=0.001) had shown a statistically significant association with the post-test level of proteinuria among mothers with pre-eclampsia at p<0.001 level and the other demographic variables had not shown a statistically significant association with post-test level of proteinuria among mothers with pre-eclampsia in the placebo group.

Conclusion

Based on the findings of the current study, it was evident that there was a significant effect of aromatherapy on our study participants Therefore, aromatherapy can be implemented as an alternative treatment by all midwife nurses and other health care professionals to reduce blood pressure during antenatal period as a part of nursing care to minimize complications and promote and neonatal wellbeing. Aromatherapy enhanced, the reduction in the level of blood pressure and proteinuria among these clients.

Acknowledgement

Conflict of Interest

The authors declare no conflict of interest.

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