

Lifestyle Modifications for Pregnant Women with Mild Pre-Eclampsia and the Condition of Maternal and Fetal



Sabah Lotfy Mohamed El Sayed* and Mervat Mustafa Deoky

Department of Obstetrics & Gynecology Nursing, Zagazig University, Egypt

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*Corresponding author: Sabah Lotfy Mohamed El Sayed, Assistant Professor, Department of Obstetrics and Gynecology Nursing, Faculty of Nursing, Zagazig University, Egypt

Abstract

Background: Lifestyles in pregnancy have long-term effects on maternal and child health.

Aim: This study was conducted to evaluate lifestyle modification for pregnant women with mild preeclampsia and the condition of maternal and fetal.

Methods: This study is a quasi-experimental study design that was conducted on 80 pregnant women with mild preeclampsia attended in the outpatient high-risk pregnancy clinic, Zagazig University Hospital, and private clinic, Zagazig, Al-Sharqia Governorate. Data collection tools: Monitoring the maternal condition by measuring blood pressure, body weight, and fetal condition using the USG and DFMC chart.

Results: The mean of age was 25.1 years old. The study showed that a highly statistically significant differences were observed between pre and post guidelines session in related to maternal systolic and diastolic blood pressure, and fetal condition.

Conclusion: The study found a positive correlation between lifestyle adjustment for pregnant women with mild pre-eclampsia and counseling sessions that seemed necessary to improve pregnancy.

Keywords: Daily fetal movements count; Lifestyle adjustment; Preeclampsia; Pregnancy

Introduction

Pre-eclampsia can be divided into mild and severe forms, according to the severity and type of the symptoms presented. The mild form of pre-eclampsia is characterized by systolic blood pressure (SBP) ≥ 140 mmHg or diastolic blood pressure (DBP) ≥ 90 mmHg, and proteinuria >300 mg/24h. The severe form of pre-eclampsia is characterized by severe hypertension (SBP > 160 mmHg or DBP > 110 mmHg), or severe proteinuria (>5 g/24h), or signs and symptoms of target organ damage Dhariwal & Lynde [1].

Hypertension is the second largest cause of direct maternal death worldwide (14% of the total), and it is estimated that 192 people die every day because of hypertensive disorders in pregnancy Say et al. [2] Hypertension is the most prevalent maternal complication worldwide (it affects 7-10% of all pregnancies), and it is associated with a significant morbidity and mortality of the mother and fetus Ahmad and Samuelsen [3]. Pre-eclampsia affects 2-8% of all pregnancies worldwide Gongora Wenger [4]. It is one of the greatest challenges of obstetrics causing nearly one-fifth of all maternal deaths and increasing the risk of adverse outcomes.

The maternal mortality ratio was 5.6 per 100,000 (deaths per 100,000 live births). During that time, there were 15 maternal deaths per about 2 million live births due to pre-eclampsia or its complications, 12.4% of all maternal deaths Tessier et al. [5]. Every year an estimated 62,000 to 77,000 women worldwide die due to pre-eclampsia and its complications. That is almost 18% of all maternal deaths, most of these in developing countries Enkhmaa et al [6].

Lifestyle is the way individuals, families and communities can live healthy or unhealthy in terms of personal behaviors such as nutrition, physical activity and stress management. A healthy lifestyle can improve health and happiness. In contrast, an unhealthy lifestyle can lead to disease or morbidity Saffari et al. [7]. Thus, these risk factors can be addressed by changing and modifying the lifestyle, which in turn will reduce morbidity and mortality from chronic diseases Mahdipour et al. [7].

Significance of the study

Preeclampsia is a disorder of widespread vascular endothelial malfunction and vasospasm that occurs after 20 weeks gestation. It accounts for 22% of maternal deaths, 18% of all premature

births worldwide Sahar [8]. The importance of prescribing early guidelines for pre-eclampsia is vital to maternal and fetal outcomes, and all healthcare staff in the hospital (nurses, doctors and pharmacists) is responsible. However, it would be useful to add a guideline through which to guide the healthcare team to provide the best health expectations of patients Peres et al. [9]. There are no standardized and follow-up national guidelines according to some international guidelines in hospitals. Therefore, it would be useful to provide nursing guidelines to manage pre-eclampsia adequately.

Aim of the study

This study was conducted to evaluate lifestyle modification for pregnant women with mild preeclampsia and the condition of maternal and fetal.

Research hypotheses

Lifestyle change for women with mild preeclampsia can improve the condition of maternal and fetal.

Subjects & Methods

Research design

A quasi-experimental design was used to conduct this study.

Setting

The study was conducted in the outpatient high-risk pregnancy clinic, Zagazig University Hospital, Zagazig, Al-Sharkia Governorate, which offers low-cost services and high-quality health care. The study sample was also collected from the private clinic.

Sample

The sample size was based on the standard deviation of the health sub-domains that promoted a lifestyle (0.54) in a study of the Stark & Brinkley [10] Eighty participants were calculated by taking into account an acceptable error of 0.05 around the mean (3.09) The test power is 0.8 were selected using non-probable convenience sampling.

Study population

The eligibility criteria for the study:

- a) Pregnant women who suffer from mild preeclampsia (systolic pressure less than 160mmHg and diastolic blood pressure less than 110 mmHg with proteinuria + 2 or less in the urine test strip)
- b) Pregnancy with a viable single fetus.
- c) The age of women is 20 to 40 years.
- d) The absence of medical or obstetric complications, e.g., IUFD or vaginal bleeding, the deterioration of the case in severe form, conduct for delivery during the study period.
- e) Exclude those who use antihypertensive drugs.
- f) The desire of maternal to participate in the study.

Data collection tools

Prepared by the researchers based on the relevant literature reviews that included the following:

Monitoring maternal condition

It was assessed as follows:

Interview questionnaire sheet: It included characteristics of pregnant women who suffer from mild pre-eclampsia, such as: age, education level, occupation, residence and income level properties. Moreover, the gravidity, parity, history of abortions, the previous mode of delivery and history of pre-eclampsia.

Physical Assessment Questionnaire sheet: The researchers measured maternal systolic blood, diastolic blood pressure (mmHg) and body weight (kg).

Monitoring the fetal condition

It was evaluated as follows:

Assessment of fetal condition: The fetal condition was assessed using ultrasonography (USG) to evaluate gestational age (GA) / weeks, fetal body weight estimation (EFBW) /gm, fetal heartbeat (min) and amniotic fluid index (AFI) / cm.

Daily Fetal Movement Counting (DFMC) Chart: Maternal perception of fetal movement is an inexpensive, noninvasive method of assessing fetal well-being. The DFMC was used to record the number of fetal movements for one hour after meals (breakfast, lunch, dinner). Fetal movements are considered enough if the number is about three to five times within one hour. A period of 12-hours without at least 10 perceive movements is a warning signal Sergent et al. [11]. If the result is unsatisfactory, the patient should be assessed with the USG.

Maternal lifestyle modification

It was designed on the basis of Walker et al. [12]. An instruction guideline was developed after extensive review of literature which include the guidelines on nutrition (9 points) and slow breathing exercises (8 points). Breathing technique: Subjects were guided to do 20 deep diaphragmatic respirations, which took around 5 min. BP was measured from the right hand at the level of the heart after 5 min, resting in a chair in sitting position. The first Korotkoff sound was regarded as the systolic BP and the last was considered as the diastolic BP Aalami et al. [13].

Methods

- a) Obtain the approval of the Ethics Committee at the Faculty of Nursing and the directors of clinics, Zagazig University to conduct the study and collect the necessary data.
- b) The validity of the questionnaire was reviewed by a panel of 6 experts (3 of nursing staff members and 3 of obstetricians) to test its content validity. The required modifications were made in order for the accuracy of the items content. Also, the validity of this questionnaire has been measured by the study of Mohamadi Zeidi et al.

c) The reliability of the questionnaire was determined using the alpha Cronbach coefficient (0.89) through the test and re-test method after conducting

d) The pilot study was conducted on 10% of the sample (10 of patients diagnosed with mild preeclampsia) and excluded from the main sample. It was done to test the tools of the study in terms of feasibility, clarity and application, as well as the time required for the questionnaire. After the pilot study, the necessary modifications were made to the questionnaire in the final form.

e) The average time required for each session took about 30-45 minutes, where it was given a weekly session for 4 continuous weeks and follow-up the cases for another 8 weeks.

f) Ethical considerations were taken at all stages of the study as follows:

i. Oral consent was obtained for all participants in the study after the aim was explained by the researchers.

ii. The researchers confirmed that there was no harm to them or carrying them. Women in the study have the right to withdraw from the study sample. Also, they will have assisted them if needed.

g) The study was conducted through the guideline's sessions prepared and presented by the researchers. Continuation of doing breathing exercises was followed by the phone calls. The symptoms of severe preeclampsia were checked both by phone calls and at the beginning of each session. It was carried out as follows:

i. At the first meeting. The researchers presented themselves, clarified the study aim and took verbal approval to participate in the study. The maternal blood pressure and weight were measured. They also explained to women: the effects of deteriorating of preeclampsia on maternal and fetal. The importance of changing lifestyle in relation to nutritional status, breathing exercises, body weight control, monitoring blood pressure and fetal status (GA, fetal heartbeat, EFW and AFI) by USG. Besides,

trained women how to calculate the daily movement of the fetus.

ii. Second meeting. Women's blood pressure was measured by researchers twice from the right arm using the standard mercury pressure gauge with the appropriate size cuff in the sitting position after 5 minutes of rest. The average of these two values was used as a rule for blood pressure. Women were also weighed without shoes and heavy clothes. The researchers explained, breathing techniques slowly for women at this session. Where women sit on a comfortable chair to ensure their relaxation. They also taught women slow breathing, stopping after inhalation and slowly exhaling.

iii. Third meeting. The researchers explained to women, the food pyramid and the optimal diet based on the dietary approach to stop high blood pressure (DASH). Reduce consumption of salt and fat with increased consumption of cereals, vegetables, fresh fruits and complex carbohydrates European Society of Hypertension [14]. Maternal blood pressure and weight were assessed. Monitoring fetal movement using the daily fetal movement chart Saastad et al. [15].

iv. The fourth session. It included a review of the previous points and the results of guidelines after participating in sessions by evaluating maternal and fetal condition as in the previous session of the guidelines.

v. Data were collected over 3 months, from March to May 2018.

h) Data analysis was performed using SPSS version 22. Descriptive statistics including frequency, percentage, mean and standard deviation were used to describe the characteristics of pregnant women with preeclampsia. The relationship between pre and post guidelines for pregnant women with preeclampsia was determined by using statistical tests such as Pearson. The t-test was used to analyze the differences means between pre and post-guidelines. The P value was used to examine the level of significance between the pre and the after the guideline's sessions. The level of significance was determined at 0.05.

Results

Table 1: Characteristics of pregnant women with mild preeclampsia (n=80).

Characteristics		No	%
Age (years)	20-23	32	40
	24-27	28	35
	28-33	20	25
	Mean ± SD	25.1 ± 3.571	
Education Level	Illiterate	12	15
	Primary school	16	20
	Secondary school	40	50
	University	12	15

Occupation	Formally employed	4	5
	Self Employed	12	15
	Housewife	64	80
Residence Place	Rural	64	81.3
	Urban	16	18.7
Income Level	Indept	8	10
	Just meet life expenses	32	40
	Insufficient	40	50
Gravidity	One	24	30
	3-Feb	40	50
	≥4	16	20
Parity	Nullpara	24	30
	Primipara	32	40
	Multipara	24	30
History of Abortion	None	56	70
	One time	19	23.7
	≥2 times	5	6.3
Mode of Last Delivery	None	24	30
	NVD	32	40
	C.S	24	30
History of Preeclampsia	No	66	82.5
	Yes	14	17.5

NVD: Normal vaginal delivery; C.S: Cesarean section

The characteristics of the studied sample are presented in Table 1. More than one third (40%) of pregnant women with preeclampsia were in the age group of 20-23 years with the mean (SD) age of 25.1 (3.571) years, and half (50%) of them were secondary education. The majority (80% and 81%) of them were housewives and residents of rural areas, respectively. Half (50%) of them don't have enough income. Regarding the number of pregnancies, half of the pregnant women with preeclampsia (50%) had 2 to 3 pregnancies. More than a third (40%) were primipara, while more than two-thirds (70%) hadn't previous abortion. With regards to the mode of the last delivery, more than

one-third (40%) were vaginal. Moreover, the most (82.5%) of them do not have a history of preeclampsia.

Table 2 clarifies that the total mean score of maternal systolic blood pressure pre-guidelines was 147.15±5.356mmHg compared to the post-guidelines (142.58±2.514mmHg). Furthermore, the diastolic blood pressure was 97.0±2.465mmHg compared to the post-guidelines (90.83±1.719mmHg). Meanwhile, maternal weight pre-guidelines session was 75.85±6.767kg compared to the post-guideline's session (76.94±6.475kg). There are a highly statistically significant differences were observed between pre and post guidelines sessions (P = 0.000, P = 0.000, and P = 0.000, respectively).

Table 2: Total mean scores of pre and post-guidelines sessions regarding condition of pregnant women with mild preeclampsia (n=80).

Items	Pre- guidelines	Post guidelines	Paired t Test	P Value
	Mean ± SD	Mean ± SD		
SBP (mmHg)	147.15±5.356	142.58±2.514	9.036	< 0.001
DBP (mmHg)	97.0±2.465	90.83±1.719	23.196	< 0.001
Weight (Kg)	75.85±6.767	76.94±6.475	-6.645-	< 0.001

Table 3: Correlation between pre and post guidelines sessions regarding parameters of pregnant women with mild preeclampsia (n=80).

	R	P Value
SBP (mmHg)	0.541	<0.000
DBP (mmHg)	0.398	<0.000
Weight (Kg)	0.976	<0.000

Table 3 The Pearson's correlation of the pre and post guidelines regarding blood pressure and weight of the study sample, there is a highly significant positive correlation (P< 0.001).

Table 4 clarifies that the total mean score of EFBW pre-guidelines session was 1526.5±624.108gm compared to the post-guideline's session (1896.3±739.324gm). Moreover, ten movements in two hours test pre-guidelines session was 1.2±.402

compared to the post-guideline's session (1.73±.201). Meanwhile, three movements in one-hour pre-guidelines session were 1.7±.461 compared to the post-guideline's session (1.87±.22). Moreover, Total daily fetal movement counting pre-guidelines

session was 1.6±.493 compared to the post-guideline's session (1.97±.1006). There are a highly statistically significant differences were observed between pre and post guidelines sessions (P = <0.000, P < 0.000, P < 003 and P < 0.000, respectively).

Table 4: Total mean scores of pre-& post-guidelines sessions in relation to fetal condition (n=80).

Items	Pre- guidelines	Post guidelines	Paired t-Test	P Value
	Mean ± SD	Mean ± SD		
EFBW (gm)	153.5±624.11	189.3±74.32	-5.863-	<0.000
Fetal heart beat/min	147.6±11.32	142.67±7.95	5.778	<0.000
Amniotic fluid index (cm)	8.60±1.87	7.88±1.97	7.209	<0.000
Ten movements in two-hour test	1.2±.402	1.73±.20	-5.517-	<0.000
Three movements in one-hour test	1.7±.461	1.87±.22	-3.031-	<0.003
Total daily fetal movement counting	1.6±.493	1.97±.10	-6.607-	<0.000

EFBW: Estimated Fetal Body Weight

Table 5 Concerning correlation between the pre and post guidelines sessions of fetal condition assessment, there is a significant positive correlation in relation to estimated fetal body weight, amniotic fluid index, and ten fetal movements count (r = 0.967, r = 0.667, p < 0.00). Meanwhile, there is insignificantly correlation in relation to, three and total daily fetal movements count

Table 5: Correlation between pre and post-guidelines sessions in relation to assessment of fetal condition (n=80).

	R	P
EFBW (gm)	0.967	<0.000
Fetal heart beat/min	0.746	<0.000
Amniotic fluid index (cm)	0.894	<0.000
Ten movements in two-hour test	0.667	<0.000
Three movements in one-hour test	0.099	0.384
Total daily fetal movement counting	0.068	0.549

Discussion

Preeclampsia was defined as hypertension (two separate blood pressure readings ≥ 140/90mmHg taken at least 6h apart) and proteinuria (≥ 1+ on a dipstick test in two urine samples or ≥ 300mg of protein in a 24h urine sample) after 20 weeks of gestation. Mild preeclampsia was defined as raised blood pressure (≥ 140/90mmHg and <160/110mmHg) and proteinuria (≥ 1+ and <2+ on a dipstick test in two urine samples) Wang et al. [16]. Preeclampsia remains a serious threat, chiefly in underdeveloped countries where its rates and mortality rates are higher. In these countries, there is a crucial need in health policies to promote the proper care of women who suffer from the preeclampsia Peres et al. [9].

The lifestyle factors that are recommended for reducing hypertension include: losing weight, regular physical exercise, moderate alcohol consumption, a change in diet and reduced sodium intake. The DASH diet has produced effective results in

lowering hypertension Eskridge [17]. Brantsaeter et al. [18] reported that the risk of preeclampsia is known to be reduced by a third with a healthy balanced diet comprising vegetables, compared with a diet predominantly on processed food. The dietary approaches to stop hypertension (DASH) diet recommends lots of fruits and vegetables, low-fat dairy products, low in total fat, saturated fat and cholesterol.

Characteristics of pregnant women with mild preeclampsia

The present study showed that more than one third of women with preeclampsia were in the age group of 20-23 years old. This result agrees with the findings of Kumari et al. who reported that 25.9% of preeclampsia cases were in the age group 20 ≤ 25 years. However, who observed that maternal age >30 years was associated with the risk of preeclampsia. The reasons for variation may be due to differences of selected criteria or different to maternal characteristics. With regards to socio-demographic characteristics in the present study, preeclampsia was associated with secondary education. Furthermore, the most of them were housewife and inhabitant in rural places. Similarly, El-Moselhy et al. [19] who reported that the majority of women with the preeclampsia were housewives and lives in rural areas. Concerning the level of income and the number of pregnancies the current study found that half of the study sample had insufficient income and 2-3 pregnancies. While, less than half were primiparous and delivered by vaginal. This agrees with the findings of Bilano et al. [20] who found that the incidence of preeclampsia was higher among primipara women.

The present findings observed that the highest percentage of them hadn't history of abortion or preeclampsia. This is comparable to that reported by Trogstad et al. who found that the majority of preeclampsia cases had no history of miscarriage. Additionally, Ramesh et al. [21] a history of pre-eclampsia in the previous pregnancy identified as a risk factor for preeclampsia. On the contrary the study done by Verma et al. found that most cases of preeclampsia had previous history of abortion.

Total mean scores of pre and post guidelines regarding monitoring the condition of pregnant women with mild preeclampsia

Lifestyle changes, in particular slow breathing exercises and dietary modifications were the basic management of women with hypertensive. The Present findings showed a statistically significant improved in maternal blood pressure after providing guidelines ($P < 0.000$). A meta-analysis of 17 randomized controlled trials evaluated the current evidence on the effect of dietary patterns on BP in adults. A significant reduction of 4.26mmHg in SBP and 2.38mmHg in DBP was observed Rhoda et al. Williams et al. [22] reported that exercises have great impact on reducing systolic blood pressure and diastolic blood pressure by 6/4mmHg points for hypertensive patients. This can explain by relaxation decreases the heart rate, decreases the respiratory rate, decreases blood pressure in people who have normal or mildly elevated blood pressure and decreases oxygen consumption. Achkar et al. [23] demonstrated that women who developed pre-eclampsia had a significantly lower vitamin D concentration at 14 weeks compared with women in the control group ($p < 0.0001$). They suggested that maternal vitamin D deficiency may be an independent rifactor for the development of preeclampsia. A randomized controlled trial investigating the use of early low-dose dietary calcium supplementation in women who have had previous developed pre-eclampsia did not demonstrate a significant benefit in reduction of blood pressure or subsequent risk of pre-eclampsia Hofmeyr et al. [24].

The study revealed that there was effective in reducing both systolic and diastolic pressure after breathing exercise therapy among pre-eclamptic women. Slow breathing increases baroreflex sensitivity and reduces sympathetic activity and chemoreflex activation, a potentially beneficial effect in hypertension; where, baroreflex is the system in the body that regulates blood pressure by controlling the heart rate, strength of heart contractions, and diameter of blood vessels. Slow breathing reduces blood pressure and enhances baroreflex sensitivity in hypertensive patients. These effects appear potentially beneficial in the management of hypertension Mohamed et al. [25].

Low dietary calcium and low serum calcium concentrations are associated with pre-eclampsia. It has been shown that high-dose calcium supplementation reduces preeclampsia in women from areas with low dietary calcium intake Hofmeyr et al. [26]. Additionally, Selby-Nelson [19] which stated that there was a highly significant reduction in systolic and diastolic blood pressures in pregnant women with mild PE who received relaxation in the form of breathing exercise.

As for the maternal weight, a statistically significant increase was observed in the weight regarding post-guidelines sessions ($P = 0.000$). This increase in weight might be due to fetal growth and weight. A nutritious and well-balanced diet may enhance functionality and efficiency of maternal and fetal metabolism

through substrate availability, reductive capacity, immunologic mechanisms, and insulin sensitivity, and the metabolic stress induced by disturbed placentation could possibly be attenuated or counterbalanced by a high-quality diet Barker et al. [27]. In a meta-analysis of Thangaratnam et al. [28] investigating the potential effects of dietary interventions on the risk of adverse pregnancy outcomes, interventions which generally improve diet quality pregnancy were associated with a reduced risk of preeclampsia.

Correlation between pre and post guidelines regarding monitoring condition of pregnant women with mild preeclampsia

The current study found that the guidelines given to pregnant women who suffer from mild preeclampsia had a significant positive correlation with decreased systolic and diastolic blood pressure, as well as maternal weight of the study sample ($P < 0.001$). Slow breathing is an active technique to reduce blood pressure it opens blood vessels, relaxing muscles in the diaphragm. The study concluded that practice of slow breathing exercise was an effective method in reduction of blood pressure Mahtani et al. [29]. The current study concluded that patients who receive a device to guide slow breathing, significantly lowered their systolic blood pressure.

An experimental study to evaluate the effectiveness of breathing therapy on mild pregnancy induced hypertension. Samples were 50 antenatal mothers with mild pregnancy induced hypertension. Quasi experimental approach was adopted in the study to evaluate the effectiveness of breathing therapy on mild pregnancy induced hypertension. One group pre-test post-test research design was selected for the study. The results revealed that there was a significant difference in the pretest and posttest. The study concluded that breathing therapy on mild pregnancy induced hypertension was an effective method in reduction of blood pressure Reshma et al. [29].

Total mean scores of pre and post guidelines sessions in relation to fetal condition

The results of the present study showed a statistical significance after the guidelines sessions with respect to estimated fetal weight, amniotic fluid index and the count of fetal movements. Maternal perception of reduced fetal movements has clinical significance as a predictor of fetal compromise, but a relatively low positive predictive value of 2% to 7% for stillbirth Unterscheider & O'Donoghue [30]. In an Australian cross-sectional survey of fetal movements maternal qualitative assessment of fetal activity was demonstrated to be of value to clinicians Raynes Greenow et al. [25].

Counting fetal movement is a way for a woman to determine the number of movements that feel to assess the condition of baby's Mangesi et al. [31]. This finding supports the idea that perceived fetal activity may be indicative of fetal status. Inquiring counts the movements of the fetus is a routine part of prenatal

care Flenady et al. [32]. Pregnant women often seek information about fetal movements, reporting any concerns about fetal activity and wanting to know if their progress is normal Bondas & Eriksson [33].

Regarding correlation between the pre and post guidelines sessions of fetal condition assessment, there was a strong positive significant correlation in relation to estimated fetal body weight, amniotic fluid index, and ten fetal movements counting. May et al. [17] examined the main effect of maternal exercise, found that maternal exercise was associated with significantly lower fetal HR and higher vagal input. We did not observe a group difference in the frequency band ratios, similar to our previous report on the effects of maternal exercise on fetal cardiac autonomic control [34]. This study suggested that maternal exercise does not change fetal sympatho-vagal balance.

Conclusion

Based on the results of the study, there was a significant positive correlation between lifestyle changes for pregnant women with mild pre-eclampsia and guidelines sessions that seemed necessary to enhance the maternal and fetal condition of these women. Therefore, the health care teams are responsible for providing that advice on lifestyle modification for women with pre-eclampsia in order to reduce subsequent complications early and enhance maternal and fetal outcomes.

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