THE EFFECT OF ARTIFICIAL INTELLIGENCE-BASED CHATBOT ON ENHANCING SELF-CARE PRACTICES AND PREGNANCY OUTCOMES FOR WOMEN WITH PREGNANCY-INDUCED HYPERTENSION

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Abstract

Background: Recently, artificial intelligence-driven technologies, such as chatbot for women with pregnancy-induced hypertension, have been able to provide evidence-based information, personalized guidance, and support to achieve positive pregnancy outcomes. **Aim:** the study aimed to evaluate the effect of artificial intelligence-based chatbot on enhancing self-care practices and pregnancy outcomes for women with pregnancy-induced hypertension. **Design:** A quasi-experimental research design was utilized in this study. **Setting:** The study was conducted at the antenatal clinics of the obstetrics and gynecology hospital, Kasr Al-Aini**. Sample**: A purposive sample of 100 pregnant women (50 study group and 50 control group). **Five tools of data collection were used:** Structured interviewing questionnaire regarding general characteristics of the pregnant women and history of current pregnancy, artificial intelligence-based chatbot application tool, reported self-care practices assessment sheet, pregnancy outcomes questionnaire, and chatbot satisfaction. **Result**: There was a highly statistically significant improvement in all items of self-care practices regarding pregnancy-induced hypertension at post-intervention for the study group ($p < 0.001$) compared to the control group. In addition to, the best-fitting multiple regression model for predicting pregnancy outcomes based on women's self-care practices, and satisfaction with the chatbot showed that both predictors had statistically significant effects and were both independently associated with enhancing positive pregnancy outcomes, and the whole model was statistically significant ($F = 4.106$, $p < 0.05$). **Conclusion:** The findings of the present study supported the research hypothesis that there is a positive effect of artificial intelligence-based chatbot on enhancing self-care practices and pregnancy outcomes for women with pregnancy-induced hypertension. **Recommendation:** Integrate an artificial intelligence-based chatbot to be an educational program in nursing protocol for pregnant women. **Further study, to** explore the effect of artificial intelligence-based chatbot on diverse areas such as postnatal care, gynecology, and family planning.

Keywords: Artificial Intelligence-Based Chatbot, Self-Care Practices, Pregnancy Outcomes, Pregnancy-Induced Hypertension (PIH).

INTRODUCTION

For the past ten years, the healthcare sector has undergone a surge in Artificial Intelligence (AI) technology such as chatbots which being used in many different medical

fields. AI-based chatbot systems can operate as automated conversational agents that simulate human interaction through textual, vocal, and visual forms of communication channels with a user, capable of promoting health, provide educational guidance, and potentially motivating self-care practices and behavior change. It can be utilized by perinatal women to share and discuss their symptoms and difficulties *(Hu et al., 2025).*

Pregnancy induced hypertension (PIH) is defined as systolic blood pressure (SBP) ≥140 mmHg and diastolic blood pressure (DBP) ≥90 mmHg, taken after a period of rest on two occasions or ≥160/110 mmHg on one occasion in a previously normotensive woman, after 20 weeks' gestation without proteinuria or end-organ damage and is considered a significant contributor to various pregnancy complications *(Farhat et al., 2024).*

By using chatbots, it is possible to develop effective tools and resources that can contribute to better maternal and fetal health outcomes for women with high-risk pregnancies, such as pregnancy-induced hypertension. In addition to, accessible and accurate assistance can help identify and address potential complications, provide essential information for PIH, and promote healthy behaviors. *(Amil, 2025).*

Pregnant women tend to readily accept chatbots because they provide easy access to information, encourage ongoing use, are scalable, and have the capacity to store and retrieve knowledge. Also, enhance specified self-care practices, which in turn reduce the adverse outcomes for those with high-risk pregnancies *(Faiyazuddin et al., 2025).*

In the current Sustainable Development Goals (SDGs) agenda through 2030, maternal death reduction remains the top priority target for ensuring safe lives and promoting well-being. The nurse provides a comprehensive range of options to pregnant women with pregnancy-induced hypertension using artificial intelligence-based chatbots, aiming to achieve these goals and improve pregnancy outcomes by assisting the expectant mother in coping with symptoms, adhering to evidence-based guidelines for safe practices and appropriate disease management to prevent adverse effects, and enhancing their health to achieve positive pregnancy outcomes and behavior changes *(Correia et al., 2025).*

Significance of the Study:

In 2017, approximately 810 women died from preventable causes related to pregnancy and childbirth. Global estimations demonstrate that 287 000 women died from a maternal cause during 2020, which equates to about 800 maternal deaths per day. In 2020, maternal mortality ratio for Egypt was 17 deaths per 100,000 live births *(Oloyede & Sowunmi, 2025).*

Globally, more than 20 million women are at risk of high-risk pregnancies, which results in an estimated 830 deaths per day. As part of the sustainable development goals (SDG), countries have agreed on a new target to accelerate the decline of maternal mortality by 2030 *(Traub et al., 2024).*

Hypertensive disorders during pregnancy affect around 8% to 10% of all pregnant women. Worldwide, evidence demonstrates that pregnancy induced hypertension (PIH) is a dangerous medical condition and a direct cause of maternal and perinatal morbidity and mortality.

Globally, PIH accounts for approximately 14% of maternal mortality, and impacts 4.2% of women in Egypt *(Pembe et al., 2025).*

Various adverse health outcomes arise due to a lack of awareness leading to inadequate utilization of healthcare facilities, poor health status, and poor drug adherence. Therefore, it is imperative to enhance hemodynamic monitoring for pregnant women and provide personalized prevention and treatment adherence through AI-Chatbot *(Ciesla et al., 2024).*

AIM OF THE STUDY:

The study aim to evaluate the effect of artificial intelligence-based chatbot on enhancing self-care practices and pregnancy outcomes for women with pregnancy-induced hypertension. This aim will be achieved through the following objectives:-

1) Assess the pregnant women self-care practices regarding pregnancy induced hypertension

2) Design artificial intelligence based chatbot to be used by women with pregnancy induced hypertension.

3) Evaluate the effect of artificial intelligence based chatbot on self-care practices and pregnancy outcomes.

4) Determine satisfaction level toward the chatbot used.

Research hypothesis:

Using of artificial intelligence based chatbot will have a positive effect on self-care practices and pregnancy outcomes for women with pregnancy induced hypertension.

Subjects and Methods:

Research design:

A quasi-experimental research design (pre- and post-test with control and study groups) was utilized to achieve the aim of this study. The intervention was implemented only for the study group, while the control group received routine antenatal care.

Setting:

The study was conducted at the antenatal clinics of the obstetrics and gynecology hospital, Kasr Al-Aini. It is a Cairo University-affiliated teaching hospital in Egypt.

Sample:

A purposive sample of 100 pregnant women (50 study group and 50 control group) with the following criteria:

Inclusion Criteria:

- Ability to deal with (AI-chatbot**).**

- Pregnant women in 2nd or 3rd trimester

- Primigravida.

- Literate pregnant women.

- Have smart mobile and internet access.

- Hypertensive pregnant women (**BP ≥140/90 mm Hg**) above (20) weeks gestation

Exclusion Criteria:

- Pregnant women with Preeclampsia and Eclampsia

- Pregnant women admitted to high-risk pregnancy intensive care unit.

Tools of Data Collection:

The data for this study were collected by using five tools:

Tool (I): **Structured interviewing questionnaire.** It is composed of two parts:

Part (1) general characteristics of the pregnant women, it included: age, educational level, place of residence, occupation, body mass index (BMI), and smoking.

Part (2) History of current pregnancy: which included questions about: gestational age, number of fetuses, attendance of antenatal care, frequent complains related to pregnancy-induced hypertension.

Tool II: Artificial intelligence based Chatbot application tool.

The application tool was designed by the researcher. The ontology of the application contains evidence-based information and guidelines about pregnancy-induced hypertension to enhance self-care practices and pregnancy outcomes for women with pregnancy induced hypertension.

Tool III: Reported Self-care practices assessment sheet: The tool was adopted from ***Nguyen et al. (2023)*** and modified by the researcher to assess pregnant women's self-care practices regarding pregnancy-induced hypertension. It involves questions regarding diet and nutrition, physical activity, lifestyle adjustments and self-monitoring, self-management of medications, psychosocial strategies, and hygienic care.

Scoring system:

The score for this tool was as two scores for done items or answer yes, and one score for not done items or answer no. The total scores were 76 grades. These scores were summed and converted into a percent score.

It was classified into 2 categories:

- **Adequate practice:** ≥60% = (46-76grades)
- **Inadequate practice:** < 60% = (38-45grades)

This tool was given twice (pre- and post-test) to the study and control groups.

Tool IV: Pregnancy outcomes questionnaire

The tool included two main items: **Section I:** It was considered with maternal outcomes during pregnancy as maternal general condition, follow up data as blood pressure, proteinuria, and edema, duration of pregnancy, time of rupture of fetal membranes (ROM), occurrence of maternal complications during pregnancy, type of complications.

Section II: It was considered with fetal and neonatal outcome as fetal and neonatal status, fetal heart rate (FHR) (beats / min), fetal distress, neonate need for oxygen, birth weight (gm.), neonatal weight adequacy to gestational age, neonatal admission to the intensive care unit (NICU).

Overall Pregnancy Outcome Score (0–28 points)

The overall score is obtained by summing the three domain scores interpretation is as follows:

- **0–6 points:** Low risk positive or favorable pregnancy outcomes expected.
- **7–13 points:** Moderate risk requires close monitoring and follow-up.
- **≥14 points:** High risk increased likelihood of adverse or unfavorable pregnancy outcomes

Tool V: Chatbot Satisfaction: It involves questions as regard chatbot easy methods for communication, fast reach for the needed individual information, fun to use, available of the chatbot at any time, attractive method of learning experiences about pregnancy induced hypertension, safe time and effort, positive effect on maternal self-care practices and pregnancy outcomes.

Satisfaction scoring system

Start from Dissatisfied score 1; Quite Satisfied score 2; Satisfied score 3. The total scores were graded as

- Satisfied ≥ 75%. (16-21)
- Unsatisfied < 75 % (7-15)

The higher score indicates the higher satisfaction level.

Validity:

The content validity of the study tools was assessed by a jury consisting of three experts from the maternal and newborn health nursing department to review the tools for clarity, relevance, comprehensiveness, understandability, and applicability.

Reliability

Internal consistency reliability was assessed in the present study tools via Alpha Cronbach's reliability analysis, which Alpha Cronbach's test scores were 88 and 94 for the questionnaire.

Pilot Study: It involved 10 pregnant women (representing 10% of the total sample size). Pregnant women included in the pilot study were also included in the sample. So, no omissions of items were performed.

Ethical Considerations: Official permission to conduct the proposed study was obtained from the scientific research ethics committee of the faculty of Nursing at Capital University (Approval No.40, dated 18-3-2024). The researcher did not implement the chatbot application with the control group during the study period. However, from an ethical and moral perspective, they were provided with a brochure about routine antenatal care.

Field of Work:

This study was carried out from the beginning of October 2024, till the end of March 2025, covering a period of six months for data collection. The researcher attended pre mentioned settings three days/week (Sunday, Monday and Tuesday) from 9.00 Am. to 12.30 Pm.

I. Assessment phase (for study and control group)

During this phase, every pregnant woman was interviewed individually in the antenatal clinic. The researcher greeted the women at the start of the interview and then introduced herself to the pregnant women involved in the study and briefly explained the aim of the study. Informed consent was obtained from the pregnant women to participate in the research. The researchers distributed tool (I), the structured interviewing questionnaire, to each pregnant woman to assess general characteristics and history of current pregnancy.

After analysis of the first structured interviewing questionnaire and applying the inclusion and exclusion criteria. The pregnant women were divided into two groups, as the first 50 were recruited into the control group, and the second 50 were recruited into the study group. The researchers used part (III): reported self-care practices to assess women's self-care practices regarding PIH. The average time needed to complete questionnaires was around 20 to 30 minutes. The data obtained during this phase constituted the baseline for further comparisons to evaluate the effect of an artificial intelligence-based chatbot for the study group.

II. Implementation phase (for study group only)

The control group was provided with routine antenatal care. The study group was given intervention through an artificial intelligence-based chatbot application designed for using by women with pregnancy-induced hypertension. Each session took 30-45 minutes according to the level of pregnant women's comprehension and feedback.

Development of an AI-based chatbot, developed based on recent evidence-based information and guidelines about PIH from verified and trusted scientific resources. Supported with Arabic and English language. The chatbot generates automated responses based on evidence-based guidelines.

Validity of AI-based chatbot: the content was reviewed by experts from the maternal and newborn health nursing and obstetric fields. Modification was done according to their recommendation to ensure content accuracy, clarity, and relevance.

Orientation and Training Session. During the first session, the researcher clarifies to the women about the chatbot application, its purpose, features, and expected benefits.

The second session, concerned with downloading the application on the pregnant women's smart mobile devices, followed the process of registration and demonstrated how to use the chatbot effectively .The chatbot provided evidence-based information and guidelines about PIH, including its definition, risk factors, signs and symptoms, complications, prevention of adverse maternal and fetal outcomes, and treatment of hypertension during pregnancy. In addition to, the chatbot provided guidelines about self-care practices related to pregnancy-induced hypertension, such as healthy diet and nutrition, physical activity, lifestyle adjustments, self-monitoring, hygienic care, psycho-social strategies, and self-management of medications.

Moreover, the chatbot includes blood pressure monitoring via an application, which contain two sections. Firstly, instruction about accurate methods of measuring blood pressure at home. Secondly, blood pressure recording: This functionality allows the woman to record the taken blood pressure measurements (systolic and diastolic) regularly. According to the input values, the application offers instant feedback, showing whether the readings fall within the normal range or not, and recommending suitable actions as needed.

In subsequent sessions, follow-up assessments were done biweekly until the 36th week of gestation, then weekly until delivery. The women who reported any warning signs and symptoms or abnormal blood pressure readings through the chatbot application, the researcher referred the women to medical evaluation and management.

III. Evaluation phase:

Two evaluations were done for the control and study groups. The first one was at the beginning of the study as baseline data (pre-test). The second evaluation in both groups was assessed every two weeks until the 36th week of gestation, then weekly until delivery for follow-up criteria such as blood pressure, weight, and proteinuria after the artificial intelligence-based chatbot implementation. The researcher started to measure the extent of the effect of artificial intelligence-based chatbot on self-care practices, correctly measuring blood pressure at home and how to deal with measuring results. This was done by interviewing them using the structured interviewing questionnaire that was distributed to each of them for the second time (post-test) after using the artificial intelligence-based chatbot implementation. At delivery time, pregnant women in the study and control groups were assessed for pregnancy outcomes using tool (5). The effect of the artificial intelligence-based chatbot was done through comparing the control and study groups (including the pre- and post-tests) to assess pregnant women's self-care practices regarding pregnancy-induced hypertension

Limitation of the study:

− The chatbot's lack of emotional intelligence and empathy limits its ability to respond appropriately for pregnant women in a stressful or emotionally complex situation.

− The use of the chatbot required a continuous internet connection; therefore, any disruption in network connectivity might have adversely effect on its usability and general functionality.

IV. Statistical design:

Recorded data were analyzed using the statistical package for social sciences, version 22.0 (SPSS Inc., Chicago, Illinois, USA). Quantitative data were expressed as mean± standard deviation (SD). Qualitative data were expressed as frequency and percentage.

RESULTS

Table (1): Number and percentage distribution of the studied women (study group and control group) according to their general characteristics (n=50 in each group)

General characteristics	Study group (n=50)		Control group (n=50)		x^2	p-value
	No.	%	No.	%		
Age (years)						
18–24 years	20	40.0	18	36.0		
25–30 years	**22**	**44.0**	**20**	**40.0**	1.001	0.606
≥30–35 years	8	16.0	12	24.0		
Mean ± SD	25.70±2.31		26.36±2.37		t=0.482	**0.219**
Educational level						
Primary education	9	18.0	10	20.0		
Secondary education	**21**	**42.0**	**22**	**44.0**	0.181	0.913
University education	20	40.0	18	36.0		
Place of residence						
Rural	4	8.0	10	20.0	2.990	0.084
Urban	**46**	**92.0**	**40**	**80.0**		
Occupation						
Employee	**31**	**62.0**	**28**	**56.0**	0.372	0.542
Housewife	19	38.0	22	44.0		
BMI						
Under weight	1	2.0	2	4.0		
Normal weight	5	10.0	9	18.0	19.960	<0.001**
Overweight	17	34.0	**33**	**66.0**		
Obese	**27**	**54.0**	6	12.0		
Smoking						
Yes	2	4.0	3	6.0	0.211	0.646
No	**48**	**96.0**	**47**	**94.0**		
Using: Chi-square test; t=independent test *p-value >0.05 NS; *p-value <0.05 S; **p-value <0.001 HS*						

Table (1): It was found that, 44.0% in the study group and 40.0% in the control group were in the age group 25-30 years, with a mean of **25.70±2.31 years** and **26.36±2.37** years. 42.0% and 44.0%, in both the study and control groups had secondary education,

respectively. In the study and control groups, they were employees (62.0% & 56%, respectively) and from urban areas with percentages of 92.0% and 80.0%, respectively. Smoking prevalence was low, in both groups were nonsmokers (96.0% and 94.0%). There was no significant difference between two groups regarding age, education, occupation, residence, and smoking status. However, body mass index shows that there was a significant difference between the study and control groups. In the study group, 54.0% were obese, while 66% were overweight in the control group.

Table (1): Number and percentage distribution of the studied women (study group and control group) according to their history of current pregnancy (n=50 in each group)

History of current pregnancy	Study group (n=50)		Control group (n=50)		x^2	p-value
	No.	%	No.	%		
Gestational age						
20- 28 weeks	**30**	**60.0**	**27**	**54.0**	1.195	0.550
29 – 36 weeks	14	28.0	13	26.0		
37 – More than 37 weeks	6	12.0	10	20.0		
Mean±SD	**27.94±2.51**		**28.81±2.59**		t=1.026	0.184
Number of fetuses in the current pregnancy						
Single	**49**	**98.0**	**48**	**96.0**	0.344	0.558
Multiple	1	2.0	2	4.0		
Attendance of antenatal care (number of visits)						
<4 visits	17	34.0	20	40.0	0.386	0.534
≥4 visits	**33**	**66.0**	**30**	**60.0**		
Frequent complain during pregnancy related to PIH						
Persistent headaches	**27**	**54.0**	**30**	**60.0**	0.449	0.930
Double or blurred visions	6	12.0	6	12.0		
Persistent nausea	**11**	**22.0**	**9**	**18.0**		
Epigastric pain	6	12.0	5	10.0		

Table (2) shows that, 60.0% of the study group and 54.0% of the control group were in the gestational age of 20-28 weeks, with a mean of 27.94±2.51 and 28.81±2.59, respectively. Also, 98.0% of the study group and 96.0% of the control group had a single fetus. In addition, 66.0% & 60.0% of the studied women in two groups attended to antenatal care ≥4 visits, respectively. Moreover, 54.0% & 60.0% of the control and study groups had a frequent complain of persistent headaches related to pregnancy-induced hypertension, while 22.0% & 18.0% had complained of persistent nausea.

Table (3): demonstrate the non-significant difference between the study and control groups at pre-intervention regarding self-care practices. However, there was a highly statistically significant improvement in all items of self-care practices regarding pregnancy-induced hypertension at post-intervention (p < 0.001) for the study group, with a higher rates of adequate self-care practices than the control group, where the highest percentages (84% & 80%) were observed with diet and nutrition, lifestyle adjustment and self-monitoring, hygienic care, and physical activity, respectively. On the other hand, the

control group showed no significant improvement in self-care practiced after the same period (p > 0.05), showing only slight increases in the percentage of correct responses.

Table (3): Comparison between the studied pregnant women's reported self-care practices about pregnancy-induced hypertension at pre, and post intervention of artificial intelligence-based chatbot (n=50 in each group)

Reported self-care practices	Groups	Pre-intervention (n=50)				Post-intervention (n=50)				x^2	p-value
		Done		Not done		Done		Not done			
		No.	%	No.	%	No.	%	No.	%		
Diet and Nutrition	Study group	10	20.0	40	80.0	42	**84.0**	8	16.0	38.502	<0.001**
	Control group	7	14.0	43	86.0	9	18.0	41	82.0	0.0744	0.785
Physical Activity	Study group	8	16.0	42	84.0	40	**80.0**	10	20.0	38.502	<0.001**
	Control group	8	16.0	42	84.0	11	22.0	39	78.0	0.260	0.610
Life style adjustment and Self-monitoring	Study group	13	26.0	37	74.0	42	**84.0**	8	16.0	31.677	<0.001**
	Control group	11	22.0	39	78.0	14	28.0	36	72.0	0.213	0.644
Self-management of medications	Study group	9	18.0	41	82.0	39	**78.0**	11	22.0	33.694	<0.001**
	Control group	6	12.0	44	88.0	9	18.0	41	82.0	0.314	0.575
Psycho-social strategies	Study group	9	18.0	41	82.0	35	**70.0**	15	30.0	25.365	<0.001**
	Control group	6	12.0	44	88.0	11	22.0	39	78.0	1.134	0.287
Hygienic Care	Study group	19	38.0	31	62.0	42	**84.0**	8	16.0	20.345	<0.001**
	Control group	16	32.0	34	68.0	21	42.0	29	58.0	0.686	0.407

Using: Chi-square test
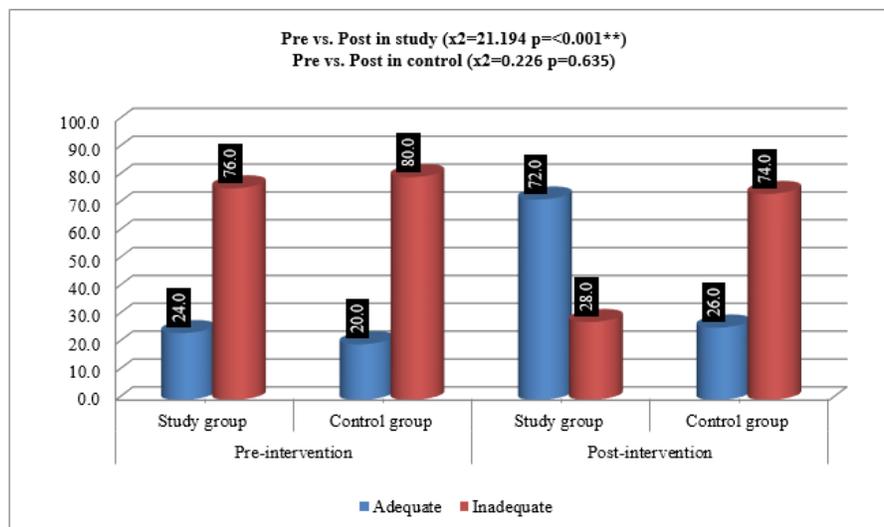*p-value >0.05 NS; *p-value <0.05 S; **p-value <0.001 HS*

Fig. (1): Percentage distribution of the total pregnant women's reported self-care practices about pregnancy-induced hypertension at pre, and post intervention of artificial intelligence-based chatbot (n=50 in each group)

Figure (1) displays that 24% of pregnant women in the study group had adequate level of reported self-care practices, which markedly increased from 24.0% to 72.0% post-intervention after using an artificial intelligence-based chatbot. There was a highly statistically significant improvement in the total level of reported self-care practices regarding pregnancy-induced hypertension post-intervention (p < 0.001) for the study

group. Meanwhile, there was no significant improvement in their total level of reported self-care practices at post-intervention for the control group.

Table (4): Comparison between the studied pregnant women's (study group and control group) according to their maternal outcome during pregnancy after intervention of artificial intelligence-based chatbot (n=50 in each group)

A-Maternal outcome during pregnancy	Study group (n=50)		Control group (n=50)		x^2	p-value
	No.	%	No.	%		
Maternal general condition						
Stable	40	80.0	30	60.0	4.762	0.029*
Unstable	10	20.0	20	40.0		
Symptoms for unstable women (>1 can be ticked)						
Severe headache	6	37.5	8	23.5	1.734	0.885
Dizziness	4	25.0	7	20.6		
Difficult breathing	2	12.5	5	14.7		
Oliguria	1	6.3	4	11.8		
Epigastric pain	2	12.5	6	17.6		
Persistent nausea or vomiting	1	6.3	4	11.8		
SBP (mmHg)						
Mean ± SD	144.90±13.04		157.30±14.16		#t=5.221	<0.001**
DBP (mmHg)						
Mean ± SD	92.60±8.33		99.00±0.891		#t=6.741	<0.001**
Proteinuria						
Present	8	16.0	35	70.0	29.743	<0.001**
Absent	42	84.0	15	30.0		
Edema						
Present	10	20.0	40	80.0	36.000	<0.001**
Absent	40	80.0	10	20.0		
Duration of pregnancy						
Less than 34 weeks	3	6.0	8	16.0	14.925	<0.001**
34 – 36 weeks	8	16.0	24	48.0		
37 – More than 37 weeks	39	78.0	18	36.0		
Time of rupture of fetal membranes (ROM)						
No rupture of membranes until the time of delivery	28	56.0	17	34.0	10.538	0.005*
Preterm premature rupture of membranes	6	12.0	20	40.0		
Rupture of membranes after the labor onset	16	32.0	13	26.0		
Occurrence of maternal complications during pregnancy						
Yes	10	20.0	28	56.0	13.752	<0.001**
No	40	80.0	22	44.0		
If yes, type of complications						
Admission to high risk pregnancy intensive care unit	0	0.0	6	21.4	9.011	0.029*
Pre-eclampsia	7	70.0	12	42.9		
Eclampsia	0	0.0	8	28.6		
Others	3	30.0	2	7.1		
Using: Chi-square test; #t=independent test *p-value >0.05 NS; *p-value <0.05 S; **p-value <0.001 HS*						

Table (4): Clarifies the maternal outcome during pregnancy among the studied sample. 80.0% of the study group had a stable condition with lower means of SBP and DBP (**144.90±13.04**) & (**92.60±8.33**), while higher in the control group with a mean of (**157.30±14.16) & (99.00±0.891**). On the other hand, proteinuria and edema had a higher percentage (70% and 80%, respectively) in the control group than the study group. Duration of pregnancy was also more favorable in the study group, reaching ≥37 weeks with a percentage of 78% vs. 36% in the control group. Similarly, 56% had no rupture of membranes until the time of delivery for the study group. Meanwhile, nearly half of the control group 40.0% had a preterm premature rupture of membranes. In addition to, only 20% had a maternal complication during pregnancy in the study group while 56% in the control group. There were statistically significant differences between the study group and the control group regarding maternal outcome during pregnancy.

Table (5) shows that 2% of the studied women in the study group had stillbirth births compared to 12% in the control group. Regarding fetal heart rate a percentage of 8.0% and 28.0% of both the control and study group had a FHR> 160, respectively, showing a significant improvement among the study group. Additionally, this table clarifies that 4.0% of the studied women in the study group had a presence of fetal distress, while 18.0% in the control group. Concerning the need for oxygen, 10% of neonates in the study group required oxygen compared to 30% in the control group, while birth weight had a small-for-gestational-age (SGA) neonates were 18% in the study group compared to 60% in the control group. 6% of the study group had admission of neonates to intensive care unit, while a percentage of 24% in the control group. There were statistically significant differences between the study group and the control group regarding fetal and neonatal outcomes.

Table (5): Comparison between the studied pregnant women's (study group and control group) according to their fetal and neonatal outcomes after intervention of artificial intelligence-based chatbot (n=50 in each group)

B-Fetal and neonatal outcomes	Study group (n=50)		Control group (n=50)		x^2	p-value
	No.	%	No.	%		
Fetal and neonatal status						
Live birth	49	98.0	44	88.0	3.840	0.050*
Stillbirth	1	2.0	6	12.0		
Fetal heart rate (FHR) (beats / min)						
120 – 160	46	92.0	36	72.0	6.775	0.009*
> 160	4	8.0	14	28.0		
Fetal distress						
Absent	48	96.0	41	82.0	5.005	0.025*
Present	2	4.0	9	18.0		
Neonate need for oxygen						
Yes	5	10.0	15	30.0	6.250	0.012*
No	45	90.0	35	70.0		
Birth weight (gm)						
<1500	0	0.0	6	12.0		
1500 – 2400	9	18.0	24	48.0	20.048	<0.001**
≥ 2500	41	82.0	20	40.0		

Neonatal weight adequacy to gestational age						
Small for gestational age (SGA)	9	18.0	30	60.0	18.537	<0.001**
Adequate for gestational age (ADA)	41	82.0	20	40.0		
Neonatal admission to the intensive care unit (NICU)						
Yes	3	6.0	12	24.0	6.353	0.012*
No	47	94.0	38	76.0		
Using: Chi-square test *p-value >0.05 NS; *p-value <0.05 S; **p-value <0.001 HS*						
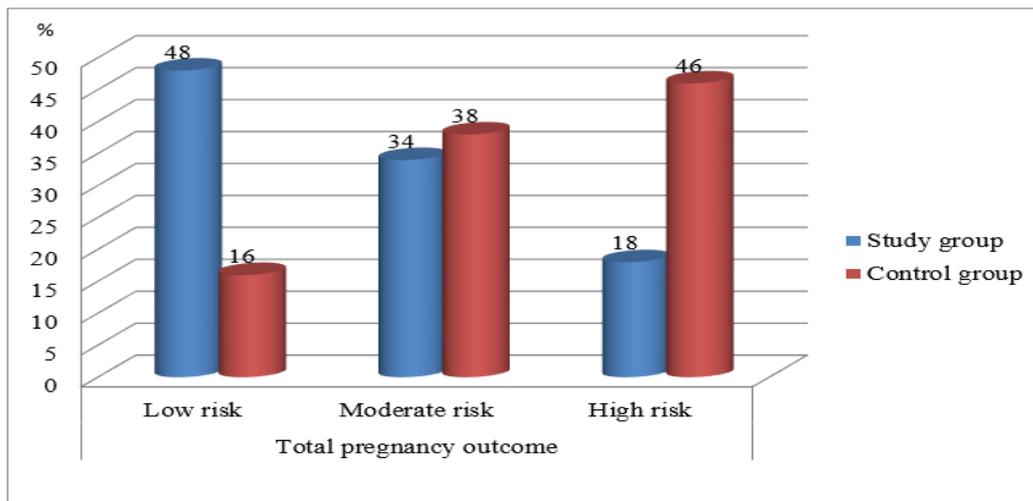
Figure (2): Percentage of the studied women with pregnancy-induced hypertension (study group and control group) according to their total pregnancy outcome (n=50 in each group)

Figure (2) displays that, 48.0% of the study group had low-risk outcomes compared to only 16.0% in the control group. There was a statistically significant difference between both groups (χ^2 = 14.236, p = 0.008) regarding total pregnancy outcomes.
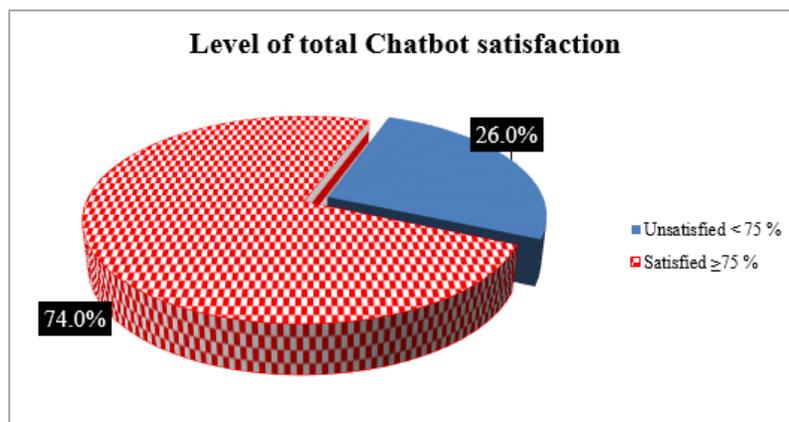

Fig. (3): Percentage of the pregnant women in the study group according to their level of total chatbot satisfaction (n=50)

Figure (3) displays that, 74.0% of the pregnant women with pregnancy-induced hypertension in the study group were satisfied with using the chatbot. While, 26% of them were unsatisfied.

Table (6) Best-Fitting Multiple Regression Model for Predicting Pregnancy Outcomes based on Women's Self-Care Practices, and Satisfaction with the Chatbot. Showed that there both predictors had statistically significant effects. Better score of self-care practices ($β = –0.094$, $p = 0.012$), and greater satisfaction with the chatbot ($β = –1.101$, $p < 0.001$) were both independently associated with enhancing a positive pregnancy outcomes. Additionally, the model described a moderate proportion of variability in pregnancy outcomes ($R = 0.405$), and the whole model was statistically significant ($F = 4.106$, $p < 0.05$). These findings indicate that the chatbot intervention contributed considerably to improving self-care practices, and enhancing positive pregnancy outcomes among pregnant women with pregnancy-induced hypertension.

Table (6): Best-Fitting Multiple Regression Model for Predicting Pregnancy Outcome According to Women's Self-Care Practice, and Satisfaction with the Chatbot

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	β	Std. Error	Beta		
(Constant)	3.014	1.207		2.47	0.014**
Self-care practice	-0.094	0.036	0.106	2.629	0.012*
Satisfaction score regarding chatbot	-1.101	0.209	0.790	5.274	<0.001**
R= 0.405 Model ANOVA: F= 4.106, p-value <0.05					
a Predictors: (Constant), Self-care practice and Satisfaction score regarding chatbot					
b Dependent Variable: pregnancy outcome					

DISCUSSION

Health education and awareness programs through AI-based chatbots targeting pregnant women with pregnancy-induced hypertension will reduce related mortality and morbidity. Consequently, these technologies are also targeted to achieve Sustainable Development Goals (SDGs) in accelerating the decline of maternal mortality by 2030. As a result, it became possible to ensure positive pregnancy outcomes and self-care practices for women with PIH through an AI chatbot *(Peter &Okafor, 2024)* & *(Correia et al., 2025)*

Regarding to general characteristics of the studied pregnant women in two groups, the present study showed that, there was no significant difference between the study and control groups regarding age, education, occupation, residence, and smoking status. However, body mass index shows that there was a significant difference between the study and control groups. In the study group, 54.0% were obese, while 66% were overweight in the control group. These results were in the same line with *Guo et al. (2025)* who conducted a study about "Impacts of Lifestyle Intervention by a Nurse-Led Smartphone Application on Blood Pressure, Weight, and Pregnancy Outcomes in Pregnant Women With Gestational Hypertension" and revealed that, the mean age of study participants in the intervention and control group was 25.62±1.19 years and more than two third of the studied women

had secondary education and employee. In addition to, majority of cases had non-smoker and more than half of the study group were obese, while overweight in the control group.

On the other hand, these results were contradicted with **Denu et al. (2025)** who conducted a study about "Home blood pressure monitoring and mobile health application practices among pregnant persons with and at risk of hypertensive disorders of pregnancy" and found that, the mean age was 31.9 years. More than half of studied cases had a bachelor's degree and almost half of cases had smokers. Most of the respondents have normal body mass index (BMI)

Concerning to the history of the current pregnancy, the findings of the present study revealed that more than half of the studied women in the study and control groups were in the gestational age range of 20–28 weeks, with a mean of **27.94±2.51 and 28.81±2.59,** respectively**.** The vast majority of the control and of the study groups hada single fetus.Around two-thirds of the control and study groups adequately attended to antenatal care (≥4 visits). In addition, more than half of the studied women in two groups had frequently complained of persistent headaches related to pregnancy-induced hypertension.

This result was in harmony with **Sabogal *et al.* (**2025) in their study entitled "Nursing Intervention" EducaTHE" to Improve Knowledge and Self-care Behaviors for Hypertensive Disorders in Pregnant Women," who reported that about two-thirds of the studied women had adequate antenatal visits. More than two-thirds of the studied pregnant women frequently complain of persistent headaches related to pregnancy-induced hypertension. Majority of studied women had a single fetus and in the gestational age of 20-28 weeks with a mean of **28 ±1.45.**

This result disagreed with **Wills *et al.* (2025)** who conducted a study about " Usability and acceptability of a mobile application prototype for managing hypertensive disorders of pregnancy: A mixed methods evaluation " who reported that the median gestational age among pregnant women was 22.0 (17.0, 29.0) weeks, with 89 % complain from persistent nausea and epigastric pain regarding pregnancy-induced hypertension.

Regarding reported self-care practices of the studied women in two groups, the findings of the present study revealed that, there was a highly statistically significant improvement in the total level of reported self-care practices score regarding pregnancy-induced hypertension at post-intervention (p < 0.001) for the study group compared to pre-intervention. On the other hand, the control group showed no significant improvement in their total level of reported self-care practices after the same period (p > 0.05), showing only slight increases in the percentage of correct responses. So, the results indicated that the use of the artificial intelligence–based chatbot contributed to significant improvements in the overall reported self-care practices among the pregnant women in the study group.

This result was harmony with **Goddard, S. (2025),** who conducted a study about "A Digital Lifestyle App for Hypertension during Pregnancy" and reported that, development of a digital interventions as chatbot, provided new data insights about how to support pregnant women with hypertension to engage in healthy behaviors regarding self-care and a currently overlooked aspect of blood pressure management.

On the other hand, this result was disagreed with **Nielsen *et al. (2023),*** who conducted a study about " Toward Safer Pregnancies: Usability evaluation of a prototype application for monitoring and controlling hypertensive disorders in pregnancy. " and reported that, the app for monitoring hypertensive disorders during pregnancy face challenges and user feedback that need to be addressed for refinement and effectiveness in supporting maternal health during pregnancy

Regarding the total level of pregnancy outcomes of the studied women in two groups, the findings of the present study revealed that nearly half of the women in the study group had low-risk outcomes. Nearly half of the control group had high-risk outcomes. There was a statistically significant difference between both groups (χ^2 = 14.236, p = 0.008) regarding total pregnancy outcomes. So, the results indicated that the use of the artificial intelligence–based chatbot contributed to significant in promoting favorable or positive pregnancy outcomes among the study group.

These results were in agreed with ***Giaxi et al. (2025),*** who conducted a study about **"** artificial intelligence and machine learning: an updated systematic review of their role in obstetrics and midwifery " and show that there was significant advancements in artificial intelligence and machine learning applications as chatbots in obstetrics and midwifery. Which achieved high accuracy across many areas in obstetric, such as assessment of high risk pregnancy e.g., pregnancy-induced hypertension, preeclampsia, gestational diabetes, preterm birth, and monitoring to fetal well. Being, mode of delivery, and neonatal outcomes as mortality rates, admission to neonatal intensive care unit and presence of respiratory distress syndrome. Almost the studies reporting significant improvements in promoting pregnancy outcome especially for those with high risk pregnancy as pregnancy-induced hypertension.

This result was contradicted with **Hua et al. (2025).** About their study entitled "Predictive Models Using Machine Learning to Identify Fetal Growth Restriction in Patients With Preeclampsia: Development and Evaluation Study" and show The study successfully developed a model in patients with preeclampsia but the method captures highly relevant risk factors for model interpretation, alleviating concerns about the "black box" problem of ML techniques. Nevertheless, further studies are needed to simplify and validate the application of the model in clinical conditions.

Related their total satisfaction of the pregnant women about chatbot, the findings of the present study revealed that majority of the pregnant women were satisfied with using the chatbot as an attractive method of learning experiences about pregnancy-induced hypertension and the ability to provide fast reach for the needed individual information.While, 26% of them were unsatisfied.

These results were in harmony with ***Heidari et al. (2024),*** who conducted a study about "Hypertensive Pregnant Women's Experience Regarding the Use of Mobile Health Application" and revealed that more than half of the pregnant women expressed high satisfaction with the app's accuracy, user-centered approach, logs, motivation to follow healthy lifestyle recommendations, and enhanced ability for pregnant women to better manage gestational hypertension.

On the other hand, this result was contradicted with **Mishina *et al. (2025),*** who conducted a study about " BePresent Universal Internet-Based Parenting Intervention: Single-Arm Pre-Post Intervention Study " and reported that, majority of pregnant women disagree about application use. Universal digital interventions have the potential to be implemented widely in community settings. However, face there is a need to assess the efficacy of digital universal interventions.

Regarding multiple regression model for predicting pregnancy outcome according to women's self-care practice, and satisfaction with the chatbot**,** the present study revealed that there all two predictors had statistically significant effects. Better score of self-care practices ($\beta = -0.094$, $p = 0.012$), and greater satisfaction with the chatbot ($\beta = -1.101$, $p < 0.001$) were all independently associated with promoting a positive pregnancy outcomes. And the whole model was statistically significant ($F = 4.106$, $p < 0.05$).These findings indicate that the chatbot intervention contributed considerably to improving knowledge, promoting self-care practices, and enhancing positive pregnancy outcomes among pregnant women with pregnancy-induced hypertension.

These results were in harmony with **Rahmatulloh et al. *(2023),*** who conducted a study about "Chatbot for Diagnosis of Pregnancy Disorders using Artificial Intelligence Markup Language (AIML) " and revealed that the chatbot application runs well, with the eligibility criteria reaching 81.4% and the results, which attributed significantly to the fact that artificial intelligence based chatbot promoting a positive maternal and neonatal outcome for women with pregnancy induced hypertension

CONCLUSION

The findings of the present study supported the research hypothesis that there is positive effect of artificial intelligence based-chatbot on promoting self-care practices and pregnancy outcomes for women with pregnancy induced hypertension.

Recommendations

- Utilization of hospital-based social media resources, such as hospital facebook page and website, and App-based resources to be linked with artificial intelligence based-chatbot for providing timely evidence-based information amongst antenatal, postnatal and high risk pregnant women, and as a more efficient means of communication.

- **Further study,** to explore the effect of artificial intelligence based-chatbot on a diverse areas as postnatal, gynecology and family planning.

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