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Impact of Health Education Intervention on Determinants of Pregnancy-Induced Hypertension among Pregnant Women in Ilorin

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Abstract **Original Research Article**

Pregnancy is often seen as a period of happiness for women of childbearing age worldwide. However, five percent of deaths occur due to pregnancy-induced hypertension (PIH). For a woman experiencing PIH due to hypertensive disorders of pregnancy, the period sometimes leads to unhappiness and death. This study, therefore, examined the impact of health education intervention on determinants of pregnancy-induced hypertension among pregnant women in Ilorin. The objectives of the study were to: (i) examine age as a determinant of PIH; (ii) investigate gestational diabetes as a determinant of PIH; (iii) assess family history as a determinant of PIH; (iv) examine multiple pregnancy as a determinant of PIH; (v) identify whether lifestyle is a determinant of PIH.

Quasi-experimental research design of pre-test and post-test control group design was used for the study. The target population for the study was all registered pregnant women attending Primary Health Care clinics in Ilorin. A multi-stage sampling procedure was used to sample 70. A researcher- developed and validated questionnaire with reliability co-efficient of 0.78, determined through split-half method was used for the study. Pre-test was administered to both the experimental and control group; intervention on determinants of pregnancy-induced hypertension was given for eight weeks to the experimental group while control group received placebo after which the groups were given post-test. Inferential Statistics of t-test was used to analyse the hypotheses at 0.05 alpha level.

The findings of the study were that:

i. age was a significant determinant of pregnancy-induced hypertension among pregnant women in the experimental group after health education intervention; (t-cal = -13.93 p-value = .000);

ii. diabetes mellitus was a significant determinant of pregnancy-induced hypertension among pregnant women in the experimental group after health education intervention; (t-cal = -11.904 p-value = .000);

iii. family history was a significant determinant of pregnancy-induced hypertension between pregnant women in the experimental group after health education intervention; (t-cal = -15.094 p-value = .000);

iv. multiple pregnancy was a significant determinant of pregnancy-induced hypertension among pregnant women in the experimental group after health education intervention in Ilorin, Kwara State (t-cal= -12.897 p-value = .000);

v. lifestyle as a significant determinant of pregnancy-induced hypertension among pregnant women in the experimental group after health education intervention in Ilorin, Kwara State (t-cal = -12.324 p-value = .000).

The study concluded that there was no difference in the knowledge of determinants of pregnancy-induced hypertension before the intervention in the two groups, but there was significant improvement after the intervention among the experimental group. This implies that health education impacted positively on the determinants of pregnancy-induced hypertension among pregnant women. The study, therefore, recommended that health education on determinants of pregnancy-induced hypertension should be given by health educators to prevent pregnancy-induced hypertension and improve pregnancy outcome.

Keywords: Collateral, Guarantees, Financing, Nigeria, Procurement.

INTRODUCTION

Background to the Study

Pregnancy is often seen as a period of happiness for women of childbearing age worldwide. However, for a woman experiencing pregnancy-induced hypertension due to certain factors linked to hypertensive disorders of pregnancy, it can turnout to be a source of concern and discomfort. Pregnancy-induced hypertension is a major cause of maternal morbidity and mortality which requires adequate attention by all levels of government globally. Pregnancy is the term used to describe the period in which a fetus develops inside a woman's womb or uterus.

Pregnancy usually lasts about 40 weeks, or over 9 months, as measured from the last menstrual period to delivery. Health care providers refer to three segments of pregnancy, called 3 trimesters (Office on Women's Health, 2010). Pregnancy is the time during which one or more offspring develops (gestates) inside a woman's uterus (womb) (Eunice Kennedy Shriver, 2015). A multiple pregnancy involves more than one offspring, such as with twins (Mosby, 2009).

Pregnancy is divided into three trimesters of approximately three months each. The first trimester includes conception, which is when the sperm fertilizes the egg. The fertilized egg then travels down the fallopian tube and attaches to the inside of the uterus, where it begins to form the embryo and placenta. During the first trimester, the possibility of miscarriage (natural death of embryo or fetus) is at its highest. Around the middle of the second trimester, movement of the fetus may be felt. At 28 weeks, more than 90% of babies can survive outside of the uterus if provided with high-quality medical care, though babies born at this time will likely experience serious health complications such as heart and respiratory problems and long-term intellectual and developmental disabilities (Eunice Kennedy Shriver, 2020).

Globally, nearly 350,000 mothers die each year due to pregnancy-related causes, and 14% of maternal deaths are due to pregnancy-induced hypertension (World Health Organization, UNICEF, UNFPA, World Bank Group, and the United Nations Population Division, 2021.) Regional estimates varied substantially, and the large proportion of deaths occurred in Sub-Saharan Africa and Southeast Asia (World Health Organization, UNICEF, UNFPA, World Bank Group, and the United Nations Population Division, 2021). Every day in 2015, about 830 women died due to complications of pregnancy and childbirth. Almost all of these deaths occurred in low-resource settings, and most could have been prevented (Alkema, 2016). Pregnancy induced hypertension like preeclampsia is one of the primary causes of death in Ethiopa (Central Statistical Agency (CSA) (Ethiopia) & ICF, 2017).

On a daily basis, 550 maternal deaths occurred in Sub-Saharan Africa and 180 in Southern Asia, compared to 5 in developed countries. The risk of women in developing countries dying from a maternal related causes during their lifetime is about 33 times higher compared to a woman in developed country (WHO, 2019). The prevalence of preeclampsia in developing countries ranges from 1.8 to 16.7% (Lakew, 2013), for instance, the prevalence of preeclampsia occurs in 10% of pregnancies in African women, which is significantly higher than the global average of approximately 2% (Nakimuli, 2015).

In Nigeria, research findings indicate varying rates of pregnancy-induced hypertension, for example a study conducted in a teaching hospital in the South-South region reported an incidence of 20.8% (Aziken, et al, 2021). Similarly, prevalence rates of hypertension conditions during pregnancy have been documented to range from 17% to 34% (Singh, et al 2016). In 2009, the occurrence of pregnancy-induced hypertension ranged between 2% to 16% (Ugwu, et al, 2013). According to Singh, et al (2016), the prevalence of hypertensive disorders was estimated to be higher than 17% in Nigeria. Akeju et al, (2016) suggested that women exhibit various health-seeking behaviours, including purchasing over-the counter drugs for headache relief, seeking advice from family members regarding symptoms like edema, epigastric pain and blurred vision, consulting spiritual or traditional healer for convulsions, and eventually seeking medical care.

All health-seeking behaviours may delay coming to the hospital, worsening the PIH complications. Between the periods of 1990 and 2015, 10.7 million maternal deaths were stated globally, in spite of the fact that maternal mortality ratio had fallen by 44% over these periods (WHO 2015). Out of this total number, developing countries accounts for about 99% of the global deaths in 2015, with Sub-saharan Africa accounting for 66%. A study by WHO showed that Nigeria and India are estimated to account for over one third of all maternal deaths globally in 2015, contributing 19% and 15% respectively. Furthermore, the study also revealed that in the West African sub-region, especially Nigeria with a maternal mortality ratio (MMR) of 814 ranks second, after Sierra Leone 1360 MMR. With this MMR, Nigeria could not meet the MDG5A target in 2015, which aimed to reduce maternal mortality ratio by 75% of its 1990 level by 2015. Among the causes of maternal mortality, hypertension ranks second (14%) after hemorrhage (Chima, et al. 2021). In Nigeria, hypertensive disorders of pregnancy could be a contributory factor to the rising prevalence of hypertension, which has been predicted to escalate up to 39.1 million by 2030, if the current inclination in figures continues (Adeloye, et al, 2017).

Pregnancy-induced hypertension is the most common medical disorder of pregnancy that complicates 6-10% of pregnancies all around the world. It is the second direct cause of maternal mortality globally (Lale, et al, 2021). WHO (2018) stated that the rate of stillbirth is 21.9 per 1000 birth in women in a pregnancy induced hypertension (PIH) and normotensive women 8.4 per 1000 live birth. Pregnancy-induced hypertension (PIH) causes 70,000 maternal deaths globally, resulting in the loss of one woman's life approximately every 11 minutes (Magee, 2014).

Age as a determinant of pregnancy-induced hypertension has been one or the major determinant of PIH. Kolluru, et al (2016) stated that trend towards delayed childbearing is a well described phenomenon in high-income counties. Chronic and pregnancy-induced hypertension is associated with advanced maternal age. The risk of gestational hypertension has previously been found to be 1.22 times higher in mothers who were 35.0-39.9 years old and 1.63 times higher in mothers who were 40.0-44.9 years old than in mothers who were25.0-29.9 years old (Timofeev, et al, 2013). Other analyses suggest that the risk of pre-eclampsia increases by 4% for every year more than 32 years of age. Concomitantly, the risk of iatrogenic premerm delivery also increases with maternal age (Poon, et al, 2019). According to Ghiadoni, et al, (2012). low nitric oxide levels and high oxidative stress are signs of ageing, which advrsely affect the relaxation of the endothelium. This could cause the development of pregnancy-induced hypertension in older women, because pregnancy increases cardiac output.

Gestational diabetes is a prevalent chronic condition during pregnancy that adversely affects the health of millions of women globally (Hildén, et al, 2020). Gestational diabetes mellitus was Initially defined by O'Sullivan and Mahan in 1964, and it was characterized by elevated blood sugar levels first identified during pregnancy (Hartling, et al, 2013). With obesity rates escalating worldwide, the incidence of gestational diabetes mellitus among pregnant women is rising, heightening their susceptibility to various pregnancy complications (McIntyre, et al, 2019). Accurate quantification of the risk factors associated with adverse pregnancy outcomes is crucial for preventive measures, risk assessment and patient education.

Virani, et al. (2020) stated that a family history of endothelial dysfunction can impair blood vessel function, increasing susceptibility to damage and elevating the risk of pregnancy-induced hypertension. Additionally, women with a family history of kidney disease are more likely to develop pregnancy-induced hypertension due to underlying renal dysfunction. The presence of cardiovascular disease, diabetes, or obesity in the family can also heighten the risk of pregnancy-induced hypertension.

Multiple pregnancies, such as twin pregnancies, significantly increase the risk of pregnancy-induced hypertension, also known as gestational hypertension. Rahim (2019) highlighted that the risk of hypertension during pregnancy rises with multiple gestations. Specifically, women carrying twins face a higher risk of developing

conditions like pre-eclampsia and gestational hypertension (Tao, et al, 2022). Research by Ross (2021) found that the risk of pre-eclampsia in twin pregnancies is three to four times higher compared to singleton pregnancies. However, a study by Berg, et al (2023) did not find a significant association between gestational hypertension and twin pregnancies after adjusting for known risk factors. Conversely, Laine, et al. (2019). reported a 71.2% higher prevalence of pre-eclampsia in twin pregnancies compared to singletons.

Phipps et al. (2019) noted that many women inherit genetic factors predisposing them to hypertension or preeclampsia during pregnancy. They further highlighted that shared lifestyle habits, dietary choices, and environmental exposures among family members can also contribute to the risk of developing these conditions. According to the Lok, Huber, Lee Shenoy, Yeyzlin et al. (2020), familial influences on gene expression can alter blood pressure regulation in pregnancy. Women with a family history of hypertension or preeclampsia may experience chronic inflammation that exacerbates during pregnancy, potentially leading to pregnancy-induced hypertension.

Health education interventions aim to enhance the understanding, attitudes, and behaviours of individuals or communities towards health-related issues. Recent studies have underscored the significant impact of these interventions in preventing pregnancy-induced hypertension. A research conducted by Herval, et al (2019) revealed that following educational sessions, there was a notable enhancement in both knowledge and perception regarding pregnancy-induced hypertension among the participants in the intervention group. This suggests that health education interventions can contribute to detection and prevention of pregnancy-induced hypertension.

Another study focusing on exercise interventions during pregnancy demonstrated that including physical activity as part of health education programmes can effectively reduce both systolic and diastolic blood pressure in pregnant women. This finding emphasizes the importance of integrating physical exercise into prenatal care to mitigate the risk of pregnancy-induced hypertension (Zhu, et al,2022). Research has demonstrated that tailored health education interventions for women at high risk of hypertension during pregnancy, such as those with a family history of hypertension, chronic conditions, or obesity, can be highly effective. These interventions typically involve personalized counselling and structured physical activity programmes (Zhu et al, 2022). Studies conducted in various settings, including rural and urban populations, have found that community-based health education intervention programmes significantly enhance knowledge and practices related to managing hypertension during pregnancy. These programmes often incorporate group sessions, individualized counselling, and the distribution of educational materials on health issues (Evelyn, et al, 2023). Integrating health education into routine prenatal care, with healthcare providers delivering educational content, has been proven to amplify the impact of these interventions. This approach ensures that pregnant women receive consistent and comprehensive information throughout their pregnancy (Evelyn et al, 2023).

Research has indicated that health education interventions empower pregnant women by equipping them with knowledge to identify early signs and symptoms of hypertensive disorders. This is crucial because early recognition can prevent serious complications. Educational programmes typically focus on monitoring blood pressure, recognizing symptoms such as severe headaches, changes in vision, and swelling, and understanding when to seek medical assistance (Bin Saeda., et al, 2024). Health education programmes also promote healthy lifestyle changes, such as adequate diets, regular physical activity, and stress management, which are essential for managing blood pressure levels. These programmes additionally emphasize the importance of adhering to prescribed medications and attending routine prenatal visits, which further reduce the risk of complications (Bin Saeda et al, 2024).

Overall, health education interventions are integral to the strategy for mitigating pregnancy-induced hypertension, promoting the health of both mother and fetus while alleviating the burden of hypertensive disorders during pregnancy. It is within

this context that this study investigated the impact of health education interventions on knowledge of determinants of pregnancy-induced hypertension among pregnant women attending antenatal clinics in Ilorin, Kwara State.

Statement of the Problem

Pregnancy induced hypertension (PIH), known as toxemia of pregnancy or preeclampsia, is a form of high Blood Pressure (BP) in pregnancy. PIH develops after 20 weeks of gestation with or without other sign of preeclampsia. PIH is a known cause of premature delivery, intrauterine growth restriction (IUGR), placental abruption and fetal death, as well as maternal mortality and morbidity.

The researcher during his practicum observed in Ilorin, Kwara State that insufficient knowledge and education about pregnancy-induced hypertension among women attending antenatal clinics at comprehensive health centers in Kwara State contributed to ineffective management and prevention efforts, leading to higher rates of maternal and fetal complications. This underscores the importance of implementing a focused health education programme aimed at improving knowledge, and proactive measures related to pregnancy-induced hypertension among this group.

The problem of pregnancy-induced hypertension (PIH) persists among women attending antenatal clinics in the comprehensive health 'center' in Kwara State, manifesting as a significant contributor to maternal and fetal morbidity and mortality rates. Despite the availability of medical resources, there exists a notable gap in knowledge regarding PIH among this demographic. The researcher also observed that majority of these women experience pregnancy-induced hypertension due to poor diet, stress, lack of emotional support and health problem. Some of these women whose cases are not properly managed died as a result of the increased blood pressure during delivery while those who survived it lived a drug dependent life in order to bring down the high blood pressure as a result of the pregnancy. Based on the researcher personal experience within six months of practicum, five cases of pregnancy-induced hypertension were recorded in his local government Area (Ilorin West), Kwara State which led to the death of three out of these pregnant women and two with delivery complication.

Research Hypotheses

The following hypotheses were tested:

H_{01}: There will be no significant difference in knowledge of age as a determinant of pregnancy-induced hypertension among pregnant women in the control and experimental groups after health education intervention in Ilorin, Kwara State.

H_{02}: There will be no significant difference in knowledge of gestational diabetes as a determinant of pregnancy-induced hypertension among pregnant women in the control and experimental groups after health education intervention in Ilorin, Kwara State.

H03 There will be no significant difference in knowledge of family history as a determinant of pregnancy-induced hypertension among pregnant women in the control and experimental groups after health education intervention in Ilorin, Kwara State.

H_{04}: There will be no significant difference in knowledge of multiple pregnancy as a determinant of pregnancy-induced hypertension among pregnant women in the control and experimental groups after health education intervention in Ilorin, Kwara State.

H_{05}: There will be no significant difference in knowledge of lifestyle as a determinant of pregnancy-induced hypertension among pregnant women in the control and experimental groups after health education intervention in Ilorin, Kwara State.

Methodology

This study focuses on pregnant women attending antenatal clinics at Adeta Basic Health Center (Ilorin West) and Okelele Comprehensive Health Center (Ilorin East) in Kwara State. A **quasi-experimental design** involving pre-test and post-test with experimental and control groups will be used. A **multi-stage sampling technique**—including simple random, purposive, and proportionate sampling—will select 70 respondents (35 per group).

The **experimental group** will receive health education on the determinants of pregnancy-induced hypertension, while the **control group** will receive education on first aid and safety. Data will be collected using a validated researcher-designed questionnaire. Descriptive statistics (frequency and percentage) will summarize demographic data, while **Cohen's d** and **t-test** will analyze research questions and hypotheses at a 0.05 significance level.

Data collection was in three phases:

- **Pre-intervention:** The researcher will seek official approval, introduce the study to health center staff and participants, and explain the purpose to both pregnant women and their husbands.
- **Intervention:** A six-week clinic-based health education programme will take place during antenatal visits—Mondays for the control group and Thursdays for the experimental group. Each session will last 45 minutes and use charts, banners, and teaching aids relevant to the topic.
- **Post-intervention:** An interactive session will be held, followed by the administration of the post-test.

Ethical considerations include obtaining informed consent, ensuring confidentiality, and complying with standard research ethics.

Results

In the course of this study,5 hypotheses were postulated and tested using Paired Sample t – test at 0.05 level of significance.

H_{01}: There will be no significant difference in knowledge of age as a determinant of pregnancy-induced hypertension among pregnant women in the control and experimental groups after health education intervention in Ilorin, Kwara State.

Table 1: Analysis of Paired Sample t – test on Age as a Determinant of Pregnancy-Induced Hypertension in Control and Experimental Group After Health Education Intervention among Pregnant Women Attending Ante-natal Clinics in Ilorin, Kwara State

	Paired Differences								
				95% Confidence Interval of the Difference					
	Mean	Std. Deviation	Std. Error Mean	Lower	Upper	T	df	Sig. (2-tailed)	Decision
Age	-2.75714	1.65447	.19775	-3.15164	-2.36265	13.943	69	.000	**H_{01} is rejected**

The paired sample t-test in table 10 evaluates the impact of a health education intervention on age as a determinant of pregnancy-induced hypertension among pregnant women attending antenatal clinics in Ilorin, Kwara State. The test showed a significant improvement, with a mean difference of -2.75714, indicating that post-intervention scores were higher than pre-intervention scores. The standard deviation of the difference is 1.65447, and the standard error of the mean is 0.19775, reflecting the variability in the differences. The 95% confidence interval for the mean difference ranges from -3.15164 to -2.36265, confirming the significance, as the interval does not include zero. The t-statistic is -13.943, a large value that further supports the substantial difference in scores. With 69 degrees of freedom (df) and a p-value of 0.000, the result is highly statistically significant, demonstrating that the health education intervention effectively addressed age-related risks in pregnancy-induced hypertension in the experimental group. Therefore, the hypothesis which stated that there will be no significant difference in age as a determinant of pregnancy-induced hypertension among pregnant women in the control and experimental groups after health education intervention in Ilorin, Kwara State is hereby rejected.

Table 2: Analysis of Paired Sample t – test on gestational Diabetes as a Determinant of Pregnancy-Induced Hypertension in Control and Experimental Group After Health Education Intervention among Pregnant Women Attending Ante-natal Clinics in Ilorin, Kwara State

	Paired Differences							
				95% Confidence Interval of the Difference				
	Mean	Std. Deviation	Std. Error Mean	Lower	Upper	T	df	Sig. (2-tailed)
Diabetes Mellitus	-2.27143	1.59639	.19080	-2.65207	-1.89078	-11.904	69	.000
Decision	**H_{01} is rejected**							

The paired sample t-test in table 11 examines the impact of health education intervention on diabetes mellitus as a determinant of pregnancy-induced hypertension among pregnant women attending antenatal clinics in Ilorin, Kwara State. The mean difference before and after the intervention is -2.27143, indicating a significant improvement following the intervention. The standard deviation of the differences is 1.59639, reflecting variability among participants, and the standard error mean is 0.19080, showing the precision of the mean difference estimate. The 95% confidence interval ranges from -2.65207 to -1.89078, confirming the statistical significance of the improvement, as the interval does not include zero. The large t-statistic of -11.904 further highlights the substantial impact of the intervention. With 69 degrees of freedom (df) and a p-value of 0.000, the result is highly significant, leading to the rejection of the null hypothesis (H_o2). This demonstrates that the health education intervention effectively addressed diabetes mellitus as a key risk factor for pregnancy-induced hypertension, confirming its success.

H_{03}: There will be no significant difference in knowledge of family history as a determinant of pregnancy-induced hypertension among pregnant women in the control and experimental groups after health education intervention in Ilorin, Kwara State.

Table 3: Analysis of Paired Sample t – test on Family History as a Determinant of Pregnancy-Induced Hypertension in Control and Experimental Group After Health Education Intervention among Pregnant Women Attending Ante-natal Clinics in Ilorin, Kwara State

	Paired Differences							
				95% Confidence Interval of the Difference				
	Mean	Std. Deviation	Std. Error Mean	Lower	Upper	T	df	Sig. (2-tailed)
Family History	-2.64286	1.46491	.17509	-2.29356	2.99215	-15.094	69	.000
Decision	**H_{01} is rejected**							

The paired sample t-test in table 12 assesses the impact of health education intervention on family history as a determinant of pregnancy-induced hypertension among pregnant women attending antenatal clinics in Ilorin, Kwara State. The mean difference before and after the intervention is 2.64286, indicating a significant improvement post-intervention. The standard deviation of the paired differences is 1.46491, reflecting some variability in the extent of improvement among participants, while the standard error of the mean is 0.17509, suggesting a precise estimate of the mean difference. The 95%

confidence interval ranges from 2.29356 to 2.99215, confirming the significance of the improvement, as the interval does not include zero. The t-statistic is 15.094, a very large value that highlights the substantial effect of the intervention. With 69 degrees of freedom (df) and a p-value of 0.000, the result is highly statistically significant. This leads to the rejection of the null hypothesis ($H_0$3), demonstrating that the health education intervention effectively addressed family history as a risk factor for pregnancy-induced hypertension.

H_{04}: There will be no significant difference in knowledge of multiple pregnancy as a determinant of pregnancy-induced hypertension among pregnant women in the control and experimental groups after health education intervention in Ilorin, Kwara State.

Table 4: Analysis of Paired Sample t – test on Multiple Pregnancy as a Determinant of Pregnancy-Induced Hypertension in Control and Experimental Group After Health Education Intervention among Pregnant Women Attending Ante-natal Clinics in Ilorin, Kwara State

	Paired Differences							
				95% Confidence Interval of the Difference				
	Mean	Std. Deviation	Std. Error Mean	Lower	Upper	T	df	Sig. (2-tailed)
Multiple Pregnancy	-2.5000	1.6219	.1939	-2.8867	2.1133	-12.897	69	.000
Decision	**H_{01} is rejected**							

The paired sample t-test in table 13 evaluates the impact of health education intervention on multiple pregnancy as a determinant of pregnancy-induced hypertension among pregnant women in Ilorin, Kwara State. The analysis shows a significant improvement post-intervention, with a mean difference of -2.5000. This negative mean difference indicates higher post-intervention scores compared to pre-intervention, reflecting enhanced awareness. The standard deviation of 1.6219 indicates some variability in individual improvements, while the standard error of 0.1939 suggests a precise estimate of the mean difference. The 95% confidence interval, ranging from -2.8867 to -2.1133, confirms the statistical significance of the improvement, as it does not include zero. The t-statistic of -12.897 is substantial, emphasizing the strong effect of the intervention, and the p-value of 0.000 reinforces the statistical significance of the results. Therefore, the null hypothesis ($H_0$4) is rejected, confirming that the health education intervention effectively improved participants' understanding of multiple pregnancy as a risk factor for pregnancy-induced hypertension.

H_{05}: There will be no significant difference in knowledge of lifestyle as a determinant of pregnancy-induced hypertension among pregnant women in the control and experimental groups after health education intervention in Ilorin, Kwara State.

Table 5: Analysis of Paired Sample t – test on Lifestyle As a Determinant of Pregnancy-Induced Hypertension in Control and Experimental Group After Health Education Intervention among Pregnant Women Attending Ante-natal Clinics in Ilorin, Kwara State

	Paired Differences							
			95% Confidence Interval of the Difference					
	Mean	Std. Deviation	Std. Error Mean	Lower	Upper	T	df	Sig. (2-tailed)
Lifestyle	-1.88571	1.28020	.15301	-2.19097	-1.58046	-12.897	69	.000
Decision	**H_{01} is rejected**							

The paired sample t-test in table 14 evaluates the impact of health education intervention on lifestyle as a determinant of pregnancy-induced hypertension among pregnant women attending antenatal clinics in Ilorin, Kwara State. The mean difference before and after the intervention is -1.88571, indicating a significant improvement post-intervention, with higher scores after the intervention. The standard deviation of 1.28020 shows variability in individual improvements, while the standard error mean of 0.15301 suggests a precise estimate of the mean difference. The 95% confidence interval, ranging from -2.19097 to -1.58046, does not include zero, confirming that the intervention resulted in a statistically significant change. The t-statistic of -12.324 indicates a substantial effect size, reinforcing the significance of the intervention's impact, and the p-value of 0.000 further supports these findings.

Consequently, the null hypothesis (H_05) is rejected, demonstrating that the health education intervention effectively increased awareness and understanding of lifestyle factors as key determinants of pregnancy-induced hypertension among the participants.

Discussion of Results

The findings from hypothesis one reveal a significant difference in the knowledge of age as a determinant of pregnancy-induced hypertension between pregnant women in the experimental and control groups following the health education intervention in Ilorin, Kwara State. This outcome aligns with existing literature that identifies age—particularly advanced maternal age (35 years and above)—as a major risk factor for pregnancy-induced hypertension (Smith et al., 2023; Brown et al., 2022). In many communities, especially those with limited access to health information, age-related risks are often poorly understood. Consequently, targeted health education interventions play a vital role in improving pregnant women's awareness of how age influences their pregnancy outcomes.

This result is also consistent with findings from similar studies where health education significantly enhanced participants' understanding of pregnancy-related risk factors (Johnson et al., 2022). It further supports broader research emphasizing the importance of health education in reducing maternal morbidity and mortality, particularly in resource-constrained settings (Olumide et al., 2024). The success of the intervention in this study highlights the value of incorporating age-related risk factors into routine antenatal education programs, especially in areas like Ilorin, where awareness may be limited.

The findings from hypothesis two indicate that the health education intervention produced a significant improvement in pregnant women's knowledge of gestational diabetes as a determinant of pregnancy-induced hypertension in Ilorin, Kwara State. The intervention effectively strengthened participants' understanding of how diabetes increases the risk of developing hypertension during pregnancy, underscoring the need to address diabetes as a critical risk factor within antenatal care programmes

Gestational diabetes is widely recognized as a significant contributor to pregnancy-related complications, including pregnancy-induced hypertension. Numerous studies have consistently

shown that women with pre-existing or gestational diabetes face a heightened risk of developing hypertensive disorders during pregnancy (Yang, *et al* 2022). Despite these well-established risks, awareness of diabetes as a determinant of pregnancy-induced hypertension remains low in many communities. The intervention implemented in this study successfully addressed this gap by equipping pregnant women with essential knowledge to better understand and manage their health during pregnancy.

The improvement in knowledge recorded aligns with existing literature emphasizing the effectiveness of health education in enhancing women's understanding of chronic conditions and their influence on pregnancy outcomes. Previous studies demonstrate that targeted health education programmes can significantly raise awareness of risk factors for hypertension and other pregnancy-related complications, empowering women to make informed decisions and adopt proactive health behaviours (Nguyen et al., 2021). By strengthening awareness of diabetes as a key risk factor, this intervention has the potential to reduce the incidence of pregnancy-induced hypertension over time, particularly among women living with or at risk of developing gestational diabetes.

Overall, these findings highlight the crucial role of health education interventions in addressing modifiable risk factors—such as gestational diabetes—that contribute to pregnancy-induced hypertension. Increasing women's understanding of these risks can significantly enhance both maternal and fetal health outcomes. Future research may further examine the long-term impact of such interventions and their effectiveness in reducing hypertensive disorders and other pregnancy-related complications across diverse populations.

The findings from hypothesis three show that the health education intervention significantly improved pregnant women's knowledge of family history as a determinant of pregnancy-induced hypertension in Ilorin, Kwara State. The results demonstrate a substantial increase in participants' understanding of how a family history of hypertension or preeclampsia can elevate their own risk during pregnancy. Although family history is widely acknowledged as a major risk factor for pregnancy-induced hypertension (Higgins et al., 2023), many women are often unaware of its importance. By addressing this gap, the intervention enhanced participants' recognition of the relevance of their family medical background, enabling them to take more informed steps toward managing their health.

This improvement is consistent with existing research showing that health education interventions effectively increase knowledge of risk factors for pregnancy-related complications. Programmes focused on family history have been shown to improve women's health literacy, supporting informed decision-making and encouraging preventive health behaviours (Bello et al., 2023). Through targeted information on the role of family history, the intervention empowered the women to better assess their risk and seek appropriate medical monitoring throughout pregnancy. These results underscore the essential role of health education in promoting awareness of hereditary risk factors for pregnancy-induced hypertension and improving maternal health outcomes.

The findings from hypothesis four further highlight the effectiveness of the intervention in increasing knowledge of multiple pregnancy as a determinant of pregnancy-induced hypertension among pregnant women in Ilorin, Kwara State. Multiple pregnancies are well-established risk factors for hypertensive disorders due to the increased cardiovascular demands and elevated hormonal levels associated with twin or higher-order gestations (Bello et al., 2023; Adeyemi et al., 2022). The intervention successfully raised awareness about these heightened risks, helping participants better understand the unique challenges associated with carrying more than one fetus.

These results align with global evidence showing that targeted maternal education improves understanding of pregnancy-related risks, leading to enhanced antenatal care attendance and improved risk-management behaviours (Roberts et al., 2021). They also reflect World Health Organization recommendations that emphasize integrating health education into routine antenatal services, especially in resource-limited settings where awareness may be

low (WHO, 2022). By improving knowledge of risks associated with multiple pregnancy, the intervention likely contributed to more proactive health-seeking behaviour among participants, consistent with findings from studies demonstrating that women who understand their risk profile are more likely to seek timely care and adhere to medical advice (Higgins et al., 2023). Overall, this reinforces the importance of health education in reducing the burden of hypertensive disorders in pregnancy and supporting positive maternal and fetal outcomes.

The study also revealed that the intervention's approach to discussing abortion-related risks improved participants' understanding of the importance of regular prenatal care and proactive health behaviours. Women who are better informed are more likely to seek professional advice, follow treatment recommendations, and monitor early signs of complications (Adeyemi et al., 2023). This supports broader evidence showing that targeted educational interventions can empower women to take charge of their reproductive health, particularly in environments where stigma or misinformation may hinder access to care. Overall, these findings affirm the effectiveness of health education interventions in improving determinants of maternal health and reducing the incidence of pregnancy-induced hypertension in resource-constrained settings.

The findings from hypothesis five demonstrate that the health education intervention significantly increased pregnant women's knowledge of lifestyle as a determinant of pregnancy-induced hypertension. This emphasizes the critical importance of addressing modifiable lifestyle behaviours—such as diet, physical activity, stress management, and sleep quality—in reducing the risk of hypertensive disorders during pregnancy. Poor diet, chronic stress, and physical inactivity are widely recognized contributors to metabolic and vascular disturbances that can worsen hypertension (Adeoye et al., 2023). The intervention helped participants understand how adopting healthier habits can mitigate these risks.

These results align with global research showing that structured health education programmes focusing on lifestyle modifications can lower blood pressure levels and improve pregnancy outcomes (Smith et al., 2022). The intervention successfully addressed common barriers to healthy practices, including cultural misconceptions about physical activity or dietary restrictions during pregnancy. By equipping participants with practical strategies to improve their lifestyle, the programme fostered informed decision-making and empowered women to take control of their health. Such changes benefit not only the mother but also contribute to improved fetal health outcomes (Chukwu et al., 2021).

Overall, the study highlights the need to integrate lifestyle-focused health education into routine antenatal care to effectively address modifiable risk factors for pregnancy-induced hypertension. Tailored interventions such as this can play a crucial role in reducing the prevalence of hypertensive disorders and improving maternal and child health, particularly in communities with limited access to health resources.

Conclusion

Based on the findings of this study, the following conclusions were made:

1. A significant difference was observed between the control and experimental groups, indicating that the intervention effectively influenced knowledge of age-related risks.
2. The intervention resulted in a significant increase in understanding the link between gestational diabetes and pregnancy-induced hypertension.
3. There was a notable difference in the recognition of family history as a determinant, with the experimental group showing improved knowledge post-intervention.
4. The health education intervention significantly increased knowledge of multiple pregnancies as a determinant for hypertension.
5. Significant changes were noted in the experimental group, with better knoledge of lifestyle choices as key determinants of hypertension during pregnancy.

Recommendations

Based on the conclusions drawn from this study, the following recommendations were made:

1. Healthcare providers should incorporate targeted health education programmes into routine antenatal care to increase knowledge of age-related risks and other critical determinants of pregnancy-induced hypertension. Tailored educational content can help pregnant women better understand their individual risk profiles.
2. Antenatal care should include regular screening for diabetes mellitus and comprehensive education about its link to pregnancy-induced hypertension. This would enable early detection and management of gestational and pre-existing diabetes.
3. Community health initiatives should focus on raising knowledge about the influence of family history on hypertension risks during pregnancy. These campaigns can be integrated into antenatal visits to encourage women to share relevant family health information with healthcare providers.
4. Special attention should be given to pregnant women with multiple pregnancies by providing tailored education about their increased risks and ensuring close monitoring during antenatal care visits.
5. Antenatal programmes should actively promote healthy lifestyle choices, including balanced nutrition, regular physical activity, and stress management, to address modifiable risk factors for hypertension during pregnancy.

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