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*Full Length Research Paper*

# Investigation of the Quantitative Aspects of Placental Morphometry in Hypertensive Mothers attending Sir Yahaya Hospital

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**Abstract**

Hypertensive disorders during pregnancy pose significant risks for maternal and foetal health, often leading to placental abnormalities that compromise foetal development. This study investigates the quantitative aspects of placental morphometry in hypertensive mothers attending Fati Lami Sir Yahaya Hospital, Birnin Kebbi. A cross-sectional study was conducted over eight weeks, comparing placental weight, area, and circumference between hypertensive and normotensive mothers. A total of 27 placentas were analysed, comprising 12 from hypertensive mothers and 15 from normotensive controls. The placenta weighed significantly less in hypertensive mothers' pregnancies (446.7 ± 64.89 g) than in normotensive mothers' pregnancies (846.7 ± 291.7 g). There was a strong positive correlation between placental weight and baby weight in hypertensive pregnancies (Pearson correlation = 0.9539, $p < 0.0001$). Placental area was also significantly lower in hypertensive pregnancies (209.9 ± 26.76 $cm^2$) compared to normotensive pregnancies (327.2 ± 41.79 $cm^2$). Similarly, placental circumference was reduced in hypertensive mothers (54.67 ± 3.789 cm) relative to normotensive mothers (70.19 ± 4.705 cm). These findings align with previous studies that indicate that hypertensive disorders adversely affect placental morphology, leading to impaired foetal growth due to reduced placental efficiency. The study underscores the need for routine placental assessments in maternal care to identify potential complications early in hypertensive pregnancies. It further recommends targeted interventions, including regular blood pressure monitoring, nutritional support, and timely medical intervention to mitigate the risks associated with placental insufficiency. Future research with larger sample sizes and detailed histological assessments is warranted to enhance understanding of the relationship between hypertensive disorders and placental development. These insights could contribute to improved maternal and foetal outcomes in hypertensive pregnancies.

**Keywords:** Investigation, Quantitative, Placental Morphometry, Hypertensive Mothers Sir Yahaya Hospital.

## INTRODUCTION

The placenta is a unique organ attached to the uterus and connected to the foetus via the umbilical cord. It facilitates physiological exchange between maternal and foetal circulation (Saurjyaranjan et al., 2015). The human placenta is usually discoid in shape. At term, one-fifth of the placenta is of maternal origin, consisting of the decidua basalis, while four-fifths are of foetal origin, developing from the chorionic frondosum. The placenta has foetal and maternal surfaces, as well as peripheral margins (Shariff, 2019). The foetal part develops from the chorionic sac, lined by the amnion and completely covered by chorion, with the umbilical cord attached. The maternal part originates from the endometrium (Batsa et al., 2015). The transfer of

nutrients and gaseous exchange between mother and foetus occurs in the placenta. It is a fascinating organ with a wide range of functions, including protection, nutrition, respiration, excretion, and hormone production (Vr et al., 2018). In term, the placenta is a circular disc with a diameter of 185 mm and a thickness of about 2.5 cm at its centre. It feels spongy, weighs about 500 grams, and has a weight-to-baby ratio of roughly 1:6 at term, occupying about 30% of the uterine wall (Dutta, 2001).

**Fig Ii: Fetal Side.**

**Fig I: Maternal Side.**

The intrauterine existence of the foetus depends on its vital organ, the placenta. Examining the placenta provides significant insights into the prenatal health of both baby and mother (*Udainia et al*., 2001). The placenta is vital for maintaining pregnancy and promoting normal foetal development; it acts as a mirror reflecting the uterine status of the foetus (Udainia *et al.,* 2004). Hypertension, also known as high blood pressure, is a common health condition affecting millions of people worldwide (Joseph, 2000). Hypertension is a common complication in pregnancy, diagnosed when maternal blood pressure exceeds 140/90 mmHg. It can be chronic primary hypertension (onset before pregnancy) or pregnancy-induced, such as gestational hypertension or preeclampsia (Ahmed and Daver, 2013).

Patients with hypertension occasionally exhibit symptoms such as dizziness, pulsating headaches behind the eyes in the morning, blurred vision, facial flushing, or tinnitus (ringing in the ears) (Bar et al., 2012). Severe hypertension, with systolic blood pressure (SBP) >240 mmHg or diastolic blood pressure (DBP) >120 mmHg, is termed accelerated hypertension, often associated with confusion, visual disturbances, nausea, and vomiting (WHO). When hypertension causes increased intracranial pressure (pressure exerted by the cranium on brain tissue and fluid), it is termed malignant hypertension or a hypertensive crisis, a medical emergency requiring immediate intervention. This condition may result in end-organ damage (Anantha *et al.,* 2014).

**Problem Statement**

Despite advances in maternal healthcare, hypertensive disorders during pregnancy remain a global challenge. There is a need for detailed studies on placental changes associated with hypertensive pregnancies to better understand their impact on outcomes. Existing research is limited and often inconsistent. This study addresses this gap by analysing placental morphometry in hypertensive pregnancies.

**Aim of the Study:**

This study aims to investigate the quantitative aspects of placental morphometry in hypertensive mothers attending Sir Yahaya Hospital.

**Objectives of the Study**

1. To compare the morphometric characteristics of placentas from hypertensive and normotensive pregnancies.

**Justification of the Study**

Existing research on placental morphometry and hypertension is limited. This study aims to provide

reference data on placental morphometry in hypertensive mothers at Sir Yahaya Hospital, Kebbi State.

**Significance of the Study:**

This study contributes to understanding placental changes due to hypertensive disorders. Its findings may aid in the development of diagnostic tools and therapeutic strategies, improve maternal and foetal outcomes, and reduce complications through early detection and intervention..

## METHODOLOGY

After obtaining ethical clearance from the Department of Anatomy, Basic Medical Science, College of Health Sciences, Federal University Birnin Kebbi

**Study Design**

This study used a cross-sectional design to look at the differences in the placental morphometric features between mothers with high blood pressure (cases) and mothers without high blood pressure (controls) within eight weeks of the study.

**Study Setting**

The study was conducted at Fati Lami, Sir Yahaya Hospital, Birnin Kebbi, Kebbi State, after obtaining approval from the Chief Medical Director (CMD) of the hospital.

**Participants**

The study comprised pregnant women with hypertension and those without hypertension who attended antenatal clinics (ANC) and delivered at Fati Lami, Sir Yahaya Hospital, Kebbi State, within the eight (8) weeks of the study. The participants provided verbal informed consent after being briefed on the scope and aims of the study.

**Table 1:** Inclusion and Exclusion Criteria

| Inclusion Criteria | Exclusion Criteria |
|---|---|
| Both primigravida and multigravida aged 20-45 years who attended antenatal check-ups, with detailed clinical data and cooperation, were included in the study. | Mothers below 20 years or above 45 years and those with other diseases such as diabetes mellitus, endocrine disorders, cardiovascular diseases, and renal diseases were excluded. |

**Source:** Author Construct, 2025

**Table 2:** Sample Size

| Sample | Hypertensive Mothers | Non-Hypertensive Mothers | Total |
|---|---|---|---|
| Number of Samples | 12 | 15 | 27 |

**Source:** Author Construct, 2025

**Data Collection**

**Medical Record Review**: Relevant clinical data were extracted from medical records, including prenatal care details and laboratory results (e.g., blood pressure measurements).

**Placental Specimen Collection**: Placentae were obtained from hypertensive and normotensive mothers immediately after delivery. Samples were collected following standardized protocols, and placental measurements (e.g., weight) and baby weights were documented.

**Methods**

The placenta was weighed in grams (g) using a calibrated weighing scale. The following steps were followed:

i. The placenta was placed on the weighing scale immediately after delivery, ensuring proper leveling for accuracy.

ii. After recording the weight, a clear photograph of the placenta was taken for additional morphometric measurements, such as circumference, diameter, and area.

iii. The baby's weight was also recorded on a clean weighing scale


**FIG III: Representing Method 3.6.1 (I)**


**FIG IV: Representing Method 3.6.1 (II and III)**

**Materials Used**

i. Weighing scale
ii. Hand gloves
iii. Ruler
iv. Nose mask
v. Camera

**Image Acquisition**

Photographs of the placentae for further morphometric measurements (e.g., circumference, diameter, and surface area) were taken using a Tecno Spark 10 Pro phone camera. The specimen was positioned neatly on the scale, and the camera was aligned to capture all parts of the placenta without distortion. Images were then transferred to a computer for analysis.

**Fig vi:** Showing the image of an analyzed Placental using the ImageJ software

## RESULTS AND DISCUSSION

**Table 1**: Relationship between Placental Weight and Baby Weight

| | Placental Weight | Baby Weight | Pearson Correlation | P-Value |
|---|---|---|---|---|
| **Hypertensive** | 446.7 ± 64.89 | 2.408 ± 0.2392 | 0.9539 | <0.0001 |
| **Non-Hypertensive** | 846.7 ± 291.7 | 3.140 ± 0.390 | 0.2664 | 0.3371 |

**Source: Field data, 2025**

1. Hypertensive mothers: Placental weight = 446.7 ± 64.89 g, Baby weight = 2.408 ± 0.2392 kg.
2. Normotensive mothers: Placental weight = 846.7 ± 291.7 g, Baby weight = 3.140 ± 0.390 kg.
3. Significant positive correlation between placental weight and baby weight in hypertensive mothers (Pearson correlation = 0.9539, $p < 0.0001$).
4. The descriptive statistics display the mean, SD, and Pearson correlation between the placenta weight and baby weight in hypertensive and non-hypertensive pregnancies. As mentioned in the earlier findings from Table 1 above, the reduced placenta weight in hypertensive pregnancies suggests compromised placental function, which directly impacts foetal growth and birth weight. This fits with what Salmani et al. (2014) found: high blood pressure during pregnancy greatly reduces the size and weight of the placenta, which in turn lowers the weight of the baby because blood flow between the uterus and the placenta is slowed down. The strong correlation in hypertensive groups also shows that the placenta's health is a key factor in determining the outcome of a hypertensive pregnancy. It can affect how well the placenta works and how well the foetus can grow inside the mother.

**Table 2:** Comparison of Placental Area

| **Varables** | | | **Welch's Correlation for variance** | | **F-test to compare variance** |
|---|---|---|---|---|---|
| | No of Freq | Mean ± SD | P-Value | T-test | P-Value |
| **Hypertensive** | 12 | 209.9 ± 26.76 | <0.0001 | 8.835 | 0.1436 |
| **Non-Hypertensive** | 15 | 327.2 ± 41.79 | | | |

**Source:** Field data, 2025

1. **Hypertensive mothers**: Mean placental area = 209.9 ± 26.76 $cm^2$.

2. **Normotensive mothers**: Mean placental area = 327.2 ± 41.79 $cm^2$.

Showing there's a significant difference between the two groups above.

Descriptive Statistics showing the Mean, SD and of Hypertensive and Non-Hypertensive Placenta Area Using T-test and Welch's Correction to check for unequal variables between the two groups.

**Table 2:** Comparison of Placental Circumference

| **Varables** | | | **Welch's Correlation for variance** | | **F-test to compare variance** |
|---|---|---|---|---|---|
| | No of Freq | Mean ± SD | P-Value | T-test | P-Value |
| **Hypertensive** | 12 | 54.67 ± 3.789 | 0.1547 | 1.468 | 1.443 |
| **Non-Hypertensive** | 15 | 70.19 ± 4.705 | | | |

**Source:** Field data, 2025

1. Hypertensive mothers: 54.67 ± 3.789 cm.

2. Normotensive mothers: 70.19 ± 4.705 cm.

Descriptive Statistics showing the Mean, SD and of Hypertensive and Non- Hypertensive Placenta Circumference Using T-test and Welch's Correction to check for unequal variables between the two groups

**Conclusion/ Recommendations**

These researchers looked into how hypertensive disorders affect the weight, area, and circumference of the placenta in mothers at Fati Lami Sir Yahaya Hospital in Birnin Kebbi. The results showed statistically significant differences in placental size between hypertensive and non-hypertensive mothers. These findings suggest that hypertensive disorders in pregnancy may significantly alter placental morphometry in this population. These findings are helpful, but they also show that more research is needed with bigger groups of people and more in-depth examinations of functional and histological placental changes in order to fully comprehend the connection between hypertensive disorders and placental development. Understanding this could improve maternal and foetal outcomes in hypertensive pregnancies. The following recommendations are made for ways to improve the situation**:** Routine Placental Assessment**:** Incorporate placental morphometric evaluation into standard maternal care protocols to identify potential complications early in hypertensive pregnancies. Targeted Interventions: Develop provincial-specific maternal healthcare strategies to manage hypertensive disorders during pregnancy, including regular blood pressure monitoring; nutritional support to mitigate risks associated with placental insufficiency; and, lastly, timely medical interventions to address complications like preeclampsia.

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