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Anthropometric Value And Insulin Level Among Pregnant Women In University Of Port Harcourt Teaching Hospital, Rivers State Nigeria

[1]N.P.N. Ezebunwa, [2*]S.C. Onuoha, & [3] Prof. F. Diorgu

[1]Department of Nursing,
African Centre of Excellence for Public Health and Toxicological Research,
University of Port Harcourt, Port Harcourt, Nigeria

[2]Department of Nursing Science, University of Port Harcourt, Port Harcourt, Nigeria

[3]Department of Biochemistry, University of Port Harcourt, Port Harcourt, Nigeria

[1]ezebunwankoyo@gmail.com; [2]faith.diorgu@uniport.edu.ng; [3]sammyonuoha@yahoo.com

***Corresponding author's email: sammyonuoha@yahoo.com**

ABSTRACT
Pregnancy leads to changes in a mother. At this stage, the mother's caloric intake must be maintained in order to provide for both her and the growing foetus. These changes include the preparation of the mammary glands for lactation and other organs. This is in addition to her regular bodily activities. Also, there is the growth of subcutaneous tissue that can be utilised in the later stages of pregnancy and during breastfeeding if necessary. Examining and detecting insulin levels during all three trimesters of pregnancy allowed the test of hypothesis, that changes in leptin levels are related to shifts in maternal weight and age. Using a descriptive cross-sectional research design and purposive sampling method, prenatal 50 pregnant women at the University of Port Harcourt Teaching Hospital (UPTH) were recruited. A checklist was used to record vital statistics such height, weight, and age. Each lady had 6 ml of blood collected and evenly divided between two anticoagulant-containing vials before being spun to measure insulin and leptin levels using the ELISA method. Descriptive statistics were calculated using Graph Pad Prism 9, with a p-value less than 0.05 at a 95% confidence level. The result showed that there was no significant difference in insulin levels between first-, second-, and third-trimester of pregnant women. The study concluded that there is no significant relation between insulin level among diabetic and non-diabetic pregnant women. It was recommended among others that the government (through policies, findings) need to do more to improve their collective commitment to health.
Keywords: Anthropometry, Insulin, Pregnancy, Women

INTRODUCTION

The mother's metabolism has a tough time during pregnancy. At this stage, the mother's body has to provide for both her own and the developing baby's energy requirements. Mammary glands develop and the mother's other organs swell in size during pregnancy. It takes more effort to make these adjustments. This is on top of what her body already performs. The mother's body is also undergoing adjustments to better accommodate her anticipated metabolic demands. For instance, she's putting on weight to prepare

for the possibility that she'll require more energy in the later stages of pregnancy or when she's nursing. The mother's body adjusts the systems that maintain energy balance to accommodate these increased requirements. One consistent strategy for satisfying this demand is to eat more. It has long been known that pregnant mice and rats consume more food than their non-pregnant counterparts. Women are typically told they need to "eat for two," although their daily energy needs actually increase by only a little amount while they are pregnant.

During pregnancy, there is a tremendous deal of variation in insulin blood level which is vital in keeping glucose and energy levels stable. This hormone make you feel full stop performing as well as your pregnancy advances because of the increased caloric intake you're likely to be experiencing. Blood levels of the hormone insulin control many aspects of growth and development during pregnancy and infancy. This indicator can be used to track an infant's weight gain over time. In the first trimester, women of a healthy weight and BMI don't need to eat more calories than usual, while in the second and third trimesters, they need an extra 350 and 500 calories per day, respectively (Butte et al., 2004; Catalano et al., 1998b). Choi et al. (2019) and Wan et al. (2020) report that having an excessive amount of fat in the abdomen region is associated with an elevated risk of cardiovascular disease, diabetes, and hypertension. Commonly referred to as the "waist circumference," the abdominal circumference (AC) is the most widely used anthropometric predictor of central obesity. Because it's such a simple and practical method, it's used in every clinical practise to evaluate patients' risk for obesity-related complications. In addition to or instead of the BMI (Ross et al., 2020).

Multiple unfavourable pregnancy outcomes, such as pre-eclampsia, gestational diabetes, intrauterine development delay, and recurrent miscarriage, have been linked to the interaction between insulin and leptin. Since these hormones are created in the mother's circulation and, to a lesser extent, the fetus's bloodstream, where they function as placental signals, nourish the foetus, and control the placenta, Toth et al. (2009) propose employing them in the endocrine system. Gestational diabetes (GDM) is the initial diagnosis for pregnant women with high blood sugar levels (Yan et al., 2019). We still don't know how its core mechanisms work. One of the most prevalent pregnancy problems, GDM affects 3-8% of all births, according to research by Uzelac et al. (2010). The incidence of this problem has been continuously rising over the past few decades (Ferrara, 2007), and it now affects as many as 20% of youngsters in various parts of the world. In the twenty-first century, it poses a major threat to society's health. Despite claims that the GDM phenotype is quite unique (Powe et al., 2016), excess weight and obesity are argued to account for at least half of all cases by Kim et al., 2010. Overweight women have an increased risk of developing GDM compared to women of a healthy weight (Powe et al., 2016). Prenatal hypertension and preeclampsia are issues that can arise in pregnant women with GDM if they gain too much weight, gain too much weight too quickly, or fail to keep their blood sugar levels under control.

Some researchers have even gone so far as to suggest that being overweight during pregnancy is the single most critical determinant in whether or not a baby will develop macrosomia, a condition linked to a higher risk of infant mortality and illness. Both the mother and the kid are at greater risk for acquiring type 2 diabetes, metabolic syndrome, and obesity when the mother has GDM (Lee et al., 2007; Thadhani et al., 2010). As a result, both the mother and the unborn child face serious risks and financial costs if the mother is overweight. Therefore, preventing obesity would also help lower the number of people diagnosed with type 2 diabetes. Poor glucose homeostasis in GDM is linked to increased generation of reactive oxygen species (ROS), which in turn decreases the body's anti-oxidative state. That's why it's so important to help women before, during, and after pregnancy if we want to slow the rate at which obesity is spreading.

Lifestyle changes, such as early pregnancy nutrition, have not helped obese women at risk of GDM from developing the condition (Poston et al., 2015). Practical treatments for obesity and lifestyle changes that lighten the metabolic load prior to pregnancy are now widely recognized as essential. This type of evidence gives credence to the treatments and increases hope that they will help both the mother and the child. Obesity-related metabolic diseases can be treated with a weight-loss plan that reduces food intake. Although much is known about diets that promote weight loss, little is known about others, such as those that reduce inflammation in adipose tissue. In this sense, the hormone leptin is extremely important in regulating hunger. More of the cells that make it, called adipocytes, are present in obese people (Singla et al., 2010). Dietary methods that restore leptin metabolism and signals of energy balance may help treat obesity-related diseases including type 2 diabetes mellitus (T2DM).

Given the importance of the placenta in regulating the health of both mother and child is directly related to the mother's diet during pregnancy, labour, and delivery, as well as the first few months and years of life. Maternal obesity and excess weight before and throughout pregnancy is a major risk factor for adverse outcomes for both mother and child. Polycystic ovary syndrome, recurrent abortions, gestational diabetes, preeclampsia, hypertension, hyperinsulinemia, glucose intolerance, obesity, lipid abnormalities, and intrauterine growth restriction are just some of the obstetric conditions associated with impaired leptin and insulin function.

The goal of this study is to develop tools for treatment and diagnosis, keep an eye on pregnant women to reduce risks, encourage a healthy lifestyle and find ways to control weight gain during pregnancy, and use dynamic delivery course monitoring to help stop deaths of both mothers and babies. The study provided answers to the following research questions:

1. What is the insulin level of pregnant women in their first, second and third trimester?
2. What is the relationship between age and insulin level of pregnant women getting prenatal treatment at the University of Port Harcourt Teaching Hospital (UPTH)?
3. What is the relationship between weight and insulin level of pregnant women getting prenatal treatment at the University of Port Harcourt Teaching Hospital (UPTH)?

METHODOLOGY

A descriptive cross-sectional research design was adopted with a population which consisted of 50 pregnant women attending antenatal clinic in UPTH at the time of the study. A purposive sampling technique was used to select all 50 women for the study. Data was collected using a checklist to record vital statistics such height, weight, and age. Each lady had 6 ml of blood collected and evenly divided between two anticoagulant-containing vials before being spun to measure insulin and leptin levels using the ELISA method and Fintec equipment per the manufacturer's instructions. Descriptive statistics was calculated using Graph Pad Prism 9, with a p-value less than 0.05 at a 95% confidence level.

RESULTS

The results of the study are shown below:

Table 1: Insulin and Trimester of pregnancy

TRIMESTERS	INSULIN
1st	73.59 ± 27.53
2nd	65.34 ± 19.18
3rd	79.98 ± 35.35
F- Value	0.6803
p- value	0.5149
Comment	Not Significant

The table above showed the insulin level of pregnant women attending antenatal clinic in UPTH. The result showed that the mean, standard deviation, F value and *p* value of insulin result tabulated above (F-value = 0.68, p-value = 0.51) revealed that there is no significant difference between gestational periods (Trimesters) and Insulin level.

Table 2: Insulin and Age of pregnant women attending antenatal clinic in UPTH

Age	Insulin
20-25	65.10 ± 18.76
26-30	63.98 ± 23.36
31-35	79.08 ± 30.54
36-40	78.14 ± 33.27
F-value	0.6110
P value	0.6139
Comment	Not Significant

The table above showed the age and insulin level of pregnant women attending antenatal clinic in UPTH. The result showed that the mean, standard deviation, F value and *p* value of insulin result tabulated above (F-value = 0.61, p-value = 0.61) revealed that there is no significant difference between age of women and Insulin level.

Table 3: Insulin and weight of pregnant women attending antenatal clinic in UPTH

Weight	**Insulin**
80-90	78.68 ± 35.42
91-100	79.26 ± 30.64
101-110	78.51 ± 25.35
111-20	53.24 ± 13.00
F value	1.620
P value	0.2089
Comment	Not significant

The table above showed the weight and insulin level of pregnant women attending antenatal clinic in UPTH. The result showed that the mean, standard deviation, F value and *p* value of insulin result tabulated above (F-value = 0.62, p-value = 0.20) revealed that there is no significant difference between weight of women and Insulin level.

Table 4: Insulin and diabetic/non-diabetic pregnant women attending antenatal clinic in UPTH

Group	Insulin levels
Pregnant women control	120.3+11.88
Pregnant women with DM (T)	168.6+8006
P value	<0.0001
comment	Non-significant

The table above showed the diabetic/non-diabetic women and insulin level of pregnant women attending antenatal clinic in UPTH. The result showed that there was a significant difference in the insulin levels of diabetic and non-diabetic pregnant women (p-value = 0.00).

DISCUSSION

The purpose of this research was to determine the level of insulin, whether or not age and weight, among other anthropometric factors, affected insulin levels in pregnant women across all three trimesters and to compare leptin and insulin level in diabetic and non-diabetic pregnant women. Insulin levels in pregnant women during the first trimester did not differ significantly by age or body mass index. Our first-trimester results are consistent with those of Walsh et al. and Kim et al., who found no correlation between insulin levels in the first trimester and later weight increase during pregnancy (Kim et al., 2008; Walsh et al., 2014).

Maternal serum total insulin levels were shown to be higher and to change more noticeably in the second and third trimesters of pregnancy in another investigation (Zaneta et al., 2004). They noted that pregnant women do not show signs of decreased food intake or metabolic activity due to the physiological hyperleptinaemia that occurs during pregnancy. Puerperal women had insulin levels that were similar to those of nonpregnant women, and lower than those of pregnant women. They also noted that pregnant

women's BMI may not be an accurate reflection of their body fat percentage, and that the dramatic rise in insulin seen in pregnant women cannot be accounted for by a rise in fat mass alone. They also theorised that placental synthesis of insulin is responsible for the rise in maternal levels seen in pregnancy.

Finally, the 2002 study by Sagawa et al. found no association between maternal plasma insulin levels and BMI. Due to the fact that changes in body mass index occur differently in each trimester of pregnancy depending on feeding status, these variations were not accounted for here. While further research is needed to determine the precise processes that contribute to pregnancy-induced insulin resistance and a putative feed-forward loop in humans, our findings add to the existing body of information and imply that a state of insulin also exists in human pregnancy. Our findings did not appear to be influenced by insulin resistance or insulin secretion; however, other factors, such as certain pregnancy hormones, may be involved and require more investigation. The findings may suggest that insulin levels during pregnancy are of little significance for the development of the fetus. The lack of correlation between weight, and insulin for diabetic versus non-diabetic pregnant women could be because the women were in good dietary and glycemic control. Their hormones were within normal range.

CONCLUSION

The prevention of maternal death is essential in ensuring sustainability of the human race through preservation of those whose role is to procreate. Ensuring that these individuals who play a vital role in family welfare across the globe are preserved is a duty for all stakeholders. The need for the protection of a woman's health can never be over emphasized; lets avoid maternal and child deaths. There is no significant relation between insulin level among diabetic and non-diabetic pregnant women.

RECOMMENDATION

In order to find, unravel, and comprehend the physiological activity of insulin contributing to excessive weight gain in pregnancy, more research in this area is strongly urged. Government (through policies, findings, etc.), society (through improved health seeking behaviours, change of bad cultural habits and lifestyle, etc.), and health care providers (through the provision of quality and effective care services through advocacy health education and counselling, especially for the girl's child and mothers, promoting a healthy lifestyle in childhood, prenatal nutrition of pregnant women) all need to do more to improve their collective commitment to health.

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