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Short Communication

Blood glucose levels of pregnant women at different gestation periods in Aba area of Abia State of Nigeria

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Blood glucose levels of pregnant and non-pregnant women were assayed at different gestation periods. The volunteers were divided into four groups based on certain criteria: Group A served as control and consisted of 150 women who were not pregnant; Group B consisted of 120 women who were at the first trimester of pregnancy; Group C consisting of 120 pregnant women at their second trimester of pregnancy; and Group D consisted of 150 volunteers who were at the third trimester of pregnancy. The mean blood glucose levels of the four groups were as follows: Group A, 6.04 mmol/L; Group B, 7.6 mmol/L; Group C, 7.4 mmol/L; and Group D, 11.0 mmol/L. The pregnant volunteers were regrouped into A2, B2, C2 and D2 based on their ages. Group A2 falls within the age group 19 - 24 years, Group B2 25 - 30 years, Group C2 31 - 36 years and Group D2, 37 - 42 years. Their mean blood glucose levels were 7.0, 8.4, 8.5 and 7.5 mmol/L, respectively. It was observed that elevated blood glucose level occurred after the second pregnancy reaching its peak after the 6th pregnancy. It can be seen that pregnancy induces gestational diabetes on susceptible patients and this occurs mostly at the second and third trimesters of pregnancy.

Key words: Blood, Diabetes-mellitus, Gestation, Glucose, Pregnant-women.

INTRODUCTION

Glucose is not only a fuel, but also an excellent precursor, capable of supplying a wide array of metabolic intermediates for biosynthetic reactions (Thomas, 1986). Glucose entry into the blood stream is facilitated by insulin. The absence of insulin creates an outrageously high level of glucose in the blood. According to Burtis and Davis (1998), there is hyperglycaemia resulting from blood glucose levels exceeding the normal range of 90-100mg/100 ml or 3.9 - 7.0 mmol/L.

Gestational diabetes is demonstrated biochemically by random blood testing in each trimester of pregnancy and by oral glucose tolerance test (OGTT). It can also be diagnosed using fasting blood sugar analysis (Philip, 1994; Bartha et al, 2003). If the plasma glucose level is higher than 7 mmol/L, it is diabetic (Rumar and Clark, 1999). Since the renal threshold of glucose falls during normal pregnancy, and also glucose tolerance deteriorates, the condition may be easily misdiagnosed. Different types of diabetes mellitus are identified by the world Health organization (WHO). In Type 1 diabetes mellitus currently termed insulin dependent diabetes mellitus (IDDM), the pancreas of the child or young adult produces little or no insulin. This may be as a result of autoimmune disease which destroys the pancreas.

Type II diabetes mellitus referred to as non-insulin dependent diabetes mellitus (NIDDM), develops in later life. Gestational diabetes mellitus, found among pregnant woman occurs within the 20th week of pregnancy when the placenta has grown too large, due to the inhibitory effect of placental hormones (oestrogen, cortisol, and human placental lactogen). These have contra-insulin effect (Monica, 1999). NIDDM is the most common form of diabetes mellitus which usually develop after forty (40) years of age. It is not associated with total loss of the ability to secrete insulin. It is highly prevalent in some populations of Asia, India, Polynessian, Mauritanians and Creoles (Monica, 1999). Women having gestational diabetes have high level of insulin that is inactive (insulin resistance). Any woman can develop gestational diabetes, but there are predisposing factors associated with this syndrome,

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Table 1. Blood glucose levels (Mean ± SD) of pregnant women at different trimesters.

Trimester group (months of pregnancy)	A (n = 150) 0.00 (Control)	B (n = 120) 1st trimester (1 - 3 months)	C (n = 120) 2nd trimester (4 - 6 months)	D (n = 150) 3rd trimester (7 - 9 month)
Blood Glucose (mmol/L)	6.04 ± 0.17	7.00 ± 0.18	7.40 + 0.13	11.00 + 0.59
Mean Blood Glucose (% age) relative to control	100.00	115.89	122.52	182.12

n = number of subjects.

Table 2. Blood glucose levels (mean + SD) of pregnant women at different age groups.

Age Group	A_2 (n = 125)	B_2 (n = 155)	C_n (n = 150)	D_n (n = 110)
Age bracket (years)	19 – 24	25 – 30	31 – 36	37 – 42
Blood Glucose (mmol/L)	7.0 ± 0.17^a	8.4 ± 0.48^b	8.50 ± 0.29^b	7.5 ± 0.11^a

Values with the same superscript letters are not significantly different at 95% confidence level (P ≥ 0.05). n = number of subjects.

Table 3. Blood glucose levels (mean ± SD) of pregnant and non-pregnant volunteers based on parity.

Number of previous Pregnancy	Mean blood glucose levels of pregnant volunteers	Mean blood glucose levels of non-pregnant volunteers
0	$16 + 0.13^a$	6.16 ± 0.13^a (n = 26)
1	7.94 ± 0.79^b	5.47 ± 0.16^b (n = 30)
2	6.42 ± 0.13^c	5.59 ± 0.11^c (n = 25)
3	9.70 ± 0.49^d	6.41 ± 0.18^d (n = 25)
4	9.10 ± 0.77^e	6.00 ± 0.38^e (n = 22)
5	10.70 ± 1.64^f	6.20 ± 0.15^f (n = 16)
6	19.60 ± 8.75^g	6.00 ± 0.35^g (n = 14)

Values on the same rows with the same superscript letters are significantly different at 95% confidence level (p ≥ 0.05). n = number of subjects.

which include, obesity, family history of diabetes mellitus or a history of having given birth to a large child (macrosomia), still birth or a child with birth defect in an earlier pregnancy (Johnslow et al., 1990). Women older than 35 years are at greater risk than younger ones. Another form of diabetes mellitus is malnutrition related diabetes mellitus (MRDM). It is associated with progressive pancreatic-damage leading to pancreatic fibrosis and calcification. The root crop, cassava (manioc) has been implicated. The staple diet in Aba area of Nigeria is cassava-based meal (Uwakwe et al., 1991). This study was thus carried out to investigate the possible role of this staple diet in the development of malnutrition related gestational diabetes. MRDM affects young people. Patients may need diet, drug or insulin to control hyperglycaemia.

MATERIALS AND METHODS

The research was conducted with five hundred (500) women, who attended ante-natal clinic at Abia State University Teaching Hospital, Aba, in Abia State, of Nigeria, within the months of October through December, 2003. Blood samples were collected from each volunteer with the help of a lancet and glucose was estimated by a glucometer (Accutrend, Boehringer Mannheim, Germany) as described by Baker et al (1998). The blood was collected in the morning after over-night fasting. No beverage or coffee was taken.

The volunteers were divided into various groups; A, B, C, and D based on trimesters of pregnancy respectively. Group A served as control and consisted of 150 women who were not pregnant; Group B consisted of 120 women who were at the first trimester of pregnancy; Group C consisting of 120 pregnant women at their second trimester of pregnancy; and Group D consisted of 150 volunteers who were at the third trimester of pregnancy. Additional grouping was made based on the age of the volunteers. Such groups were A2 (12 - 24), B2 (25 - 30), C2 (31 - 36) and D3 = (37 - 42) years.

RESULTS AND DISCUSSION

The results of the blood glucose levels of pregnant women at different trimesters and at different age groupings are presented in Tables 1 and 2. Table 3 shows the blood glucose levels of pregnant and non-pregnant women based on parity. From this table, pregnant women were noted to have high blood glucose than non-pregnant at each

level of conception. Increase in blood glucose was also progressive within the number of conceptions. Blood glucose of women was noted to increase progressively with trimester of pregnancy. Maximal increase was noted at the third trimester (7 - 9 months) of pregnancy (Table 1). Age was also observed to influence the blood glucose level of pregnant women. Pregnant women at age bracket of 31 - 36 years were noted to have maximal increase in blood glucose (Table 2).

Gestational diabetes has been associated with obstetric and neonatal problems (Dapaonte et al, 1999). It is likely to recur in subsequent pregnancies. It is the harbinger of NIDDM in later life of women (Kumar and Clarke, 1999, Monica, 1999). There is significant difference between mean blood glu-cose levels in all the groups except in groups B (1st trimester) and C (2nd trimester), showing that really, pregnancy induces gestational diabetes (Johnslow et al., 1990; Monica, 1999) and that gestational diabetes is also tenable in Aba, Nigeria. The 9% incidence of gestational diabetes from this work may be higher than what some authors have obtained in rural communities (Dapaonte et al., 1999; Seyoum et al., 1999). We believe that socio-economic status and the dependence on cassava and other energy rich foods may have contributed to this variance. Moreover the area is a commercial nerve center of Abia State of Nigeria and the inhabitants live in affluence, which could have contributed to this figure. Gestational diabetes should be regarded as one of the complications of pregnancy; hence, pregnant women should be pro-perly informed as to guard against it during pregnancy (Davidson, 1978; Mbanga et al, 1999). The need for diet therapy and planned diet for pregnant women becomes very relevant and periodic screening is recommended of all pregnant mothers.

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