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Comparing Glycemic Indices among Different Ethnic Groups Residing in Yenegoa, Bayelsa State, Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Increased prevalence and incidence rates within ethnic minorities have been reported by numerous studies on tribal differences in type 2 diabetes patients, sharing a western setting. This study was aimed at comparing glycemic indices among different ethnic groups residing in Yenegoa, Bayelsa State. The study population consisted of apparently150 healthy male and female subjects; 116 Ijaws, 21 Igbos and 13 Yorubas residing in Yenagoa Local Government Area, Bayelsa State of Nigeria. All subjects were aged between 16 and 48 years. 4 mls of Blood samples was collected from each subject. 2mls of the blood was withdrawn into EDTA for HbA1c estimation while the other 2mls was withdrawn into fluoride oxalate for fasting blood glucose. Glycated haemoglobin (HbA1c) was determined using the automated CLOVER A1c Analyser while FBG was assayed using Glucose Oxidase Method. Results revealed that there was a significant difference in the mean levels of FBG among the studied groups (P-value < 0.05) but there was no significant difference in the HbA1c mean levels (P-value > 0.05). This study has revealed that ethnic differences may cause significant changes on fasting blood glucose but may not in HbA1c.

Keywords: Fasting blood sugar; glycated haemoglobin; Igbo; Ijaw and Yoruba.

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1. INTRODUCTION

Glycated haemoglobin (HbA1c) is a type of haemoglobin estimated mainly for the identification of average plasma glucose level for three months. It is restricted to a three-month average since the lifecycle of erythrocyte is usually between three to four months. Nevertheless, glycated hemoglobin is usually assumed as an incomplete measure of three months. This is because erythrocytes do not all experience haemolysis at once. The mode of formation is through a glycation pathway that is non-enzymatic through haemoglobin's exposure to glucose in plasma. The degree of the beta-N-1-deoxy fructosyl part of hemoglobin is glycated haemoglobin [1]. History revealed that diabetes became common first among wealthy western populaces, then spread rapidly to other populaces due to better conditions of living and western way of life embracement (Coca-colonisation). Other factors that contributed majorly to the diabetes epidemic are changes in environment due to development, excessive fat accumulation and getting old. Differences in genetic composition among populations are possibly a contributor of diabetes mellitus. The prevalence of type differs among tribes, with a greater danger in those of European origin compared to African descent, and considerably reduced in Asian and Pacific Islanders although the prevalence of type 1 diabetes is relatively low (<1%) across the world [2]. Increased prevalence and incidence rates within ethnic minorities have been reported by numerous studies on tribal differences in type 2 diabetes patients, sharing a western setting. Particularly, Native Americans and South Asians, Africans, Hispanic and Arabs are affected in different proportions. This study will focus on assessing the impact of ethnicity on glycemic indices such as fasting blood glucose and glycated haemoglobin.

2. MATERIALS AND METHODS

2.1 Study Area

The study was conducted among Ijaw, Igbo and Yoruba subjects of the Niger Delta region of Nigeria who resides in Yenagoa Local Government Area of Bayelsa State, Nigeria. Bayelsa state is located within Latitude 4^0 15^1 North and Latitude 5^0 and 23^1 South [3].

2.2 Study Population and Sample Size Description

The study population consisted of apparently healthy male and female Ijaws, Igbos and Yorubas who resides in Yenagoa Local Government Area, Bayelsa State of Nigeria. A total of 150subjects were enrolled for the study. 116 subjects constituted the Ijaws; the remaining 34comprised two tribes among the three major ethnic groups of Nigeria; 21 Igbos and 13 Yorubas. All subjects were aged between 16 and 48 years in the general population and included both males and females.

2.3 Subjects Eligibility Criteria

All the subjects utilized for the study were apparently healthy as portrayed by the research clinician. Subjects with history of diabetes mellitus and other chronic diseases were excluded from the study. More so, subjects that were not origins of Ijaw, Igbo and Yorubas were not included in this study.

2.4 Specimen Collection

Four milliliters (4 mls) of Blood samples was collected from the subjects utilizing standardized phlebotomy venepuncture method [4,5,6]. 2mls of the blood was withdrawn into EDTA for HbA1c evaluation while the other 2mls was withdrawn into fluoride oxalate for fasting blood glucose.

2.5 Sample Analysis

2.5.1 Determination of glycated haemoglobin

Glycated haemoglobin (HbA1c) was determined using the automated CLOVER A1c Analyser as described by Diabetes Management Technology [7]. It is a spectrophotometric self Analyser that consist of self-Test catridge and provides a convenient method for measuring the percent concentration of haemoglobin A1c (HbA1 %) as specified by Diabetes Management Technology. The CLOVER A1c self-system is a fully automated boronate affinity assay for the determination of the percent of Hemoglobin A1c (HbA1c %) in whole blood.

2.5.2 Determination of fasting blood glucose

Fasting blood glucose was determined using Glucose Oxidase method. The reaction is a coupled reaction with hydrogren peroxidase, an enzyme that catalyzes the hydrolysis of hydrogen peroxide. The overall effect is the production of a coloured solution that is read spectrophotometrically. The intensity of the colour is proportional to the concentration of glucose in the sample.

2.6 Statistical Analysis

Data were analyzed with Statistical Package for Social Sciences (SPSS) version 20, and Microsoft excel. ANOVA and Post-hoc analysis were used for comparing glycemic indices levels among the ethnic groups and $p \leq 0.05$ was considered significant.

3. RESULTS

Fasting Blood Glucose and Glycated Haemoglobin concentration were also evaluated among Igbos, Ijaws, and Yorubas. There was observed significance difference between Igbos, Ijaws, and Yorubas for Fasting blood Sugar with a mean FBG Concentration of 4.41 ± 0.88 (mmol/l), 3.93 ± 1.11(mmol/l), and 5.17 ± 0.39(mmol/l) respectively, p <0.0001. No significant difference was observed between the three ethnic groups residents in Yenagoa for HbA1c, *p* =.48. HbA1c concentration of 4.89 ± 0.64 (%), 5.11± 0.87 (%) and 5.15 ± 0.63 (%) was observed for Igbos, Ijaws, and Yorubas respectively.

4. DISCUSSION

Based on ethnic groups, the Yoruba subjects had significantly higher FBS than the Igbo and Ijaw in the studied subjects. The mean Fasting Glucose concentration in mmol/l among the three ethnic groups for Igbo, Ijaw and Yorubas were 4.41±0.88, 3.93±1.11 and 5.17±0.39 respectively showing a significant higher concentration in Yoruba Ethnic group, followed by Igbos and lastly Ijaws. There was observed significant difference (p<0.0001) among the different tribes. The reduced FBS concentration observed among the Ijaws may probably be due to their diet. Majority of Ijaw local food consist of fish and different sea food which include clams, oysters and periwinkles. Example is the “kekefiyai, popularly called “KKF” which is a pottage prepared with unripened chopped plantain [8]. Seafood, yam, vegetable and fruits have a low glycemic index and help in the control of blood sugar. Another common popular Ijaw local diet is the “Kpo-Kpo garri” eaten with breakable groundnut or dried/roasted fish. It is rich in dietary fiber which reduces blood cholesterol and decreases the absorption of sugar thereby reducing blood sugar level. The occupation of the Ijaws include fishing and farming and are thus involved in physical activity which might have also contributed to regulating their blood sugar level. It is therefore believed that ethnic differences may have significant effect on glycemic index and this finding is in consonance with other studies [9 ,10].

Games-Howell Post-hoc analysis carried out in FBG among these three ethnic groups also revealed statistically significant difference between Igbos and Ijaws (*p*=0.034), Igbos and Yorubas (P=0.0002) and between Ijaws and Yorubas (*p*=0.0001). This study is thus in line with previous study carried out by Venkataraman *et al.,* [11] on “Ethnicity modifies the relation between fasting plasma glucose and HbA_{1c} in Indians, Malays and Chinese”. That study also reported differences in the relationship between fasting plasma glucose and HbA_{1c} between the three major ethnic groups living in Singapore. There was no significant difference (*p*> 0.05) in Glycated haemoglobin levels among subjects of the three ethnic groups. This finding is in consonance with other studies [12,13]. It was also observed that subjects of Ijaw ethnic group had the lowest parameters except in HbA1c that it had almost the same concentration with Igbos.

Table 1. Evaluation of parameters among subjects based on ethnic groups

Ethnic Groups	FBG(mmol/L)	HbA1c(%)
Igbo(A)(N = 21)	4.41±0.88	4.89±0.64
Ijaw(B) (N= 116)	3.93±1.11	5.11±0.87
Yoruba(C) (N = 13)	5.17±0.39	5.15±0.63
p-value	<0.0001	0.48
	Post Hoc	
A vs B	S(0.034)	(NS)0.48
A vs C	S(0.0002)	(NS)0.63
B vs C	S(<0.0001)	(NS)0.98

Key: FBS = Fasting Blood Sugar; HbA1c = Glycated Haemoglobin; N = No. of subjects; S = Significant; NS= Not Significantl; post hoc testing was done using games-Howell

5. CONCLUSION

This study has shown that ethnic difference could significantly impact on fasting blood glucose among residents in Bayelsa Sate. Although this difference may not cause a significant change in glycated haemoglobin among the studied ethnic groups.

CONSENT

A written consent was also obtained from each subject after been told of the nitigrities of the study.

ETHICAL APPROVAL

The experimental protocol was approved by the Ethics Committee of the Bayelsa State Ministry of Health.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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