# ASSESSMENT OF PRACTICE OF PREMARITAL GENOTYPE SCREENING FOR SICKLE CELL DISEASE AMONG UNIVERSITY STUDENTS IN NORTH WEST ZONE, NIGERIA

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**Abstract**

The purpose of the study was to assess the practice of premarital genotype screening for sickle cell disease among university students in North-West zone, Nigeria. The study used a descriptive survey research design. The population comprised of 70,530 undergraduate students in the ten Federal universities of North-West zone, Nigeria. The researcher sampled 572 students through multi-stage sampling techniques, which comprised of cluster, simple random and proportionate sampling techniques. A researcher-developed close-ended questionnaire was used for data collection. 534 (93%) copies of the administered questionnaire were used for data analysis because 38(7%) were not duly filled by the respondents and as such they were considered invalid. Descriptive statistics of frequencies and percentages were used to describe the demographic characteristics of the respondents and to answer the research question, means and standard deviations were used. Inferential statistics of one sample t-test was used to analyze the hypothesis at 0.05 level of significance. Finding of the study revealed that the respondents do not significantly practice premarital genotype screening for sickle cell disease (mean = 2.49 and P = 0.707). Based on the finding of the study, the researcher concluded that university students in North-West zone, Nigeria do not practice premarital genotype screening for sickle cell disease. The researcher recommended thatthe university managements in North-West zone, Nigeria should make genotype screening a requirement for admission of students and also the need for health personnel in university health services in North-West zone, Nigeria to include counselling on premarital genotype screening for sickle cell disease as one of their programmes.

**Key Words:** Practice, Premarital genotype screening, Sickle cell disease, North-West zone.

## Introduction

Sickle cell disease is a red blood cell disorder that results from the inheritance of an abnormally structured haemoglobin called the sickle cell haemoglobin. Those that inherit 2 copies of the sickle cell haemoglobin will have sickle cell disease while those that inherit one copy of the sicklecell haemoglobin and one copy of the normal haemoglobin will have the sickle cell trait. The most common types of sickle cell disease are Sickle Cell Anemia (HbSS), Sickle Hemoglobin- C Disease (HBSC), Sickle Beta-Plus Thalassemia (HbSBthal), Sickle Beta Zero-Thalassemia (HbSB0) (Centres for Disease Control, 2016).

Statistics of the World Health Organization (WHO) on sickle cell disease revels that about 5-7% of the world global population have an abnormal haemoglobin gene and sickle cell disease is the most predominant (Ademola, 2015).Sickle cell disease have its highest prevalence in sub Saharan Africa, Spanish-speaking regions (south America, central America and the Caribbean), Saudi Arabia, India, Mediterranean countries such as Turkey, Greece and Italy (Centres for disease control, 2017). The WHO statistics also revealed that Africa carries 75% of the world sickle cell disease burden and out of this, Nigeria accounts for 63%. Globally, about 300,000 babies are born with sickle cell disease annuallyand this figure is expected to increase to 400,000 by 2050 (Piel, Hay, Gupta, Weatherall, Williams, 2013). Nigeria accounts for half of the global sickle cell disease births, that is, 150,000 babies are born with the disease annually (Mujeeb & Nike, 2021).

Sickle cell disease reduces the quality of life of those affected. The disease makes life difficult for them and their family members. Most of them die in childhood, while those that live long actually live a hard life because management of the disease is a long-life, tiring and costly procedure. The disease leads to serious complications like anaemia, stroke, hypertension, acute chest syndrome, multi organ failure syndrome among others, and if untreated, they may lead to death (Ademola, 2015). The patients often experience sudden attacks characterized by extreme pain in the arms, the back, the knees, the legs, the chest, and the stomach. The attack is termed "sickle cell crisis" and may that last for several hours to days. These complications are as a result of blockage of blood vessels by the sickled cells. Management of sickle cell disease is not adequate in the countries where the disease is prevalent and the goals of treating the disease are to manage its complications which include pain, infections, anaemia, stroke, and organ damage (Medline Plus, 2011).

Premarital genotype screening is blood test done especially by prospective couples to know the possible genotype of their unborn children (Oyedele, Emmanuel, Gaji & Ahure, 2015). It is one of the WHO identified methods of preventing the birth of children with sickle cell disease and reducing its prevalence. The screening is a consultation offered to couples who are planning to get married; it involves taking their history, clinical examination and laboratory investigation for genotypes. Carrier couples identified through the screening are further counselled and given options to choose from in order to

avoid the risk of birthing children with sickle cell disease (Al-Shroby, Sulimani, Alhurishi, Bin Dayel, Alsanie &Alhraiwil, 2020). However, in Nigeria and other developing countries with high prevalence, the best option is cancelling the marriage as the other options such as prenatal diagnosis, preconception genetic diagnosis and in-utero transplantation are costly and not affordable by most families. Premarital genotype screening for sickle cell disease and other haemoglobinopathies has since been mandated in several countries in Middle East and North Africa (Al-Allawi, Jalal, Faraj, Shalli & Hamamy, 2013). The researcher observed that some religious organizations in Nigeria have also recently mandated premarital genotype screening for sickle cell disease, but most times it is done only a few days to the wedding when the prospective couples might find it hard to accept negative result.

As observed by the researcher, there is high level of ignorance within the area of the study. As a result, the residents believe that all blood tests done before marriage are to check Human Immunodeficiency Virus (HIV) status and other sexually transmitted diseases (STDs) which are meant for the promiscuous and couples who do not trust each other. Another challenge is the religious belief of the residents, that is, belief in destiny and readiness to accept a diseased child as one's fate. The emotional feeling of love or fear of losing a loved one due to negative result is also a major problem. Because of love, some people could go to an extent of deceiving their intending partners by lying about their results, the truth eventually gets revealed but mostly after the damage has been done.

**Research Question:** To what extent do university students in North-West zone, Nigeria practice premarital genotype screening for sickle cell disease?

**Hypothesis:** Practice of premarital genotype screening for sickle cell disease among university students in North-West zone, Nigeria is not significant.

**Methodology**

This study adopted a descriptive survey research design. The population of the study comprised of seventy thousand, five hundred and thirty (70,530) undergraduate students admitted in the year 2017 and 2018 in the ten (10) Federal universities in North-West zone, Nigeria (Joint Admissions and Matriculation Board, 2018). The rationale behind choosing these set of students as the population of the study is that at the time of the study, they were expected to be graduating soon, and as such, were presumed to enter wedlock, a stage where important decisions such as premarital genotype screening for sickle cell disease are made. The study used a researcher-developed close-ended questionnaire to collect data from 572 samples drawn through multi-stage sampling techniques as follows:

Stage one: The seven States in North-West zone, Nigeria were clustered into 2 based on proximity.

Stage two: Two States were selected each from the two clusters using simple random sampling technique. The names of the States in the first cluster were written on pieces of

paper, folded and then put in a container. The researcher randomly picked the folded pieces of paper one after the other from the container, unfolded it and recorded the name of the selected States. The same procedure was followed to select the States from the second cluster used for this study.

Stage three: The same simple random sampling technique used in stage two was used to select two universities from the selected States in each cluster.

Stage four: Proportionate sampling technique was used to calculate the number of respondents from each of the selected universities who were administered copies of the questionnaire.

Stage five: Respondents in the selected universities were selected by "Yes" or "No" sampling technique. Students that met the criteria for the study (that is, those admitted in the year 2017 and 2018) found within the areas chosen for data collection (eateries, hostels, lecture halls, gymnasia and gardens) were allowed to pick “Yes” or “No” written on pieces of paper and folded. Those who picked “Yes” and were willing to fill a copy of the questionnaire and submit on the spot were given a copy of the questionnaire, while those who picked “No” or those not willing to fill a copy of the questionnaire and submit on the spot were not given the questionnaire. Five hundred and seventy-two(572) copies of questionnaire were administered and all were retrieved.

**Results**

All the 572 (100%) copies of the administered questionnaire were retrieved. However, 534 (93%)were used for data analysis because 38 (7%) were not duly filled by the respondents, and as such, they were considered invalid. The results of the analysis are presented in the tables below:

**Table 1: Demographic Characteristics of the Respondents**

| Variable | Option | Frequency | Percent |
|---|---|---|---|
| Age range (years) | < 22years | 280 | 52.4 |
| | 22-26years | 161 | 30.2 |
| | [illegible] | 82 | 15.4 |
| | 32 – 36years | 5 | 0.9 |
| | >36years | 6 | 1.1 |
| | Total | 534 | 100.0 |
| Gender | Male | 279 | 52.2 |
| | Female | 255 | 47.8 |
| | Total | 534 | 100.0 |
| Religion | Islam | 364 | 68.2 |
| | Christianity | 167 | 31.3 |
| | Traditional | 3 | 0.5 |
| | Total | 534 | 100.0 |

Table 1 reveals that most of the respondents (280; 52.4%) were below 22years of age. This skewness is generally expected since most students are generally young. Students between 22-26 years were 161 (30.2%.) and 27-31years were 82 (15.4%). The remaining respondents were ages 32-36 (5; 0.9%) and >36years (6; 1.1%) respectively. Concerning the gender of the respondents, the majority (279; 52.2%) of the respondents were males, while the remaining (255; 47.8%) were females. The representation could be said to be proportionate in ratio to the male/female in the universities within the zone.In terms of religious affiliation, most (364, 68.2%) respondents were of the Islamic faith. Those of the Christian faith were (167; 31.3%) not as many as the Islamic faith, while 3 (0.5%) of respondents belonged to the Traditional religion. The dominance of the Islamic faith among the respondents could be attributed to the location where the study was conducted.

**Research Question:** To what extent do university students in North-West zone, Nigeria practice premarital genotype screening for sickle cell disease?

**Table 2: Mean Scores of Responses on Practice of Premarital Genotype Screening for Sickle Cell Disease by University Students in North-West Zone, Nigeria**

| *SN* | *Practice* | *Mean* | *Std dev.* |
|---|---|---|---|
| *1* | I have already known my genotype | 2.48 | 0.469 |
| *2* | I will attend premarital genotype screening for sickle cell disease | 2.57 | 1.252 |
| *3* | I will go for the screening alone | 2.49 | 1.106 |
| *4* | If my result of premarital genotype screening for sickle cell disease is negative, I will not reveal it to my intending partner | 2.45 | 1.036 |
| *5* | My reason(s) for not revealing the result is/are: | | |
| | i. Fear of cancelling my marriage | 2.43 | 1.089 |
| | ii. Fear of exposing my genotype status to the public | 2.45 | 0.816 |
| *6* | I will not attend premarital genotype screening for sickle cell disease because: | | |
| | i. My faith does not allow it | 2.44 | 0.831 |
| | ii. The screening is costly | 2.49 | 1.006 |
| | iii. Laboratory tests are not always reliable | 2.48 | 1.173 |
| *7* | I will attend premarital genotype screening for sickle cell disease only if my intending partner insists | 2.44 | 1.193 |
| *8* | I will attend premarital genotype screening for sickle cell disease: | | |
| | i. During courtship | 2.30 | 1.153 |
| | ii. Just before marriage | 2.72 | 1.354 |
| | iii. Immediately after marriage | 2.48 | 1.143 |
| | iv. After delivery | 2.44 | 0.753 |
| | v. After giving birth to a child with sickle cell disease | 2.49 | 1.039 |
| *9* | I will attend premarital genotype screening for sickle cell disease in: | | |
| | i. Laboratory | 2.78 | 1.442 |
| | ii. Private hospital | 2.45 | 1.246 |
| *10* | I will still marry my partner no matter the outcome of the result | 2.49 | 1.105 |
| | Aggregate mean | 2.49 | 0.222 |

(Fixed mean = 2.5)

Table 2 shows that the practice of premarital genotype screening for sickle cell disease among university students in North-West zone, Nigeria was negative. The observed mean of 2.49 is lower than the fixed mean of 2.50.However, most of the students agreed that they will attend the screening (2.57) just before marriage (2.72) and in the laboratory (2.78). The aggregate mean score of 2.49 with a standard deviation of 2.222 for the table suggested a relatively negative practice of premarital genotype screening for sickle cell disease among university students in North-West zone, Nigeria.

**Hypothesis:** Practice of premarital genotype screening for sickle cell disease among university students in North-West zone, Nigeria is not significant.

**Table 3: One Sample t-test Analysis on Practice of Premarital Genotype Screening for Sickle Cell Disease Among University Students in North-West Zone, Nigeria**

| Variable | N | Mean | Std. Dev. | Std. Error | t-value | DF | p-value |
|---|---|---|---|---|---|---|---|
| Practice | 534 | 2.50 | 0.222 | 0.010 | 0.376 | 533 | 0.707 |
| Test mean | 534 | 2.50 | 0.000 | 0.000 | | | |

(t-critical = 1.96, p > 0.05)

Table 3 shows that the practice of premarital genotype screening for sickle cell disease by the university students was not statistically significant. The observed t-value obtained at 533 degree of freedom was0.376 and the p-value was 0.707 (P > 0.05). This means that the practice of premarital genotype screening for sickle cell diseaseamong university students in North-West zone, Nigeria is not significant.

**Discussion**

The findings of the study showed that practice of premarital genotype screening for sickle cell disease among the university students was negative (2.49). The study found that only 2.48 of the respondents know their genotype. Though 2.57 were willing to go for the screening, 2.49 agreed to go alone, while 2.45 agreed that if their result of premarital genotype screening for sickle cell disease turned to be negative, they wouldnot reveal it to their intending partners and they agreed that such decision has to do with fear of cancelling their intended marriages (2.43) or fear of exposing their genotype status to the public (2.45). It was found that the students did not see their faith (2.44), or the cost of the screening (2.49), or the unreliable nature of laboratory tests (2.48) as obstacles. Also, 2.44 of the respondents agreed that they will attend the screening only on the insistence of their intending partners.In the test of the related null hypothesis, practice of premarital genotype screening for sickle cell disease among the respondents was found to be not significant (p>0.05).

Finding of the study contradicted the study of Gbeneol, Brisibe and Ordinioha (2015), on uptake of premarital screening for sickle cell trait among marital couples in a semi-urban community in South-South, Nigeria where they found out that practice was positive as majority of the respondents (72.76%) carried out premarital screening when they got

married. Another contradicting study which was conducted by Sani and Suleiman (2014) on practice of premarital genetic counselling and testing of sickle cell disease among women in Zaria, Nigeria showed that practice was significant as 72.6% of the respondents know their genotype. However, a study conducted by Suberu, Timothy, Yunusa, Lawal, Abubakar, and Hamisu (2016) titled "Interplay between knowledge and practice of premarital genotype screening: Implications for sickle cell control, among Bayerouniversity, Kano undergraduate students in Kano State, Nigerias upported the finding of this study because they revealed that practice was lacking irrespective of the marital status of the respondents ($p>0.05$).

**Conclusion**

University students in North-West zone, Nigeria do not practice premarital genotype screening for sickle cell disease.

**Recommendations**

University managements in North-West zone, Nigeria should make genotype screening a requirement for admission of students and health personnel in university health services in North-West zone, Nigeria should include counselling on premarital genotype screening for sickle cell disease as one of their programmes.

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