

Knowledge, Attitude, And Practice of Genotype Screening among Junior and Senior Secondary School Students in Gwagwalada Area Council, FCT Abuja

Abdulazeez Abdulhameed and Ramsey Msheliza Yalma

Department of Community Medicine, College of Health Sciences,
University of Abuja, Gwagwalada-Abuja Nigeria



Abstract

Background: The knowledge, attitude and practice of genotype screening is very important in the control and prevention of sickle cell disease (SCD). Methods of preventing this disease include preschool and premarital screening, genetic counseling, prenatal diagnosis, preconception diagnosis and implantation of normal embryos after *in vitro* fertilization and *in vitro* therapy using stem cell transplantation. The objective of this study is to determine the knowledge, attitude and the practice of genotype screening among junior and senior secondary school students in Gwagwalada Area Council, FCT, Abuja.

Methodology: This was a cross-sectional descriptive study conducted among students aged 11-23 years in junior and senior secondary schools in Gwagwalada. A sample size of 264 was studied. A multi-stage sampling technique was used to select the schools, classes and participants. Data was collected by means of self-administered and semi-structured questionnaire. Demographic variables and associations were tested using Chi-square test with the level of statistical significance set at $p < 0.05$, at 95% confidence interval.

Results: This study showed that the students had good knowledge of SCD as 81.5% and 88.0% of the Junior Secondary School (JSS) and Senior Secondary School (SSS) students respectively knew the causes of SCD, 89.5% and 92.7% of the JSS and SSS students knew it could be transmitted from parents to offspring, and 83.3% and 88.0% of the JSS and SSS students knew that marriage of two AS partners could result in a sickle cell child. Also, this study revealed that the students had positive attitudes to SCD as 68.5% and 72.6% of the JSS and SSS students agreed that pre-school practice could prevent SCD while 79.8% and 80.7% of the JSS and SSS students also agreed pre-marital screening could prevent SCD. In addition, 50.9% and 48% of the JSS and SSS students agreed that newborn screening for SCD should be encouraged. The practice of genotype screening was however found to be poor as much as 45.7% and 24.6% of the JSS and SSS students respectively do not know their genotypes, $p = 0.001$.

Conclusion: The students generally have good knowledge and positive attitudes towards genotype screening; however, the practice of genotype screening was poor. The school authorities should therefore ensure pre-school genotype screening and teaching on SCD should be incorporated early into the school curriculum to reduce the burden of the disease.

Keywords – Genotype, Screening, Students, Knowledge, Attitude, Practice.

I. INTRODUCTION

Premarital genotype screening presents an opportunity for individuals to become informed about their genetic predisposition to diseases and for couples to be aware of the possible genetic characteristics of their unborn children. Therefore, if one holds the view that one of the reasons for marriage is procreation, then concerns about genetic compatibility and avoiding genetic inheritance

of serious consequence becomes something to strongly consider. The most common genetic diseases include sickle cell disease (SCD), cystic fibrosis and Tay-Sach's disease of which sickle cell disease is the commonest [1].

Premarital screening consists of a comprehensive group of tests, especially for those who are planning to get married. The WHO reported that 5% of the world population carry genes responsible for haemoglobinopathies and that Sickle cell anemia is particularly common among people whose ancestors come from sub-Saharan Africa, India, Saudi Arabia and Mediterranean countries [2]. Furthermore, over 300,000 babies are born worldwide with sickle cell disease mostly in low-and middle-income countries, and the majority of these births are from Africa [2].

Sickle cell disease is one of the commonest genetic disorders in Nigeria, with about 24% of the population being carriers of the mutant gene and prevalence at birth of 2% i.e., about 15,000 children are born with sickle cell disease genotype annually in Nigeria alone [2]. Sickle cell disease contributes to the equivalent of 5% of under five deaths on the African continent, with more than 9% of such deaths in west Africa and up to 16% of under five deaths in individual West Africa countries [3].

Haemoglobinopathies are important public health problems worldwide. According to WHO, approximately 240 million people are carriers of genetic diseases and at least 200,000 affected individuals are born annually [4]. The prevalence of genetic disease is becoming higher, in human populations, creating more stress despite the difficulties the people already encounter in life [4,5].

With the increasing prevalence of genetic diseases in developing countries such as Nigeria, there is the need to evaluate the level of awareness and acceptance of premarital genotype screening.

Most youths today are either unmarried or intending to get married and will procreate in the future. This group of persons having missed the opportunity for newborn screening are the target population who will benefit from appropriate interventions aimed at controlling the sickle cell disease. This study is therefore aimed at assessing the knowledge, attitude and practices of genotype screening among secondary school students in Gwagwalada, Abuja, Nigeria. The findings of this study will contribute towards understanding the current SCD-related gaps in knowledge and practice among these youths, which will inform policy decisions targeted at reducing the burden of SCD.

II. MATERIALS AND METHODS

2.1 Study design

A cross sectional study design was used.

2.2 Study population

Inclusion criteria: Students in junior and senior secondary schools in Gwagwalada Area Council, Abuja were studied.

Exclusion criteria: All other students not in the selected schools and age group were excluded.

2.3 Study area

The study was conducted in junior and senior secondary schools in Gwagwalada town in Gwagwalada-Area Council of the Federal Capital Territory. Gwagwalada Area Council is one of the six local Government Councils of the Federal Capital territory Abuja-Nigeria. It is a suburban district located in the west of Abuja, the country's capital at a distance of 51 kilometers from Abuja city. It has a population of about 160,000 persons according to the 2006 national census figure by the National Population Commission. It is now estimated to be well above 1,000,000 persons due to influx of people from other parts of the FCT and Nigeria.

2.4 Sample size

A minimum sample was obtained using the Leslie-Kish formula.

$$N = Z^2 p q / d^2$$

Which is valid where N is the minimum sample size, Z^2 is the abscissa of the normal curve that cuts off an area α at the tails (1 - α equals the desired confidence level is 95%), d is the desired level of precision, p is the estimated proportion of an attribute that is present in the population, and q is 1-p. The value for Z is found in statistical tables which contain the area under the normal curve [6]

2.5 Sampling technique

This study employed a multistage sampling technique. A simple random sampling technique was used to select two (2) out of the ten (10) junior secondary schools and two (2) out of the ten (10) senior secondary schools in Gwagwalada, making a total of 4 schools. Each school has various subclasses i.e., JSS2, JSS3, SSS2, SSS3 each with A to F arms. A simple random sampling technique was used to select 4 subclasses A, C, D and F out of the available strata in a class. A simple random sampling technique was then used to select students within each subclass.

2.6 Data collection instrument

The instrument used for this study was developed by the researchers including Likert scale format and closed ended questions. The questionnaire had four sections including socio-demographic data, knowledge on genotype screening, attitude towards genotype screening, and practice of genotype screening. Data was collected over a period of 4 weeks while the schools were in session.

2.7 Ethical consideration

Ethical approval for this research was obtained from the health research ethics committee of the University of Abuja Teaching Hospital, Gwagwalada-Abuja. Also, permission to administer the questionnaire to the students was obtained from the management of the secondary schools. In addition, written informed consent was obtained from the parents and guardians of the students. Maximum effort was made to ensure confidentiality and anonymity of data collected and respondents were free to pull out of the study at any stage without any punitive measures.

2.8 Data analysis

Data collected was entered into a computer and was analyzed using the Statistical Package for Social Science (SPSS) version 23 and results were presented using tables and charts. The proportions and percentages of the students with good and poor knowledge were calculated. Cross tabulation and Pearson's Chi-square test with p-value set at <0.05 and 95% confidence level were used to ascertain association between the socio-demographic variables, the level of knowledge, the attitudes of the students and the practice of genotype screening.

To assess the knowledge and practice of genotype screening structured closed questions offering a dichotomous choice of "yes" or "no" were used. A maximum of 100% score and a minimum of 0% was assigned to each question and the mean values calculated for subgroups as appropriate. Respondents with scores equal to or above the mean value were considered to have a good knowledge and practice to genotype screening respectively while those who had scores below the mean value were categorized as having poor knowledge or practice to genotype screening.

The attitude of the respondents toward sickle cell disease was assessed using a 5-point Likert scale ranging from strongly disagree, disagree, indifferent, agree to strongly agree. Strongly agree and agree were classified as positive attitude while strongly disagree, disagree and indifferent were grouped as having a negative attitude. Also, a maximum of 100% score and a minimum of 0% was awarded to each question and the mean value was calculated. Respondents with scores equal to or above the mean value were considered to have positive attitude toward genotype screening while those who had scores below the mean value were considered to have negative attitude towards genotype screening.

III. RESULTS

4.1 Socio-demography characteristics of respondents

Table 1 represent the socio-demography characteristics of the respondents. Out of 264 respondents, the age group >14 -17 years, 142 (53.7%) were the majority in the population and the mean age was 17 years. About 146 (55.3%) of respondents were females and 118 (44.7%) were males respectively.

Table 1: Socio-demographics characteristics of respondents

Variables	Frequency n(%)	χ^2	p-value
Age			
11-14	71(26.9)	23.068	0.041*
>14-17	142(53.7)		
>17-20	43(16.3)		
>20-23	5(1.9)		
>23-26	3(1.2)		
Total	264(100)		
Sex			
Male	118(44.7)	0.720	0.393
Female	146(55.3)		
Class			
JSS	114(43.2)	2.121	0.145
SSS	150(56.8)		
Tribes			
Hausa	28(9.8)	49.007	0.0001*
Igbo	70(26.6)		
Yoruba	51(19.3)		
Others	117(44.3)		
Parent's level of education			
Informal	18(6.8)	20.170	0.0001*
Primary	14(5.3)		
Secondary	96(35.6)		
Tertiary	138(52.3)		
Religion			
Christianity	167(63.3)	24.190	0.0001*
Islam	97(36.7)		

*p-value <0.05 are statistically significant

4.2 Knowledge of genotype screening among students

Table 2 shows the knowledge of genotype screening among the secondary school students. Note that the correct answer in the questionnaire is “yes”. The results revealed that overall, most of the respondents had good knowledge of sickle cell disease (SCD). For example, concerning the cause of SCD as an inheritance of abnormal genes from parents, among the junior secondary school students (JSS), 93(81.5%) answered correctly, while only 21(18.4%) were wrong and among the senior secondary school students (SSS), 132(88.0%) were right and only 18(12.0%) were wrong ($p > 0.05$).

Table 2: Knowledge about genotype screening

Variables	Yes n(%)	No n(%)	Statistic χ^2	p-value
SCD caused by inheritance of abnormal genes from parents				
JSS	93(81.5)	21(18.4)	2.121	0.145
SSS	132(88.0)	18(12.0)		
SCD can be transmitted from parents to offspring				
JSS	102(89.5)	12(10.5)	0.830	0.362
SSS	139(92.7)	11(7.3)		
Marriage of two AS parents result in sickle cell child				
JSS	95(83.3)	19(16.7)	1.171	0.279
SSS	132(88.0)	18(12.0)		

4.3 Attitude towards genotype screening among the secondary school students

Table 3 summarizes the attitude towards genotype screening in prevention of SCD. Overall, the students had a positive attitude towards genotype screening. Concerning attitude towards pre-school genotype screening among JSS students, 75(68.8%) had a positive attitude, while 39(34.2%) had a negative attitude. Among SSS students, 109(72.6%) had a positive attitude, while 41(27.4%) had a negative attitude ($p > 0.05$).

Table 3: Attitude towards genotype screening

Variables	Positive attitude n(%)	Negative attitude n(%)	Statistic χ^2	p-value
Pre-school genotype screening can prevent SCD				
JSS	75(68.8)	39(34.2)	1.450	0.228
SSS	109(72.6)	41(27.4)		
Pre-marital genotype screening can prevent SCD				
JSS	91(79.8)	23(20.2)	0.346	0.556
SSS	124(82.7)	26(17.3)		
Genotype screening should be conducted after childbirth				
JSS	58(50.9)	56(49.1)	0.215	0.643
SSS	72(48)	78(52)		

4.4 Practice of genotype screening among secondary school students

Table 4 below reveals that among JSS students, 92(80.7%) has had their genotype screening, while 22(19.3%) were yet to do. Among SSS students, 118(78.7%) had done their genotype screening, while 32(21.3%) were yet to do so.

Concerning students that had attended pre-school genotype screening health talk, 24(21.1%) of JSS students had attended, while 90(78.9%) had not. Among SSS students, 14(9.3%) had attended, while 136(90.7%) had not.

Among the JSS students, 100(91.2%) agreed to genotype screening before marriage, while 14(8.8%) did not agree. Among SSS students, 107(71.3%) agreed, while 43(28.7%) did not agree and this is a statistically significant difference, $p=0.001$

Among the JSS students, 80(70.2%) encouraged others to go for genotype screening, while 34(29.8%) did not. Among SSS students, 109(72.7%) encouraged others, while 41(27.3%) did not do so.

Table 4: Practice of genotype screening

Variables	Yes n(%)	No n(%)	Statistic χ^2	p-value
Have you had your genotype?				
JSS	92(80.7)	22(19.3)	0.854	0.652
SSS	118(78.7)	32(21.3)		
Have you attended any pre-school genotype screening?				
JSS	24(21.1)	90(78.9)	8.524	0.014*
SSS	14(9.3)	136(90.7)		
Would you do genotype screening before marriage?				
JSS	100(91.2)	14(8.8)	10.273	0.001*
SSS	107(71.3)	43(28.7)		
Have you ever encouraged others to go for genotype screening?				
JSS	80(70.2)	34(29.8)	0.196	0.657
SSS	109(72.7)	41(27.3)		

*p-value < 0.05 are statistically significant

Figure 1 below displays the percentage (%) of students that knew their genotypes and those that did not know. Among the JSS students, 51(44.7%) were AA, 11(9.6%) were AS, 0% were SS and 52(45.7%) said I do not know (IDK) my genotype. Among SSS students, 97(64.7%) were AA, 16(10.7%) were AS, 0% were SS and 37(24.6%) said I do not know (IDK); $p < 0.001$.

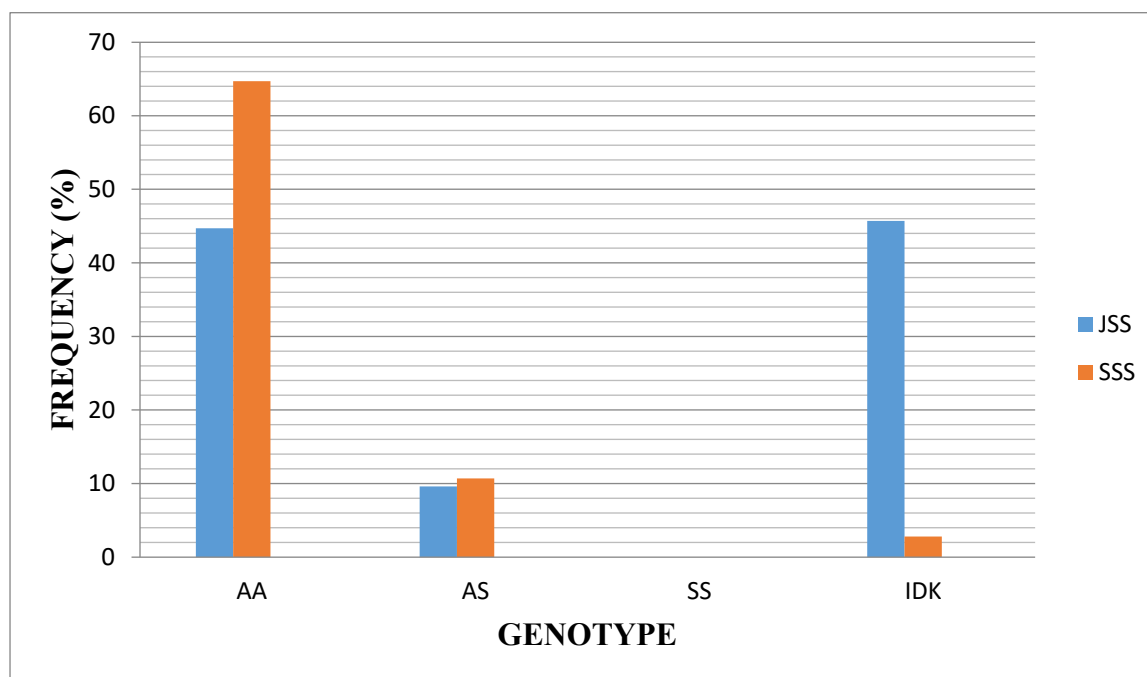


Figure 1: Distribution (%) of genotype among junior and senior secondary school students

IV. DISCUSSION

This study revealed that majority of the students 53.7 % were in the age group of 14-17 years, and most of them (55.3%) were females and this is similar to a study carried out in Benin city [7].

Our study also revealed that the parent's level of education was largely tertiary level (52.3%) and this is similar to the study of G.N Bazuaye, E.E Olayemi which suggested that the more educated the parents were, the more likely their wards would be encouraged to go school and become educated as well [7].

This study also showed that generally the students had very good knowledge of sickle cell disease (SCD) including the causes and this is in line with a study done in Yaba, Lagos that reported that on the average, 80% respondents were knowledgeable of the causes of SCD and its genetic counseling [8]. In addition, the study in Lagos revealed a significant association between respondents' educational qualifications and their knowledge of SCD and premarital counseling. Similarly, most of the parents of our respondents had a tertiary level of education. A study conducted in Tina Community in Jos Plateau State Nigeria also corroborated the above findings where 95 (63.3%) of respondents reported that sickle cell is a disease caused by inheriting two abnormal genes from both parents [9].

Our study showed that most of the students had a positive attitude to screening for sickle cell disease (SCD) students. The students reported that pre-marital screening can prevent SCD a finding that is similar to that of El-Hazmi, which found that 94% of participants considered pre-marital screening and counseling to be important in preventing genetic blood diseases; 87% of them thought testing for SCD should be mandatory [10]. In addition, Aswaidi and colleagues, also reported that the attitude of students towards premarital screening was generally positive as majority of the students (85.9%), saw the importance of premarital sickle cell screening in controlling the commonest hereditary diseases [11]. Similarly, Abioye-Kuteyi et'al also reported that their respondents considered that genetic diseases were important public health problems and agreed that premarital counseling would help in preventing genetic diseases [12].

The findings from this study shows 45.7% and 24.6% among JSS and SSS students respectively did not know their genotypes which suggests that either they were not told their genotype by their parents after screening or were yet to do the test and this is similar to a survey in Benin city, Nigeria where majority of the student (55.1%) did not know their genotype [7]. Among those who have been screened for their genotype, 51(44.7%) had AA genotype, while the majority 52(45.7%) did not know their genotypes.

Most of the respondents who are not aware of their genotypes were willing to be screened while very few, would not want to be screened. This is similar to findings of a study conducted in Tina, Jos, among respondents that knew their genotype, where majority were AA. Among respondents that did not know their genotype, 65 (91.5%) were willing to know their genotypes while 6(8.5%) were not interested in knowing their genotype [9]. In this regard, it does appear that a qualitative study to further understand the attitude of youths towards genetic screening in Nigeria may be helpful.

V. CONCLUSION

The students generally have good knowledge and positive attitudes towards genotype screening; however, the practice of genotype screening was poor.

RECOMMENDATIONS

The school authorities should ensure pre-school genotype screening. Also teaching on sickle cell disease (SCD) should be incorporated early into the school curriculum to reduce the burden of the disease. In addition, there is also need to improve the practice of routine genotype screening among the students by making genotype screening services readily available. The Abuja Universal Basic Education Board (UBEB) and Secondary Education Board (SEB) should ensure that genotype screening is fully implemented in all the junior and senior secondary schools and compliance ensured by principals and school teachers.

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AUTHORS' CONTRIBUTION

The authors contributed to the conceptualization and design of the study as well as data collection and analysis and manuscript writing. Authors read and agreed to publish this manuscript.

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CONFLICT INTEREST

The authors hereby declare that there is no conflict of interest

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