
Knowledge, Attitude and Practice of Genotype Screening Among Undergraduate Students of the University of Abuja, Nigeria

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Abstract: The knowledge, attitude and practice of genotype screening for sickle cell are very important in the control and prevention of sickle cell disease (SCD). The objectives of this study therefore are to determine the knowledge, attitude and practice of genotype screening among undergraduate students of the University of Abuja, Nigeria. The study was a descriptive cross-sectional study. A sample size of 256 was studied and multi-stage sampling technique was used to select the faculties, departments and participants. Data was collected by using self-administered, semi-structured questionnaire. Associations between variables and proportions were ascertained using Chi-square tests at 5% level of statistical significance. Most of the respondents were males (51.1%) and majority belong to age group of 21-25 years. About 98% of the students have good knowledge of genotype screening for sickle cell. Also, 93.8% of the students had positive attitude to genotype screening and 76.6% of the participants had ever had a genotype screening with 52.7% having AA genotype, 18.4% AS and 5.5% with SS genotype. In addition, the study revealed a statistically significant association between good knowledge of genotype screening and the practice (98.0% vs. 58.2%; p value <0.003). Since the students have good knowledge and positive attitude to genotype screening, increased awareness on genotype screening should be encouraged so as to increase the uptake of screening and reduce the burden of sickle cell disease.

Keywords: Genotype, Screening, Students, Knowledge, Attitude, Practice

1. Introduction

Sickle cell disease (SCD) is a group of inherited disorders of hemoglobin (Hb) in which the sickle Hb is present in association with abnormal Hb. [1] It is the most common single gene disorder in the world and up to 312,000 people are born yearly with HbSS globally; majority of these births (236,000) occur in Sub-Saharan Africa. [1, 2] Historically, the homozygous HbSS disease, HbS β -thalassaemia (HbS β -Thal), HbS plus C, D, and E (HbSC, HbSD, and HbSE, respectively) are commonly included under the classification of SCD. [3, 4] The geographical distribution of these Hb variants differs and often parallels certain attributes such as climatic conditions and malaria endemicity. While the HbSS and HbSC diseases are highly prevalent in areas of Sub-

Saharan Africa, particularly West Africa, the HbS β -Thal, HbSD and HbSE are more common in parts of the Middle East and Asia. [5-10] The prevalence of the carrier state for HbS ranges from 5% to 40% among populations in these endemic areas; thus driving the epidemiology of the disease. [10, 11]

Sickle cell disease (SCD), has major psychological, social and economic implication on the victim as well as the family. In sub-Sahara African, most of the affected children do not survive childhood largely because of malaria and bacterial infections and lack of access to appropriate health care. [10, 11]

Genotype screening and the resultant genetic counseling are increasingly recognized as integral part of preventive medicine. The emergence of genotype screening has conjured

the view on how to proceed in implementing newborn and or premarital screening at the national level that could be acceptable to society. [11] Therefore, studies are needed to gauge the 'pulse' of the society towards genotype screening.

Correct knowledge and attitude towards genotype screening for sickle cell disease is vital because preventing genetic disease through early identification and genetic counseling remains an innovative approach to reducing the impact of the disease. This also allows for better use of available resources in resource-poor countries such as Nigeria where the prevalence of SCD is high. [11]

The process of genotype screening aims to identify individuals at risk and help to make informed decisions according to their own values. Essentially, genotype screening remains voluntary, though in recent times, some religious organizations and tertiary institutions made genotype screening a pre-requisite for marriage and routine medical check-up for employment and school admissions. [11]

The objectives of this study are to assess the knowledge, attitude and practice of genotype screening for sickle cell disease among undergraduate students of university of Abuja and to determine any association between knowledge of sickle cell disease and the practice of genotype screening.

2. Materials and Methods

2.1. Study Area

The study was conducted at University of Abuja in the Federal Capital Territory of Nigeria (FCT), Abuja Nigeria. The FCT is located in the center of the country and is made up of six area councils among which is Gwagwalada area council where the university is located. The population of the FCT according to the 2006 National Census was 1.4 million with a projected rise to over 5 million by 2020. The University of Abuja was established on January 1st, 1988 under Decree No. 110 of 1992 with the mandate to run conventional and distance learning programmes. Academic work began in the University in 1990 with the matriculation of the pioneer students.

Presently, the University has twelve faculties including the College of Health Sciences. The University has its mini campus in Gwagwalada, Abuja and a Permanent site covering about 11, 824 hectares located along the Abuja Airport Road. [12]

2.2. Study Population

The study population were undergraduate students who registered in the university.

2.3. Study Design

This is a descriptive cross-sectional study involving a questionnaire survey.

2.4. Sample Size Determination

With a sample population greater than 10,000

undergraduate students, a 95% confidence level (1.96), an estimated value for prevalence sickle cell disease 19% (=0.190) [13] and a precision level of 0.05 the sample size was calculated using the Leslie Kish formula is.

$$\text{Leslie Kish Formula [13]: } N = (Z\alpha)^2 \frac{p \times q}{d^2}$$

2.5. Inclusion and Exclusion Criteria

All undergraduate students for the academic year 2017/2018 present during the period this research was conducted were considered for the study. Youths that were not registered undergraduate students at the time of the study were excluded

2.6. Sampling Technique

A multi-stage sampling technique was used in this study. In the first stage four out of the ten faculties in the university were selected using simple random sampling technique.

At the second stage, one department from each of the four faculties were also selected using simple random sampling technique and then finally all consenting students from each of the four department were studied as clusters.

2.7. Data Collection

Data was collected using self-administered questionnaire made up of four sections. The first section was used to collect socio-demographic data while the second section was deployed to obtain data on the knowledge of sickle cell disease. In addition, the third section of the questionnaire was used to obtain data on attitude to genotype screening and the fourth section was used to ascertain the practice of genotype screening. Data was collected by the researchers and this was completed in 8 weeks.

2.8. Data Analysis

Data was analyzed using the Statistical Package for Social Sciences (SPSS) version 21. Cross tabulation was used to find associations between socio-demographic characteristics and knowledge of sickle cell disease as well as the attitude and practice of genotype screening.

The knowledge section about sickle cell consisted of structured closed ended questions offering multi-chotomous choices of "Yes" or "No" or 'I don't know' options. The questions were asked on sickle cell disease. These questions provided a maximum of 100% and a minimum of 0% on each question. Respondents with scores equal to 50% and above were considered to have a good knowledge while those who had scores below 50% had poor knowledge.

The attitude of the respondents toward sickle cell disease was assessed using the 5-point Likert scale ranging from strongly disagree, disagree, indifferent, agree to strongly agree. Strongly agree and agree were categorized as having a positive attitude while strongly disagree, disagree and indifferent were considered to have a negative attitude. Six questions were asked on attitude towards genotype screening and a maximum of score of 100% and a minimum of 0% on

each question were awarded. Proportion of respondents with scores equal to or above the 50% were considered to have positive attitude toward genotype screening while those who had scores below 50% were categorized as having negative attitude toward genotype screening.

The practice of genotype screening was assessed using semi-structured questions which provided a maximum of 100% and a minimum of 0% score on each question. Respondents with scores equal to or above the 50% were classified as having good practice of genotype screening while those who had scores below 50% were considered to have a bad practice towards genotype screening.

The association between knowledge of sickle cell disease and the practice of genotype were assessed using cross tabulations of variables and the Pearson's chi square test and the results were presented in the form of tables.

2.9. 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, informed consent was obtained from selected students before administering the questionnaire. Maximum effort was made to ensure confidentiality of information by omitting names of the respondents and also assuring them that no information provided could be linked to them by anybody, including the

researcher.

2.10. Limitation of the Study

There was no screening kits for the benefit of participants who did not know their genotypes as researchers could not afford the tests.

3. Results

3.1. Socio-demographic Characteristic of Respondents

Table 1 shows that out of 256 participants 141 (51.1%) were males and 115 (44.9%) were females and the mean age of all participants was 21.9 years. Majority of the participant fall within the age group 21-25 years (57.8%), the rest comprised of 15-20 years (33.2%), 26-30years (7.4%) and 31-15years (1.6%). Most students were also in their 2nd year of study (59.8%). The participants were mostly Igbos (33.2%) followed by Yoruba's (27.7%), Hausas (13.7%) while other ethnic groups comprise (25.4%) of the participants. Most of students (94%) were single. The religions of participants include Christianity (73%), Islam (26%) and African traditional religion (0.4%). Participants' parents with tertiary education was (44.5%) while (25.4%) had secondary education, (16.4%) had primary education and (13.7%) had no formal education.

Table 1. Socio-demographic characteristics of respondents.

| Variable | | Frequency n (%) | χ^2 | p-value |
|-----------------------------|------------------------------|-----------------|----------|---------|
| Gender | Male | 141 (55.1) | 2.641 | 0.104 |
| | Female | 115 (44.9) | | |
| | Total | 256 (100) | | |
| Age | 15-20 | 85 (33.2) | 205.031 | 0.001* |
| | 21-25 | 148 (57.8) | | |
| | 26-30 | 19 (7.4) | | |
| | 31-35 | 4 (1.6) | | |
| | 100 | 32 (12.5) | | |
| Year/level of study | 200 | 153 (59.8) | 170.844 | 0.001* |
| | 300 | 49 (19.1) | | |
| | 400 | 22 (8.6) | | |
| | Hausa | 35 (13.7) | | |
| Tribe | Igbo | 85 (33.2) | 20.813 | 0.001* |
| | Yoruba | 71 (27.7) | | |
| | Others | 65 (25.4) | | |
| | No formal education | 35 (13.7) | | |
| Parents' level of education | Primary school | 42 (16.4) | 59.781 | 0.001* |
| | Secondary school | 65 (25.4) | | |
| | Tertiary education | 114 (44.5) | | |
| Marital status | Single | 243 (94.9) | 437.445 | 0.001* |
| | Married | 11 (4.3) | | |
| | Others | 2 (0.8) | | |
| Religion | Christianity | 188 (73.4) | 210.805 | 0.001* |
| | Islam | 67 (26.2) | | |
| | African traditional Religion | 1 (0.4) | | |

Statistically significant

3.2. Knowledge of Genotype Screening and Sources of Information Among Participants

Table 2 shows that 201 (78.5%) of the participants had good knowledge of genotype screening for sickle cell diseases while only 55 (21.5%) had poor knowledge.

Table 3 displays the common sources of information on sickle cell disease screening among the participants: from school (52.7%), from health workers (49.6%) and from the internet (42.6%) among others.

Table 2. Knowledge of genotype screening.

| Knowledge of genotype screening | n (%) |
|---------------------------------|-------------|
| Good knowledge | 201 (78.5%) |
| Bad knowledge | 55 (21.5%) |

Table 3. Sources of information on genotype screening.

| Source of information | Responses | n (%) |
|-----------------------|-----------|-------------|
| Radio | Yes | 85 (33.2%) |
| | No | 171 (66.8%) |
| Health worker | Yes | 127 (49.6) |
| | No | 129 (50.4) |
| Internet | Yes | 109 (42.6) |
| | No | 147 (57.4) |
| Friends and family | Yes | 82 (32.0) |
| | No | 174 (68.0) |
| School | Yes | 135 (52.7) |
| | No | 121 (47.3) |
| Religious leaders | Yes | 44 (17.2) |
| | No | 212 (82.8) |
| Other sources | Yes | 12 (4.7) |
| | No | 244 (95.3) |

3.3. Attitudes of Respondents Towards Genotype Screening

Table 4 gives a summary of the attitudes toward genotype screening: 93.8% of the participants had a positive attitude towards genotype screening while only 6.3% had a negative attitude.

Table 4. Summary of attitude of respondents toward genotype screening.

| Attitudes towards genotype screening | Frequency (%) |
|--------------------------------------|---------------|
| Positive attitude | 240 (93.8) |
| Negative attitude | 16 (6.3) |

3.4. Practice of Genotype Screening Among Respondents

Table 5 reveals that only 58.2% of the participants had good practice of genotype screening. Note that positive attitude to genotype screening as revealed in table 4 above does not always translate to good practice because of various barriers to accessing the screening tests in this setting.

Table 5. Practice of genotype screening among respondents.

| Practice of genotype screening | n (%) |
|--------------------------------|-------------|
| Good practice | 149 (58.2%) |
| Bad practice | 107 (41.8%) |

3.5. Reported Genotypes Distribution Among Respondents

Figure 1 below shows the percentages (%) of respondents that knew their genotypes and those that did not know: 52.7% of the participants had AA genotype, 18.4% had AS while 5.5% had SS genotype and 23.4% of respondents did not know their genotypes.

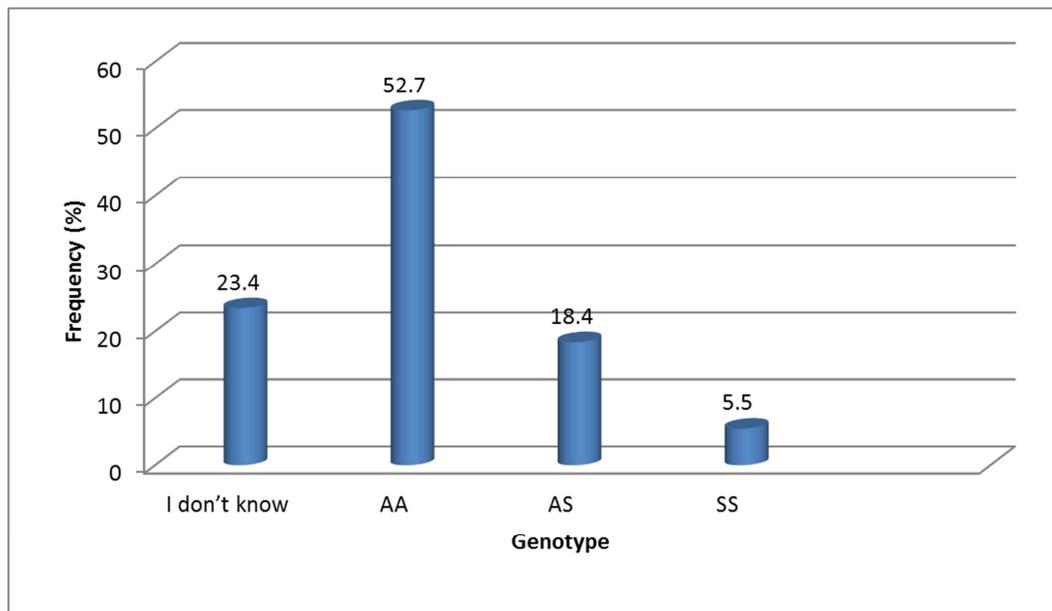


Figure 1. Reported genotype distribution among the respondents.

3.6. Summary of Reasons Given by Respondents for Refusing to Go for a Genotype Screening

Figure 2 below displays the various reasons given by

respondents for non-compliance with genotype screening: 8.3% said it was due to fear of stigma, 25% reported that it was not important, 16.7% said screening causes

unnecessary worries while 1.7% reported that genotype screening makes one prone to infection and 48.3% others gave personal reasons.

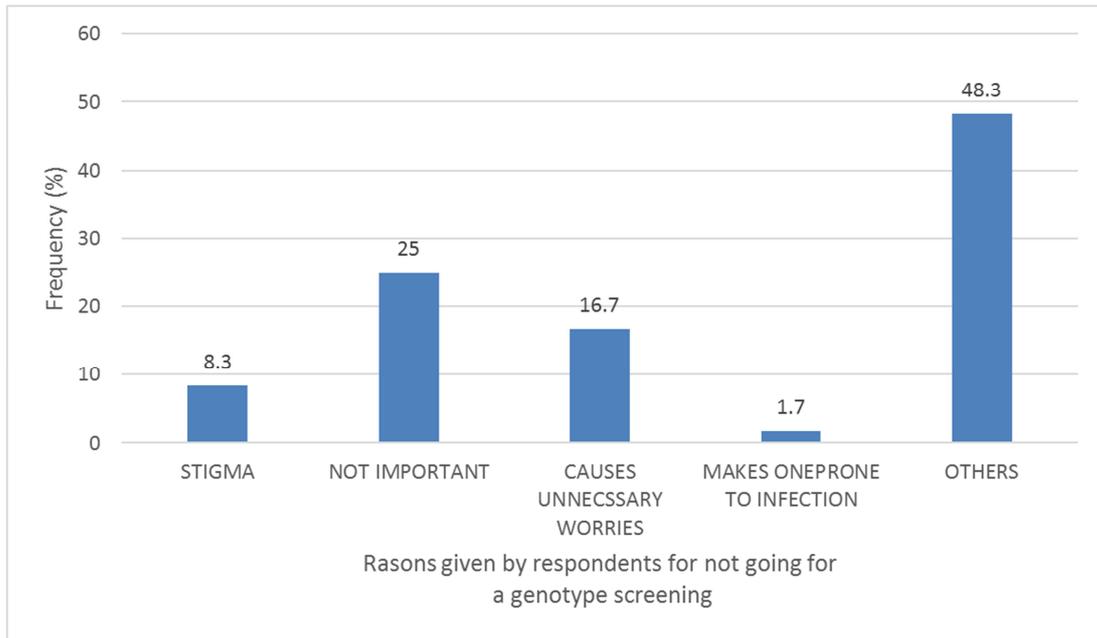


Figure 2. Reasons given by respondents for not going for genotype screening.

3.7. Association Between Knowledge and Attitude to Genotype Screening for Sickle Cell Disease

Table 6 below reveals a statistically significant association between knowledge of genotype screening and attitude to screening (p value=0.001). This means that a good knowledge of genotype screening may likely lead to a positive attitude to screening and vice versa.

Table 6. Association between knowledge and attitude to genotype screening.

| | Attitude | | Total | χ^2 | p-value |
|----------------|-------------------|-------------------|-------|----------|---------|
| | Positive attitude | Negative attitude | | | |
| Good knowledge | 196 | 5 | 201 | 22.603 | 0.001* |
| Poor knowledge | 44 | 11 | 55 | | |
| Total | 240 | 16 | 256 | | |

This study also reveals a statistically significant association between good knowledge of genotype screening and the practice of genotype screening (p=0.003) i.e. those who had good knowledge of genotype screening would likely practice it.

Table 7. Association between knowledge and practice of genotype screening.

| | Good practice | Bad practice | Total | χ^2 | p-value |
|----------------|---------------|--------------|-------|----------|---------|
| Good knowledge | 127 | 74 | 201 | 9.541 | 0.003* |
| Poor knowledge | 22 | 33 | 55 | | |
| Total | 149 | 107 | 256 | | |

3.8. Association Between Attitude and Practice of Genotype Screening Among Respondents

Table 8 shows that a good attitude to genotype screening may lead to the practice among these respondents (p=0.006) and the reverse may also be true.

Table 8. Association between attitude and practice of genotype screening.

| | Good practice | Bad practice | Total | χ^2 | p-value |
|-------------------|---------------|--------------|-------|----------|---------|
| Positive attitude | 145 | 95 | 240 | 7.734 | 0.006 |
| Negative attitude | 4 | 12 | 16 | | |
| Total | 149 | 107 | 256 | | |

4. Discussion

From the findings of this study, majority of the students were in the age group of 21-25 years and also majority were males and this is in contrast to a similar study carried out in Benin City, Nigeria probably due to the setting. [14] The findings from this results revealed that the parents' level of education was largely tertiary level of education and this is similar to the study of G. N Bazuaye and colleague which suggested that the more educated the parents were, the more likely their children would be encouraged to go school and get educated. [14, 15]

4.1. Knowledge on Genotype Screening

Our study reported that majority of participants were aware of sickle cell disease and this finding is similar to that of Adewoyin AS et al, Oleraru F et al, Bindhani, and Smith M and colleagues who observed a high level of awareness of sickle cell among corps members in Benin City Nigeria. [16, 31, 32] Participants of our study also had a good knowledge of genotype screening for sickle cell although this was less than that observed by Adeyemo Oyenike et al, Precious Kalambe et al, Oludare et al. [17-19] In contrast, Grosse et al, Isah BA et al and Ebele Uche et al reported poor knowledge of genotype screening. [20, 21, 29] Similarly, a cross-sectional study on knowledge of sickle cell, premarital screening and marital decision among local government workers in Ile-Ife, Nigeria by Abioye-Keteyi EA et al reported that 69% of the respondents had poor knowledge. [22]

In our study, most of the participants had their source of information to be from the school followed by from the health workers and the internet and these were in agreement with the findings of Olatona FA et al. [23] These were however in contrast to the findings of the studies conducted by Gbenol PK et al, Galadanci N et al and Busari AA et al that genotype screenings were first recommended by the religious leaders and herbalists. [24, 25, 30] Also, a study by Adenike FF et al in a tertiary educational institution in south western Nigeria showed that the most common source of information was the mass media. [26]

4.2. Attitudes Towards Genetic Screening

A large proportion of our respondents reported that genotype screening can help prevent sickle cell disease and this is in contrast to the finding of Adeyemo Oyenike et al, where only 64% of the participants agreed. [17] In addition, Ugwu NI also observed that a large proportion of the participants accepted that premarital screening can prevent sickle cell disease and this is also similar to our finding. [27]

A small number of the participants of this study agreed that prenatal diagnosis can help prevent sickle cell disease which was less than what was observed by Taiwo IA et al where 80.8% of the participants considered

prenatal genotype worthwhile. [28] These differences may be due to the different settings and the type of population studied.

Overall, a very strong positive attitude towards genotype screening (93.8%) was found among the participants of this study and similar results were observed by Ahmed S et al, Precious Kalamba et al and Ugwu NI. [19, 20, 27] In addition, Olatona FA et al, reported that the school, mass media and health workers influence the attitude of respondents towards sickle cell disease and genotype screening. [23]

4.3. Practice of Genotype Screening

Studies by Oyedele Emmanuel et al and Adewoyin AS et al [16] showed that only 52.7% and 94.6% respectively knew their genotype while in this study, 76.6% of our participants knew their genotypes. Of the all participants who had performed a genotype screening some 5.5% were of the SS genotype. Only 32.2% of our participants had been to pre-school genotype screening and this very similar to reports by Egbochukwu EO and Imogie AO. [28] Also, majority of their participants had ever considered genotype screening before going into a marital relationship and this is similar to observation made by Oludare et al where 65% of the respondents practiced genotype screening before marriage [19]; although studies by Abioye-Kuteyi EA et al showed that only a quarter of married persons and betrothed respondents didn't know their partners' genotype. [22] In this study, only 58.2% of the participants had good practice of genotype screening for sickle cell disease despite having very good knowledge. In addition, our study showed a statistically significant association between good knowledge and practice of genotype screening.

5. Conclusion

This study revealed that most of the students had good knowledge of genotype screening for sickle cell as well as positive attitudes to genotype screening, however only 76.6% of the participants had ever had a genotype screening with 52.7% having AA genotype, 18.4% AS and 5.5% with SS genotype. Furthermore there was a statistically significant association between good knowledge of genotype screening and the practice of genotype screening (98.0% vs. 58.2%; p value <0.003).

6. Recommendation

Since the students have good knowledge and positive attitude to genotype screening but poor practice of genotype screening, there is need for increased awareness on genotype screening so as to improve the uptake of screening and reduce the burden of sickle cell disease. In this this study setting, newborn screening, pre-school and pre-marital screening for sickle cell disease are very strongly recommended.

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