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Assessing Knowledge of Sickle Cell and Screening-Uptake among College of Education Students in Southwest, Nigeria

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Abstract
The Sickle cell disease (SCD) continues to be an important global public health problem of immense proportion and broad impact affecting approximately 300,000 to 400,000 infants each year, primarily in Sub-Saharan African countries. Studies have shown that students in Colleges of Education lacks adequate knowledge of SCD and premarital screening. This study assessed SCD awareness, knowledge, and its screening-uptake among College of Education (CoE) students in Southwest, Nigeria.The research adopted a descriptive cross-sectional research design. Study population was Emmanuel Alayande CoE, Oyo, and Osun State CoE in Oyo and Osun States, Nigeria respectively. Sample size of 300 per CoE. A validated semi-structured questionnaire at a Cronbach's Alpha internal consistency range of 0.72 to 0.85 was used to collect data. Data collected were analysed using descriptive and inferential statistics at 5% level of significance.Results revealed the mean age of respondents to be 20.6 ± 2.5years. Participants' level of awareness of SCD was high (88.8%) and (93.2%); with knowledge mean score of 6.8 ± 2.4 and 6.6 ± 2.2; p>0.05 for EACE and OSCE respectively. 47.7% of EACE and 21.8% of OSCE respondents did not go for SCD screening.In conclusion, a high level of awareness and inadequate knowledge about SCD existed. Uptake of SCD screening was poor, as almost half of respondents did not go for SCD screening. It is recommended that governmental and non-governmental organizations should introduce effective health education programmes on SCD in tertiary educational institutions to promote informed health decision for SCD screening-uptake.
Keywords: Knowledge, Nigeria, SCD screening-uptake, Sickle cell disease, Southwest
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1. INTRODUCTION

Sickle cell disease (SCD) is a common and potentially fatal genetic-related hematological disorder affecting quite a number of the population globally. In fact, millions of people around the world have been reported to be affected[1]. SCD is a growing global health concern, affecting approximately 300,000 to 400,000 infants each year, primarily in Sub-Saharan African countries[2]. The prevalence of SCD is high in Sub-Saharan Africa, South Asia, West Africa, the Middle East, and the Mediterranean region[3]. It is characterized by hemolytic anemia, vaso-occlusive crises, unrelenting end-organ damage, and premature death in those affected[4]. In the general management of SCD, there are several approaches, including symptomatic management, supportive management, preventive management, abortive management, and curative therapy[5].

Preventive management, which includes increased awareness and early OSCEs such as newborn screening and comprehensive care, has resulted in significant reductions in mortality in children under the age of five in high-income countries[6]. Pre-marital genetic counseling, an OSCE primarily carried out (for school-aged children and couples about to marry), prenatal screening done (during the second and third trimesters of pregnancy), and newborn screening conducted (within 72 hours of birth), are examples of primary preventive management[7]. Also, primary prevention efforts have ranged from legally mandated premarital blood disorder testing to public education campaigns around the world[8].

Premarital medical examination is a board of tests that couples planning to marry undergo to discover any genetic and infectious diseases that may be transmitted to each other or their offspring, the two most important of which are SCD and human immunodeficiency virus (HIV)[9]. Genetic screening dates back to the 1970s in countries such as the United States of America for diseases such as SCD, and it has also been successfully implemented in countries such as Canada, the United Kingdom, Greece, and Italy for a variety of diseases that are unique and endemic to those regions[10]. Premarital, antenatal, and neonatal screening programs have been established in certain high-income nations, including countries in the Middle East and the United States, but more importantly, such programs are beginning to emerge in areas with a very higher incidence of SCD, such as India as well as some African countries[11].

The World Health Organization (WHO) identified a number of medical genetic screening programs, such as carrier identification using kinship genealogy and screening tests, and postnatal screening for SCD, that are suitable for low- and middle-income countries and could help to reduce the incidence of SCD[12,13]. Some studies have shown that the knowledge of SCD and genetic screening among unmarried youths is low in Sub-Saharan Africa countries[14]. However, other studies conducted in Ghana and Nigeria have revealed that young people

have a good knowledge of SCD and positive attitude towards genetic screening although some do not know where to access the screening facilities and the uptake among young people may be low as a result of[15,16,17,18]. Therefore, this makes adequate health communication and effective genetic counselling with knowledge to access the essential services to be of paramount need among the younger people.

Health education is the provision of health information and knowledge to individuals and communities, as well as the development of skills to enable individuals to adopt healthy behaviors voluntarily[19]. It involves providing essential learning experiences to at-risk individuals particularly in making informed decisions regarding engaging in genetic counselling and responding appropriately to life-saving behaviour consistent with outcomes of counselling. Genetic counseling offers help and guidance to individuals who may have or are at the risk of having genetic diseases based on their genetic information, including their family background[20]. Genetic counseling and testing for SCD have been shown to provide the needed consciousness-raising and concern-arousing in the mindset of people about the disease while also allowing those at risk to make informed decisions about marriage and pregnancy[21]. In this context, genetic counseling constitutes essential resource for arousing awareness for discouraging sickle cell trait partners (carrier or AS) from marrying each other, when this process is initiated early in life by administering a screening test and following up with reminder support[7].

Sickle cell disease has remained a challenge globally which has been fueled by inadequate knowledge and wrong perceptions. The continuous formation and spread of misconceptions and myths about the disease is a challenge on the carrier[22,23,24]. Certain myths and stories have evolved around sickle cell victims and the disease. In 2006, Nigeria was pronounced by the World Health Organization (WHO) as the country with the highest number of Sickle Cell Anaemia patients globally with an approximate amount of 150,000 babies born annually[25]. However, comprehensive knowledge as regards the various genotypes related to SCD, tests to be done for genotype screening among the respondents is low especially the mixed mode research (quantitative and qualitative) and that has really motivated the researcher to embark on a mixed mode research in order to reduce the rates of the miscomputation toward screening of SCD that we have in Nigeria. Therefore, the aim of this research was to assess the knowledge and screening practices of selected college of education students in Southwest, Nigeria. While the specific objectives are to:

1. Determine the knowledge associated with sickle-cell disease
2. Assess sickle-cell screening-uptake.

The findings of this study will contribute to the knowledge of individuals, governments, and stakeholders that sickle cell carrier can survive and live a normal life if individual is aware of his/her health status.

Sickle cell disease (SCD) is a growing global public health concern, which affects 300,000 to 400,000 infants each year, particularly Sub-Saharan African countries[2.] The disease is characterised by hemolytic anemia, vaso-occlusive crises, unrelenting end-organ damage, and premature death in those affected which is often managed using various approaches such as symptomatic management, supportive management, preventive management, abortive management, and curative therapy[5,4]. (Ballas, 2018; Kapoor, Little, & Pecker, 2018). Primary preventive management includes pre-marital genetic counseling, prenatal screening, and newborn screening which should be within 72 hours of birth. Carrier identification using kinship genealogy and screening tests and postnatal screening for SCD have been identified by the World Health Organization (WHO) as suitable for low and middle-income countries. These screening programs could help to reduce the incidence of the SCD in these countries[7,12,13]. Although SCD and genetic screening knowledge is low among unmarried young people in Sub-Saharan Africa, according to some studies[14].

2. METHODOLOGY

The study is a descriptive cross-sectional study among two study groups namely the The cross-sectional study design made use of Emmanuel Alayande College of Education, Oyo State (EACE) and Osun State College of Education, Ilesha (OSCE) students. This enabled the investigator to access detailed information about the awareness, knowledge, attitude, and perception of the study population in relation to sickle cell disease.

Study Population and Sample Size

The study population encompass students in both the Osun state college of Education and Emmanuel Alayande College of Education. The sample size was determined by using a simplified form of comparison between two proportions was used as given below because there was no initial population.

The sample size was determined using the following sample size formula for calculating sample sizes:

$$\frac{Z^2\, p\, q}{d^2}$$

where,

Z is standard normal deviation at 5% (Standard value of 1.96)

P is the estimate of key proportion (21.0% or 0.21). This was derived from a study by Nnodu et al., 2020

q is (1-p)=0.21

d is the level of precision at 5%

$$n = \frac{1.96^2 \text{x } 0.21\text{x } 0.79}{0.05^2}$$

$$= \frac{3.8416\text{x } 0.21\text{x}0.79}{0.0025}$$

n= 255

The sample size was increased to 300 per group for generalization of findings and non-response rate n =300[26]. Therefore, a total of 300 participants were needed in each of the group. Hence a total of 600 participants were used for both the experimental and EACE group.

3. Sampling Procedure

In selection of the sample population, simple random technique using balloting procedure was used for the selection of 3 schools out of the five schools in each study site. In EACE three schools were selected using ballot system, these included school of education, school of science and school of Arts/SOS. Also, in OSCE, three schools were randomly selected namely School of Vocational studies, School of social science and School of science. For each school selected, two departments were sampled. Only Year 1 and Year 2 students were sampled, and respondents were selected based on their willingness to participate in the study.

4. Instrument for Data Collection

The data collection was done using quantitative (Questionnaire) and qualitative (Focus Group Discussion) methods.

Semi-structured questionnaire and focus group discussion guide were used for data collection, various 100 level and 200 level classrooms within the selected schools were used for data collection. This ensured a large number of students were captured at once and also reduces loss of questionnaires by participants. As the team of data collectors went to the classes, class representatives were identified and liaised with, however, for some classes, the class representatives were not available, so the team lead addressed the class and explained the purpose of the survey. The questionnaire used for data collection in this study contained five sections: Socio-Demographic characteristics), Awareness on sickle cell disease, Knowledge on sickle cell disease, enabling factors involved in sickle cell disease screening-uptake and uptake of sickle cell disease (SCD) screening. The focus group discussion session was used to compliment the information received from the questionnaire to obtained robust information on knowledge of sickle cell and screening uptake among selected college of education students in the study area. These instruments were used to collect information on the antecedents on knowledge of sickle cell disease and sickle cell screening-uptake.

5. Validity of Instruments

The instruments used for the study were validated by consulting experts in research instrument construction in the field of hematology independently. The instruments were also reviewed by the researcher's supervisor and experts in public health promotion and education to ensure relevance, appropriateness, and adequacy of the items.

6. Reliability of Instruments

The instruments pilot-tested among 50 respondents and two FGDs of 1 Male and 1 Female groups at the Federal, College of Education, Osiele, Abeokuta Ogun State students to establish the reliability of the study instruments. A Cronbach Alpha measurement and reliability co-efficient was then used to determine the reliability of the questionnaire. The reliability for the constructs were; Awareness of SCD=0.76 Knowledge of SCD=0.81, Enabling factors for SCD screening-uptake=0.76 and uptake of SCD screening=0.71. Questions that were not adequately clear to the FGD participants during the discussion were also noted and simplify in the FGD guide**.**

7. RESULTS

Socio-demographic Characteristics of Respondents

Results (in Table 1) indicated that the mean age in Emmanuel Alayande College of Education (EACE) was 20.6±2.3 years and Osun State College of Education (OSCE) was 20.7± years. Majority (92.1%) and 89.9% of the respondents from the EACE and OSCE respectively were less than 25 years. More female participated in the study at both study site and almost all the participants were Yoruba. However, some (31% and 25.6%) in EACE and OSCE respectively of respondents perceived their health status as below excellent.

Table 1: Socio-Demographic Characteristics of Respondents

Variables	EACE **N = 304 (100%)**	OSCE **N = 308 (100%)**
Age (years)		
Less than 24	280(92.1)	277(89.9)
More than 24	24(7.9)	31(10.1)
Mean age	1.08 ±0.27	1.10 ±0.30
Sex		
Female	185 (60.9)	218 (70.8)
Male	119 (39.1)	90 (29.2)
School		
Education	106 (34.9)	3(1.0)
Art & Social Science	106(34.9)	135 (43.8)
Science	38(12.5)	85(27.6)
Vocation	0 (0.0)	85(27.6)
Level		
Year 1	219 (72.0)	145(47.1)
Year 2	85 (28.0)	163 (52.9)
Average Monthly income in naira		
0-149,000	301(99.0)	306(99.4)
150,000-299,000	2(0.7)	1(0.3)
300000-500,000	1(0.3)	1(0.3)
Perceived Health Status		
Excellent		
Very good	210(69.1)	227(73.7)
Good	73(24.0)	64(20.8)
Fair	19(6.3)	13(4.2)
	2(0.7)	2(0.6)
Ethnicity		
Igbo	17(5.6)	19(6.2)
Yoruba	279(91.8)	284(92.2)
Hausa	2(0.7)	3(1.0)
Others	5(1.6)	1(0.3)

Awareness on Sickle Cell Disease (SCD)

Awareness of sickle cell disease among participants as shown in Table 2 indicated respondents' awareness of SCD. Few (11.2%) and (6.8%) of the respondents from Emmanuel Alayande College of Education (EACE) and Osun State College of Education (OSCE) respectively reported that they have never heard of sickle cell disease (Fig. 1). Also, many (32.9%) and (30.5%) of the respondents from EACE and OSCE said their source of information about SCD was from social media. Furthermore, most (72.7%) and (62.3%) of the respondents from EACE and OSCE respectively reported not knowing people who have suffered from SCD. During the Focused Group Discussion (FGD), when asked about what people say about SCD in the community, most of the participants from OSCE and EACE mentioned that people who have sickle cell disease die young while some said that they easily fall sick. Also, few of the participants said that people with sickle cell disease finds it difficult to get married and that people discriminate against them. A male participant from the EACE said;

"Actually, when we are talking about sickle cell it just like a blood group because most people think that people with sickle cell they can't live, they can't survive, so it very difficult for sickle cell to get married if he/she can't manage himself/herself. But with my own knowledge I think it can be managed through not stressing yourself through some activities, not going through some work you know it will hunt you since you know you are a sickle cell"

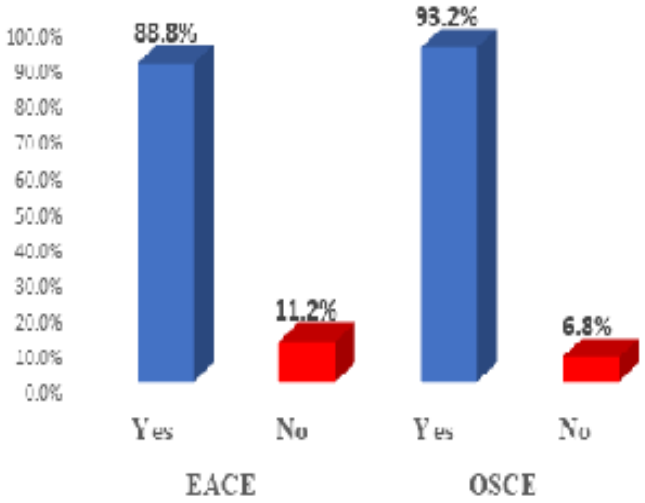

Figure .1: Awareness of Sickle Cell Diseases

Table 2 Awareness on Sickle-Cell Disease (SCD)

Variable	EACE N= 304 (100%)	OSCE N=308 (100%)
Source of Information about SCD		
Health Professional	101 (33.2)	99 (32.1)
TV	36 (11.8)	63 (20.5)
Radio	55 (18.1)	69 (22.4)
Internet/social media	100 (32.9)	94 (30.5)
Friends	41 (13.5)	43 (14.0)
Family	9 (3.0)	18 (5.8)
Religious Center	11 (3.6)	19 (6.2)
School	50 (16.4)	72 (23.4)
Billboards/Posters	12 (3.9)	20 (6.5)
Knew someone with SCD		
Yes	83 (27.3)	116 (37.7)
No	221 (72.7)	192 (62.3)
Relative died of SCD		
Yes	44 (14.5)	52 (16.9)
No	259 (85.2)	256 (83.1)
Seen someone suffering from SCD complications		
Yes	100 (32.9)	124 (40.3)
No	204 (67.1)	184 (59.7)

Knowledge on sickle cell disease

Results in Table 3 showed the knowledge of respondents on sickle cell disease. On point scale of 12, the mean knowledge score on SCD were 6.8 ± 2.4 and 6.6 ± 2.2 for Emmanuel Alayande College of Education (EACE) and Osun State College of Education (OSCE) respectively (Table 4). Majority (92.1%) and (89.9%) of both EACE and OSCE respectively were knowledgeable of SCD being inherited. Though, some (28.0%) and (30.8%) of the respondents from EACE and OSCE respectively reported that sickle cell disease is acquired. Some (21.7%) and (18.8%) of the respondents from EACE and OSCE respectively reported not knowing if sickle cell disease can cause severe debilitating pain, strokes, infections, and organ damage. Also, some (20.4%) and (23.1%) of the respondents from EACE and OSCE respectively reported that they do not know if someone must not inherit two genes (one from the mother and one from the father) to have sickle cell disease. Regarding the diagnosis of SCD, most (70.7%) and (72.6%) of respondents in both EACE and OSCE respectively reported blood test as the means of diagnosing SCD.

During the FGD, **i**n OSCE, all the participants agreed that inheritance of sickle cell from parents is responsible for causing sickle cell disease. Three of the participants also further mentioned that nonchalant attitude of intending couples to know their genotype can also cause them giving birth to sickle cell child(ren). A male participant said;

"The main cause of that might be through marriage when a man is AS and the woman AS such cannot

be avoided."

Likewise, majority of the participants in the EACE group said sickle cell is inherited from parents, therefore highlighted this as a cause for sickle cell disease. Also, when asked about if witchcraft is responsible for sickle cell, only two of the female participants said witchcraft is not responsible for sickle cell disease. Moreover, two of the participants, a male and female participants said, if partners do know their genotype status before they get married and both partners are 'AS' there is tendency for them having 'SS'. One of the female participants said;

"*Not at all, I do not think that play a role in sickle cell, because according to biology, it depends on the parent genotype, so I don't think witchcraft any role in sickle cell"*

The participants in EACE and OSCE highlighted various symptoms ranging from yellowish eyes, body weakness, swollen stomach, headache, fever, regular sickness, tiredness, long hours of pain, small stature, regular drug intake, and whitish body. A female participant said;

"*She usually falls sick all the time, one day on and one day off. She cannot do without using drugs and if she did not use the drug, she cannot be fine. No matter what they use for her sometimes she cannot put on weight and everything like that and sometimes her eyes are always yellow".*

All of the participants agreed that prayers play an important role in treatment of sickle cell disease but also suggested that going to the hospital for check-ups is also essential and should be combined with prayers. However, one of the participants believed that herbal treatment can also be considered as a means of treatment. The female participant specifically said;

"*Before all these medical things, we have what our forefathers use, they use all these herbs for malaria so definitely there should be an herb that they should be able to use but the thing might not go permanently but then it will reduce it*"

In the EACE, one of the participants said bone transplant can be a means of treatment for people with sickle cell disease, and two of the participants said medications can be a means of treatment for people with sickle cell disease. However, when asked about traditional mode of treatment, two of the participants said traditional methods should not be explored because it will only add more problem to the sickle cell patient

In EACE and OSCE, all the participants mentioned unanimously that the means of preventing sickle cell is when both partners in a relationship know their genotype status, even if the relationship is not a serious one like boyfriend, girlfriend relationship, because they can have intercourse in the course of the relationship, so the participants suggested both parties in a relationship must know their genotype is compatible before getting into a relationship or getting married. One of the male participants in OSCE said;

"The only way to prevent it is when we are in courtship, we must know our genotype before getting too much into it. Like my colleague said there is no how AA and AA can give birth to AS. The only solution is to know how we and how good our blood is. Things like that sha"

All the participants in EACE and OSCE mentioned that blood test in the hospital can be used to diagnose sickle cell disease. One of the male participants in EACE said;

"*So, for them to detect this sickle cell because it is being located in the blood, so they would like to test some of their blood to drain a little from their blood and do the test on their blood"*

Table 3: Knowledge on Sickle Cell Disease

Knowledge	EACE N=304 (100%)	OSCE N=308 (100%)
Sickle cell disease is caused by inheriting genes from parents		
Yes	280(92.1)	277(89.9)
No	7(2.3)	16(5.2)
Don't know	17(5.6)	15(4.9)
Sickle cell disease can cause severe debilitating pain, strokes, infections, and organ damage		
Yes	216 (71.1)	218 (66.8)
No	22 (7.2)	38 (12.3)
Don't know	66 (21.7)	58 (18.8)
To have sickle cell disease someone must inherit two genes, one from mother and one from father		
Yes	213 (70.1)	196(63.6)
No	29 (9.5)	41(13.3)
Don't know	62 (20.4)	71(23.1)
Sickle cell disease makes red blood cells hard and sickle-shaped		
Yes	182(59.9)	185(60.1)
No	40(13.2)	60(19.5)
Don't know	82(27.0)	63(20.5)
Causes of SCD		
Acquired	85(28.0)	95(30.8)
Inherited	177(58.4)	183(59.4)
Don't know	41(13.5)	30(9.7)
Symptoms of SCD		
Frequent illness	175(57.6)	177(57.5)
Yellow eyes	106(34.9)	104(33.8)
Don't know	46(15.1)	43(14.0)
Diagnosis of SCD		
Blood test	215(70.7)	223(72.6)
Urine test	45(14.8)	49(16.0)
Don't know	44(14.5)	35(11.4)
SCD prevention		
Genetic counselling	91(29.9)	88(28.6)
Testing before marriage	183(60.2)	162(52.6)
Health promotion campaign/awareness	72(23.7)	87(28.2)
Don't know	27(8.9)	19(6.2)
Chances of getting a healthy baby when both parents have SCD trait		
Quarter chance baby will be normal (25%)	97(31.9)	119(38.6)
Half chance baby will be normal (50%)	87(28.6)	71(23.1)
All of the children	18(5.9)	30(9.7)
None of the children	51(16.8)	66(21.4)
Don't know	51(16.8)	22(7.1)
Treatments that are used for people with SCD		
Herbal medicine	71(23.4)	93(30.2)
Conventional medicine	144(47.4)	131(42.5)
Prayers	52(17.1)	48(15.6)
Don't know	69(22.7)	56(18.2)

Table 4: Mean Knowledge Score for Sickle Cell Disease (SCD)

Mean knowledge score (M.K.S)	Maximum Score	N	T	P-value
EACE				
6.8±2.4	12	304	1.150	0.251
OSCE				
6.6±2.2	12	308		

8. Uptake of sickle-cell disease (SCD) counseling

Results in Table 5 show the uptake of SCD among the respondents, less than half (47.7%) of the respondents of EACE and 21.8% of OSCE group have not gone for their genotype testing. Most (60.7%) of the respondents in EACE said since been admitted to school, they have never done SCD screening, and similarly, 59.2% of the respondents in OSCE have never done SCD screening since they were admitted. Also, 62.9% and 64.4% of the respondents in the EACE and OSCE group respectively said they are willing to participate in SCD counselling services. Furthermore, most (73.0% and 71.8%) of EACE and OSCE respondents respectively, are willing to obtain SCD awareness/advocacy programme. In the OSCE group, most of the FGD participants were of the opinion that going for SCD screening is not common due to fear of the results and the effects it may have on them. A male participant said;

"*It is not common and the reason is that people are getting afraid that what if I get tested and I confirm that am a sickle cell. The last time we would have gone to check it, most of my colleagues said that they will write what they know there. The last time we wanted to do for HIV, the person doesn't want to have the result and at the end of the day, people who even paid said "I don't even need the result ". Someone like me I don't even want to go for the result"*

Similar reports were observed among EACE respondents, as they said the SCD screening is not common as people don't go for screening unless they have health issues. A female participant however said it was common because some institutions place the test as a criterion before being admitted. A female participant said;

"It is common to some extent, some universities, before you can enter such university, you must have done your blood test, so some are doing it for the sake of admission, some institution compulsory it like LAUTECH, U.I and so on"

On the factors hindering the uptake of SCD screening, participants in the OSCE group listed illiteracy and lack of finance as common factors that can hinder the uptake of SCD screening. Ignorance of SCD was also emphasized by a female participant, who said;

"Ignorance, some people are not non-challenge we that we are educated we should know that this is a normal thing for us. Some people are not educated to the extent that let me go for a check-up. Some people will just go into any thrash relationship and they will give birth themselves at the end of the day"

In the EACE group, finance was also mentioned as a major factor alongside factors like stigmatization and the stress involved in going for screening. A male participant said:

"I can say time, because especially that market women they don't have time for something like health, what they know about is their business. So I can say time, because some will not have time, some will have gone to market maybe in the morning and return back to their house late in the night, they will not have time for anything like health, all they know is how to get their money"

In both the EACE and OSCE groups, participants agreed that lack of proper screening centers, distance of such centers, as well as poor attitude of health workers are factors that can hinder the uptake of SCD screening.

When FGD participants were further asked what can promote the uptake of SCD counseling services, half of the participants in the OSCE group mentioned that the availability of free screening centers as well as closer venues will promote uptake of SCD screening. The other half of the participants however strongly opposed that notion. A male participant said;

"Not everybody will go there since some people are afraid"

In the EACE group, the role of government and health workers in promoting uptake of SCD counseling was emphasized. A female participant said:

"I think government should make the screening free because most of the people have issue with money, they do not have money for screening. Government should provide clinic in almost all area, like they should bring mobile clinic to most people"

The place of awareness in schools, market places and churches was highlighted by a participant.

Furthermore, the FGD participants were further asked about their thoughts on the relevance of premarital counselling in reducing cases of SCD and in the OSCE group, all the participants noted that premarital counselling has a major role to play in reducing cases of SCD. A male participant said;

"*Yes because when they counsel them so that it will still give them courage and if they are already into*

the marriage they know what to do"

Similar responses were gotten from the EACE group, a female participant said;

"It a good role, because during pre-marital counseling, they already know the Dos and Don'ts and the consequences. Since they know the consequences they won't not want something that will cause a bad havoc to them so they will not want to go into it"

Most FGD participants in the OSCE group suggested that creating awareness in both urban and rural areas is the major way to promote SCD screening. A male participant said

"It is not only here that we need this kind of orientation, we need it in villages where there is no civilization, when their eye is opened, they will know what is right and what is wrong. If there can be a way to take it close to these people"

In the EACE group, the role of social media for creating awareness was highlighted as a way of promoting SCD screening, awareness on radio and religious worship centers availability of screening centers in the campuses was mentioned by a female participant. The participant specifically said;

"For we the students that are on campus, this should be available at the health center for we to go there for the medical check-up, it should be free since this medical money has been paid with our school fees, everything should be free for we the students and also to all those clinics that are empty, because we just go to a clinic like this, they don't have drugs they don't have anything, they just discriminate and say go to this person to go and buy the drugs for you to use, so my advice for the government of our so called nation is that they should try should care about the health of the citizen. All these materials they will use for the screening, they should be available in every clinic in the community"

Table 5: Uptake of sickle-cell disease (SCD) counseling

Variables	EACE N=304	OSCE N=308
Ever gone for SCD testing		
Yes	159(52.3)	241(78.2)
No	145(47.7)	67(21.8)
Genotype		
AA	110(69.6)	186(77.2)
AS	36(22.8)	39(16.2)
AC	11(7.0)	14(5.8)
SS	1(0.6)	2(0.8)
Reason for obtained the test		
Curiosity	78(25.7)	131(42.5)
To know SCD status	80(26.3)	100(32.5)
Others	146(48.0)	77(25.0)
Reason for not ever obtained SCD screening		
Nothing	108(74.5)	56(84.8)
No time for it yet	20(13.8)	9(13.6)
Don't know any screening center/how to go about it	6(4.1)	1(1.5)
Lack of money	6(4.1)	
I don't have SCD	2(7)	
Ever done SCD screening since been admitted to school		
Yes	42(25.8)	71(29.0)
No	99(60.7)	145(59.2)
Can't remember	22(13.5)	29(11.8)
Provided with your result in school		
Yes	42(64.6)	64(62.7)
No	9(13.6)	11(10.8)
Can't remember	14(21.5)	27(26.5)
Willing to participate in SCD counselling services		
Yes	190(62.9)	199(64.6)
No	78(25.8)	76(24.7)
Not Sure	34(11.3)	33(10.7)

9. DISCUSSIONS

This study sought to identify the knowledge of sickle cell and sickle cell screening-uptake among selected college of education students in South-west, Nigeria. Majority of the participants in both study site were females, this does not imply that there are more female in the colleges, but females were more willing to participate in the study unlike their male counterparts. In both study sites, the least age of participants was 15 years, and the highest age was 30 years, averagely participants were in their 20s. This indicates that participants are majorly in their reproductive age years. Although most respondents in both study sites perceived their health status as excellent, many perceived their health status to be below excellent. This likely suggests that many of the students may have underlying ailments that need medical attention, though further questions were not solicited from the students to identify their health conditions.

The finding of this study showed that majority of the students in both Emmanuel Alayande College of Education (EACE) and Osun State College of Education (OSCE) study sites were aware of sickle cell disease. This finding agrees with the report of earlier study which reported that awareness of SCD among all the participants studied[24]. This study also supports the findings of earlier studied conducted which reported that 83.2% level of awareness of SCD among students. The major source of information was gotten to be the social media, followed closely by information they got from health professionals[27]. This affirms the result gotten by the earlier researcher who found that social media is one of the primary sources of health information for young women and men of all ages. The social media is a major source of interaction and information among young people, which allows for easy dissemination of information[14]. It is therefore not surprising that the majority of the respondents in both study sites indicate the social media as their main source of information about sickle cell. This reiterates the need for programs targeted towards young people to focus on the influence of social media in information dissemination. The high awareness level of our study participants may be because our respondents are likely to be exposed to enlightenment avenues e.g., mass media which could enhance their knowledge base about diseases such as SCD. Also, since the respondents are made up of young adult who had tertiary education, and increased exposure level, this could have influenced their high awareness level about SCD. In both study sites majority of the respondents do not have relative who have died of sickle cell, and most of the respondents do not know someone with sickle cell, this contrasts the findings of earlier researcher who pointed out that more than half (59%) of the respondents knew someone living with SCD. The high level of unawareness of people living with sickle cell or having complications from sickle cell can contribute to the poor knowledge of the participants on SCD[28]. According to the report obtained from the study carried out by a researcher who opined that knowing a family member with SCT/SCD was significantly associated with good knowledge of SCD[29].

Though, majority of the participants in both study sites were aware of the existence of SCD, yet majority of them had inadequate or comprehensive knowledge about SCD and displayed some misconceptions of SCD. Some reported that SCD is acquired. Some do not know the symptoms of sickle cell disease and how it can be diagnosed. Similar misconceptions were also reported by the earlier researcher[24]. These knowledge gaps are due to lack of proper education and enlightenment about SCD. Most of the participants in both study sites knew that SCD can be detected through blood test, more than half of the respondents knew that SCD can be inherited, and that, it affects the red blood cells. This contradicts the study conducted by earlier researcher who reported that most (80.0%) of their participants were aware that SCD is an inherited disorder, 83.0% are aware that it affects the red blood cells while only (54%) knew that the disease can only be diagnosed through blood test[30]. This indicates that although this earlier study was carried out their study among secondary school students, their participants were still more knowledgeable about SCD because their respondents were students of higher educational institution[30] This affirms the need for adequate education about SCD, as it is a disease of high morbidity and mortality rate, adequate education will help bridge the knowledge gaps and equip people to take informed decisions and appropriate actions on SCD.

In EACE, most of the respondents agreed that testing before marriage is a means of SCD prevention while a little more than half of respondents in the OSCE agreed genetic screening before marriage is a means of SCD prevention. Also, some of the respondents in both study sites affirmed that genetic counselling and health promotion campaign are preventive methods of SCD. This finding supports that genetic screening before marriage, genetic counseling and health promotion campaign are main primary prevention strategies for EACEling SCD in a developing country like Nigeria. According to the results conducted by earlier researcher whose opined that genetic screening can be made effective through population screening due to the high prevalence of HbS in Nigeria, this should be an essential part of primary health care services in Nigeria[30].

In conclusion, this study revealed that respondents' awareness level about SCD was high, poor uptake of the screening was lacking as the study identified that almost half of respondents in EACE and OSCE have not gone for their genotype testing. Though, good knowledge regarding the cause and prevention of SCD exist among the respondents, inadequate knowledge on SCD in the areas of causes, treatment, symptoms, diagnosis and chances of getting SCD still existed. Based on the findings of this study, it is recommended that both governmental and non-governmental organizations introduce effective health education OSCE programs on SCD

in public places and avenues like social media, health care centers, religious center, and schools, this can increase the knowledge level of the population, ensure informed health decision and uptake of genetic screening services. Health topics such as sickle cell disease can be introduced to the tertiary education curricula, this can help in correcting misconceptions about sickle cell and ensure adequate comprehensive knowledge of the disease.

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