EFFECT OF COMMUNICATION INTERVENTIONS ON GENOTYPE COMPATIBILITY DECISION AMONG YOUTHS TO PREVENT SICKLE CELL DISEASE

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ABSTRACT
In order to stem the tide of sickle cell disease (SCD), there is the need for the development and deployment of appropriate intervention messages to members of the society. This study assessed the effect of health talk, health flyers, and a combination of health talk and health flyers in equipping youths with knowledge on genotype premarital decisions towards prevention of SCD. The study utilized three groups pretest posttest quasi-experimental design. The multi-stage sampling technique was used to select 123 youths. Data were collected using a questionnaire. Two research hypotheses were tested using Analysis of Covariance fixed at 0.05 level of significance. Findings showed that the participants under a combination of Health Talk and Health Messages using flyers benefited more in the intervention compared to participants exposed to Health Talk and the use of flyers. A significant difference was observed in the effect of Health Talk, Health Messages using flyers, combination of Health Talk and Health Messages using flyers on participants' premarital decisions towards SCD. It is recommended that sickle cell disease education should be added to the health education curriculum of senior secondary schools and tertiary institutions. This will help to educate the youths on sickle cell disease at early age.

Keywords: communication interventions, premarital decisions, sickle cell disease

Introduction

Sickle cell disease has been identified as a problem of public health importance by the World Health Organization even as millions of Africans particularly Nigerians are yet to recognize the problem associated with the disease condition (Wastnedge et al., 2018; Maani, et al., 2007). Ashiru (2020) explained the nature of sickle cell disease (SCD) as "a group of disorders that affects haemoglobin (Hb or Hgb), the molecule in red blood cells that delivers oxygen to cells throughout the body". He added that "SCD patients have a typical haemoglobin molecule called haemoglobin S, which distorts the red blood cells original biconcave disc to a sickle or crescent shape." Sickle cell disease (SCD) condition has also been described as an avoidable but irreversible genetic disorder whereby the red blood cell is stiffened giving it a sickle shape which does not allow free flow of oxygenated blood in the blood vessel. This disorder, results in inadequate blood supply to cells and tissues in the body. The condition causes

pains and other complications and eventually leads to death in most cases particularly among infants and children (Aziza & Noah, 2019).

In most African countries including Nigeria, only 5% of children born with the sickle cell disorder live beyond ten years of age (Adewoyin et al., 2015; Allege, 2015). Another report has it that 50% to 90% of those born with the disease die before the age of five (Thomas, 2015). While only five percent of the global populations are carriers of the sickle cell trait, one out of every four Nigerian bears the sickle cell gene (Akinsete, 2016). Research findings have equally shown that there are no adequate medical facilities or sustainable health policies and programmes designed to check the prevalence of the disease in addition to ensuring the survival of SCD patients in sub-Sahara Africa (Denis-Antwi et al. 2008). The carrier rate in Nigeria is put at 20% to 30%, and 2% to 3% cases. Studies have shown that religion and culture have impaired the knowledge level about the disease among youths as different cultures with multiple religious' beliefs in Nigeria share various views about SCD (Jiya et al., 2017). A handful number of the respondents believe the disease is caused by evil spirits while some believe that with religious faith and prayer they can marry a carrier even when they are carriers as well. These and other views are borne out of limited awareness and knowledge about the disease (Ajilore et al., 2018).

A study by Ajilore et al. (2018) found the awareness level of participants in operation know your genotype media advocacy campaign on SCD in Delta State, Nigeria showed that a significant percentage of the study participants believe that someone with the AS genotype can marry another person with AS genotype. In the same study, a significant number equally believe that genetically incompatible couple will give birth to SCD free children. Clearly, some of the respondents did not have sufficient knowledge of their genotype, which triggers a call for knowledge based interventions with a view to broadening people's knowledge of the disease, form positive attitude towards the disease and consequently take informed genotype decisions through genotype counseling, genotype screening, selective inter-gender relationship or dating, marriage engagement and consummation. Research findings have revealed that some people are aware of the disease but majority do not have adequate knowledge of the disease to form the needed positive attitude (Ugwu, 2016).

It has been observed that making a firm marital decision in the face of genetic incompatibility among lovers is a big issue. Many do not have adequate information and/or undergo premarital genotype screening, while those that do, find it difficult to make the right decision. This has led to the birth of children with genetic diseases such as sickle cell disease. Poor decision making due to lack of adequate information can lead to the birth of a child with sickle cell disease, which is a genetic disease that ought to have been prevented.

These problems necessitated the need for such a study on communication intervention with a view to broadening the knowledge of youths on SCD, advocate a change in attitude and possibly influence a positive genotype decision in terms of going for premarital genotype counseling, premarital genotype screening, selective inter-gender relationship or dating, marriage engagement or courtship and consummation of marriage. In recent years the rate of genetic disorders and sickle cell diseases has increased. Among inherited genotype diseases, thalassemia and haemoglobinopathies are common and cause significant morbidity and mortality and imposed a heavy financial burden on the society. Despite that hereditary diseases are widespread due to high rates of consanguineous (blood related) marriages, research regarding community awareness towards premarital carrier screening in our country is scarce. There are so many factors influencing the consanguineous marriages to occur in a high rate, specially, in the rural areas. Most of the people are

ignorant of the health parameters and consequences regarding consanguinity and child birth. It is assumed that many genotype disorders can be prevented if consanguineous marriages are prevented or if awareness is created on the risk factors. Thus, there is need for this study
The following hypotheses were tested in this study:

HO1: There will be a significant difference in the effect of health talk, health message flyers and combination of health talk and health message flyers on participants' post intervention genotype premarital decisions to prevent Sickle Cell Disease

HO2: There is a significant main and interaction effects of treatments (health talk, health message flyers, and a combination of health talk and health message flyers), finance, parental and peer pressure on participants' genotype premarital decisions to prevent sickle cell disease.

Methods

Research design: This study utilized three groups pre test post test quasi-experimental design to assess the effect of health talk, health message flyers, a combination of health talk and health message on the genetic premarital decisions of youths to prevent sickle cell disease.
Population: The study population consisted of 1881 unmarried youths within the ages of 16-30 in Agbor, Asaba, and Ogwashi-Uku in three local government areas of Delta State.
Sample Size and Sampling Technique: One hundred and twenty three (123) unmarried Christian youths were sampled for this study, using the Katz, Elmore, Wild and Lucan (2014) sample size determination method. This included 42 youths from Agbor, 39 youths from Asaba, and 42 youths from Ogwashi-Uku in Delta State, Nigeria. The multi-stage sampling technique was used through three stages. The first stage was to determine the senatorial districts for the study among the three senatorial districts in the State. Delta North Senatorial district was purposively selected. This is because previous study carried out within the senatorial district revealed poor knowledge of sickle cell disease among youths (Ajilore et al., 2018). At the second stage, four communities, including Agbor in Ika South Local Government area, Asaba in Oshimili south local government area, and Ogwashi-Uku in Aniocha South Local Government area were selected as the communities are within Delta North Senatorial District. At the third stage, the treatment to be given to each group was purposively determined taking into cognizance the nearness of the resource persons to the location of the study and accessibility to the respondents bearing in mind the restriction of movement due to the COVID 19 pandemic.
Instrumentation: The research instrument for the study was a structured questionnaire which was adopted from Ajilore et al. (2018) and modified by the researchers. The modification was done to remove all items that were culturally biased and may infringe on the right of the respondents. The instrument had four sections: Section A elicited responses for demographic data. Section B had 15 items and was used to elicit data to measure participants' knowledge level of sickle cell disease on a five point Likert scale of VHE: Very High Extent =4, HE: High Extent =3, LE: Low Extent = 2, VLE: Very Low Extent. = 1 and Not at All = 0. Knowledge as a variable was measured as either high (mean score between 41.0 & 60.0), moderate (mean score between 21.0 & 40.0) or low (mean score between 1.0 & 20.0).
Section C provided data to determine participants' attitude towards sickle cell disease. This section had 22-items, with a five point Likert scale scoring system of SA: Strongly Agree=4, Agree =3, Disagree= 2, Strongly Disagree = 1 and Not at All = 0. This is similar to the 5 likert scale (0, never; 1, almost never; 2, sometimes; 3, fairly often; 4, very often) used by Cohen et al.

(1983) to score the Perceived Stress Scale 4 items. The lower the score the better the participants' attitude towards sickle cell disease. Attitude as a variable was measured as either positive (mean score between 1.0 & 29.0), Indifference (mean score between 30.0 & 58.0) or negative attitude (mean score between 59.0 & 88.0).

Section D elicited data to measure the participants' genotype premarital decisions. This section had ten items in a Likert scale scoring system made up of: VHE: Very High Extent = 4, HE: High Extent =3, LE: Low Extent. =2, VLE: Very Low Extent. = 1 and Not at All = 0. The higher the score, the better the decision level. The minimum score is 10 and the maximum score is 40. Higher score (21-40) signifies good premarital decision on genotype compatibility while lower score (1-20) signifies poor premarital decision on genotype compatibility by the participants.

Validity and Reliability of the Research Instrument: the instrument was validated onface, content and constructs validity.A pre-test of the instrument was conducted by administering 20 copies of the research instrument to 20 randomly selected youths that were not part of the study but shared similar inclusion criteria as not being married and between the ages of 16 and 30 years of age. The data from the pre-test were analyzed using reliability coefficient test. The Cronbach's Alpha results revealed 0.894 for knowledge of sickle cell disease, 0.847 for attitude towards sickle cell disease and 0.851 for genotype premarital decisions.

Data Collection Procedure: The researchers administered the research instrument in two phases to participants who gave their consents.

Procedure was carried out in three stages as follows:

(a) **Pre treatment stage** involved a familiarization visit to the three selected communities, which focused on general introduction, establishment of rapport as well as the administration of the questionnaire to participants. A simple random sampling procedure was used to select 45 participants from each community. After the selection process, participants were briefed on the objective of the study and the benefits therein. The genotype premarital decisions and knowledge of sickle cell disease was administered to participants.

(b) **The treatment Session:** The participants in the experimental groups were subjected to seven (7) weeks of treatment programmes. The subjects in experimental group A were subjected to health talk, group B on were exposed to the use of flyers while that of group C were treated with both health talk and use of flyers. Each of the three experiment groups had seven session of the therapy. Each session took 45 minutes.

(c) **Post-treatment Session:** This is the evaluation stage. At this phase, a post test was carried out at the seventh week of the study across the three experimental groups and the control group to gather data with the same instrument used to gather the base line data in first schedule during the first week. This was for analysis to determine the effect of the communication interventions on the genetic premarital decisions among the study participants.

Method of Data Analysis: Descriptive analysis of frequency counts, percentage, mean, and standard deviation, t-test, and analysis of covariance, univariate analysis of covariance were used.

Ethical Consideration: Ethical approval for this study was obtained from Babcock University Health Research Ethics Committee (BUHREC)

Results

Table 1: Demographic Characteristics of Respondents

		Pre-intervention		Post-intervention	
		Freq	**%**	**Freq**	**%**
Groups	Flyers	42	25.2	40	26.1
	Oral/talk	39	23.4	37	23.5
	Talk and flyers	42	20.3	42	21.0
	Total	**123**	**100**	**119**	**100**
Gender	Male	58	47.2	56	47.1
	Female	65	52.8	63	52.9
	Total	**123**	**100.0**	**119**	**100**
Age	16-20	77	62.6	75	63.0
	21-25	30	24.4	29	24.6
	26-29	16	13.0	15	12.6
	Total	**123**	**100.0**	**119**	**100.0**
		Mean age = 20.3, Std. Dev. = 7.11			

Table 1 presents the information of participants in both pre and post intervention on the study of the effect of sickle cell disease communication intervention on knowledge, attitude and genotype premarital decision among youths in Delta State, Nigeria using three experimental groups (health talk, use of flyers, and a combination of health talk and use of flyers) and a control group. The result shows that most of the participants were female. The age spectrum of the study was between 16-29years, out of which most of the participant were 16-20years (62.6%), followed by 21-25 years (24.4%) while least of the participant were 26-29years (13%). The mean age of the youths who participated in the study was 20.3, with Standard Deviation 7.11.

Table 2: Analysis of Covariance of the main and interaction effect of health talk, use of flyers, combination of health talk and use of flyers on participants' post intervention genotype premarital decisions on SCD

Source	**Type III Sum of Squares**	**Df**	**Mean Square**	***F***	***P***
Corrected Model	2002.377[a]	3	559.740	25.807	.000
Intercept	1933.117	1	1933.117	30.223	.000
Pre-premarital decisions	123.665	1	123.665	3.837	.067
Group	855.914	3	285.305	19.999	.000
Error	1087.578	111	9.798		
Total	3019.089	119			
Corrected Total	3112.711	115			
a. R Squared = .633 (Adjusted R Squared = .630)					

Table 2 presents the effect of health talk, flyer health messages, a combination of health talk and flyer health messages on participants' post intervention premarital decisions on SCD (R^2 = .633; Adj. R^2 = .630; $F_{(3,115)}$ = 19.999; p = .000).This showed that the intervention accounted for 63%

of the variance observed in the participants' post intervention genotype premarital decisions on SCD. Therefore, the null hypothesis which states that "There will be no significant difference in the effect of health talk, flyer health messages, combination of health talk and health messages using flyers on participants' post intervention genotype premarital decisions on SCD" is rejected while the alternate hypothesis is accepted. This means that there are significant interaction effects of health talk, flyer health messages, a combination of health talk and flyer health messages on participants' post intervention genotype premarital decisions to prevent SCD.

Table 3: Descriptive Statistics of Post intervention genotype premarital decisions to prevent SCD Scores of Participants' in health talk, flyer health messages, a combination of health talk and flyer health messages on participants' post intervention genotype premarital decisions to prevent SCD

Dependent Variable: post intervention genotype premarital decision on SCD

Group	Mean	Std. Error	95% Confidence Interval		Sig.
			Lower Bound	Upper Bound	
Health Talk (HT)	**33.92 (a)**	**1.00**	**30.269**	**34.017**	**.000**
Use of Flyers (UF)	**32.86(a)**	**0.88**	**29.980**	**34.432**	**.000**
HT/UF	**34.67(a)**	**0.90**	**32.444**	**36.000**	**.000**

a. covariates appearing in the model are evaluated at the following values: pre test premarital decisions on SCD = 19.308.

Results revealed that participants exposed to Health Talk (HT) had a mean score of 33.92 and a standard error of 1.00; for participants under Health Messages (HM) with the use of flyers, the mean score was 32.86 and the standard error was 0.88, while a mean score of 34.67 and a standard error 0.90 were revealed for participants under a combination of health talk and health messages using flyers. This shows that the participants under a combination of health talk and health messages using flyers (34.67) benefited more in the intervention compared to participants exposed to Health Talk (HT) (33.92) and Health Messages with the use of flyers (32.86). This result shows the combined treatment is most effective. To determine if significant difference exists in the mean scores of treatment, the analysis of covariance was undertaken as indicated in Table 4 below.

Table 4:Univariate Analysis of Covariance for effect of health talk, health messages using flyers, a combination of health talk and health messages using flyers on participants' post intervention genotype premarital decisions on SCD

Dependent Variable: post-test genotype premarital decisions on SCD

	Sum of Square	Df	Mean Square	F	Sig.
Contrast	566.928	3	288.976	15.105	.000
Error	2219.312	116	19.132		

The F tests the effect of group. This test is based on the linearly independent pair wise comparisons among the estimated marginal means.

Data analysis in Table 4 revealed a univariate F-ratio of 15.105 that was found to be significant at less than the predicted .05 level. The null hypothesis of no significant difference in the effect of health talk, flyer health messages, a combination of health talk and flyer health messages on participants' premarital decisions to prevent SCD could not be supported by the findings of this study. Therefore, the earlier stated null hypothesis was rejected. The implication of this is that there is a significant difference in the effect of health talk, flyer health messages, combination of health talk and flyer health messages on participants' premarital decisions to prevent SCD.

Table 5: Analysis of Covariance of the Main and Interaction Effects of Treatment, finance, parental and peer pressure on Participants' genotype premarital decisions

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	1897.086[a]	3	632.362	19.120[a]	.000
Intercept	1874.900	1	1874.900	27.760	.000
Pre Marital Decision	123.665	1	123.665	3.837	.057
Group	811.434	2	405.717	5.361	.009
Finance	8.327	1	8.327	.572	.288
Religion	7.689	1	7.689	.225	.321
Parental	10.009	1	10.009	1.002	.157
Peer	13.113	1	13.113	.986	.109
Group * Finance	321.344	3	107.115	.396	.094
Group * Parental	388.009	3	129.337	.432	.261
Group * Peer	411.432	3	137.144	.197	.231
Finance * Religion* Parental * Peer	317.995	3	105.999	.250	.605
Group * Finance * Parental * Peer	517.004[a]	3	129.251	.151[a]	.821
Error	4469.406	106	38.649		
Total	6657.001	119			
Corrected Total	5283.526	115			

a. R Squared = .399 (Adjusted R Squared = .396)

Results in Table 5 indicates that there was a significant effect of health talk, use of flyers, and combination of health talk and use of flyers on the genotype premarital decisions of Christian youths ($F_{(2,115)} = 5.361$; $p = .009$). There were no significant main effects of finance($F_{(1,115)} = .572$; p .228), parental pressure($F_{(1,115)} = 1.002$; $p = .157$) and peer pressure ($F_{(1,115)} = .986$; $p = .109$) on participants' post intervention genotype premarital decisions. The results however revealed no significant two-way interaction effects of treatment on finance ($F_{(3,115)} =$

.396; p .094), religion ($F_{(3,115)}$ = .600; p =.121), parental ($F_{(3,115)}$ = .432; p = .261) and peer pressure ($F_{(3,115)}$ = .197; p = .231) on participants' post intervention genetic premarital decisions. Also, no interactive effect was found among finance, parental and peer pressure ($F_{(3,115)}$ = .250; p = .605) on participants' post intervention genotype premarital decisions. The results equally showed no interaction effects of treatment, finance, parental and peer pressure ($F_{(4,211)}$ = .151; p >.821) on participants' genotype premarital decisions.

The implication of this result is that finance, parental and peer pressure did not significantly moderate the effects of health talk, flyer health messages, and a combination of health talk and flyer health messages on the genotype premarital decisions of youths.

Discussion

The main and interaction effect of health talk, use of flyers and a combination of health talk and use of flyers on participants' post-intervention genotype premarital decisions on SCD accounted for 63% of the variance observed in the participants' post-intervention genotype premarital decisions to prevent SCD. This outcome means that there are significant interaction effects of health talk, flyer health messages, combination of health talk and health messages using flyers on participants' post-intervention genetic premarital decisions against SCD. The implication of this is that health education would drastically be enhanced especially through the flyer health messages on social media which might help to reduce the physical barriers such as fear and intimidation that traditionally impede access and utilization of healthcare resources and support by young ones. Therefore, young people will be able to go for genotype counselling, genotype screening, opt for genotype compatible partners for marriage. This in no doubt will be a wise decision that may minimize the prevalence of the disease to some degree. As a solution to sickle cell disease, this result aligns with the position of other researchers who stated in his finding that through a number. of simple interventions, high mortality due to sickle cell disease among children younger than five years has been virtually eliminated or reduced to the barest minimum (Ajilore et al., 2018; Scott et al., 2011).

It is important to note that the premise of the Information-Motivation-Behavioural Skill Model (Ajzen, 1991) provided a guideline for this study. According to Denis-Antwi et al. (2008); Jiya et al.,(2017) and Lizette et al., (2019), the premise of this model is that the degree to which a person is informed and motivated to engage in a particular health behavior and having the behavioural skill to do so may lead to the possibility to start and sustain a health behaviour. This premise was a guide to designing the intervention material which provided a comprehensive information about sickle cell disease, captured the expected attitude and what the study participants stand to gain by engaging in a positive behaviour expected to change the negative narrative of sickle cell disease in Nigeria and Africa. Similarly, the submission of Sodeinde, (2019) that an interventionist is expected to come up with an individual focused intervention material, truthful, strongly persuasive message that will counter previously held negative attitude, unhealthy subjective norms and boost perceived behavioural control (Ajilore et al.,2018; Jiya et al.,2017; Sodeinde, 2019).

On the effects of treatment, finance, parental and peer pressure on participants' genotype premarital decisions, it was observed that these variables did not significantly moderate the effects of health talk, flyer health messages, and a combination of health talk and flyer health messages on the genotype premarital decisions of youths. This result contrasts with the position of Maliki that socio-economic status is a major consideration in making choice of marriage partners among intending couples in south-south Nigeria (Maliki, 2011).

Conclusion

Communication intervention with a view to inform and educate people particularly unmarried young persons in Nigeria about sickle cell disease (SCD) has become imperative following the prevalence of the disease in the country. It can be concluded from the findings of the study that the combination of health talk and the use of flyers was more effective than the isolated intervention of health talk and the use of flyers.

Flowing from the findings of this study, the following recommendations are made.

1. Religious institutions should as a matter of importance, organise health programmes to educate the youths on sickle cell disease from time to time.
2. Genotype compatibility test result should be made a requirement for obtaining marriage certificate at marriage registries in Nigeria.
3. Sickle cell disease education should be added to the health education curriculum of senior secondary schools. This will help to educate the youths on sickle cell disease at early age.

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