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Effect of Nutrition Education on the Eating Habits of Undergraduates in South-West, Nigeria

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ABSTRACT

To assess the effect of nutrition education on the eating habits that may predispose undergraduates to cancer, a quasi-experimental study was carried out in a representative sample of undergraduates aged 16 to 25 years in two Universities in South-west Nigeria. A sample of 436 participants (males and females) was randomly selected from both universities (1 control group; 1 experimental group). Participants' eating habits was assessed before nutrition education intervention by having a focussed group discussion and responding to a 19-item self-developed food frequency scale (pretest). Nutrition education intervention was given to the experimental group for 8 weeks and the control group had a placebo. The effect of nutrition education on eating habits was measured immediately and 8 weeks after intervention using the pretest scale (posttest). Data analysis was employed using SPSS version 15; independent t-test, ANCOVA, using the pretest as the covariate to measure the effect of the intervention. Nutrition education significantly affected the eating habits of the participants ($p < 0.05$). The experimental group performed better by contributing a higher mean score of 61.48 while the control group contributed a mean score of 56.64. The level of study significantly affected the eating habits of the participants with students in lower level of study performing better ($p < 0.05$). Nutrition education positively modulated the eating habits of the participants. More students need to be exposed to nutrition education on eating habits because it appears to be a potent tool in forestalling the harmful effects of poor eating habits especially cancer.

Key words: Nutrition education, eating habits, undergraduates, cancer

INTRODUCTION

Cancer remains an important factor in the global burden of disease. The disease arises principally as a consequence of individuals' exposure to carcinogenic agents in what they inhale, eat and drink or are exposed to in their personal work environment. However, studies show that some people indulge in some eating habits like excessive intake of salt, meat, fatty foods, low intake of fruits vegetables, cigarette smoking, excessive intake of alcohol that make them more susceptible than others to develop cancer, especially stomach cancer (Tsugane, 2005; National Cancer Institute (NCI), 2007; AICR, 2007; Anand *et al.*, 2008). Over a decade ago, the World Cancer Research Fund (WCRF) and the American Institute of Cancer Research (AICR) predicted that one of three people globally will develop cancer at some point in their lives and that

there were over 10 million new cases of cancer diagnosed each year (WCRF, 1997). In another report, the World Health Organization (WHO) indicated that in many countries, more than a quarter of deaths are attributable to malignant tumors. The report further pointed out that cancer has emerged as a major health problem in developing countries, matching its effects in industrialized nations.

Diet is one of the three factors (others being smoking, infections) that can prevent one third of cancers and another third cured. Therefore, recommended that the alarming rate of cancer spread will be prevented if these factors are taken care of. This report was corroborated by other studies which confirmed that thirty to forty percent of cancer cases have been linked to dietary choices (Amorim-Cruz, 2000; Thiele *et al.*, 2004; Gunderson *et al.*, 2004; Vairio and Weiderpress, 2006; Anand *et al.*, 2008; National Cancer Institute (NCI), 2007).

Furthermore, Coren reported that cancers of the liver, stomach and oesophagus were more common in the developing world than the developed countries and that they are linked to consumption of carcinogenic preserved foods such as smoked or salted food and parasitic infection of organs. He further reported that, the most lethal cancers were lung, stomach and liver cancers (Coren, 2005).

Since, cancer is known to be a disease that can cause great suffering and claims many lives, the overall commitment of scientists and other professionals involved in disease prevention is to reduce the rates of cancer and other diseases, so that many people can enjoy quality life with good health until they eventually die in old age.

Previous studies carried out in Nigeria, pointed out that there is a dearth of statistics (data) about cancer of the stomach and recommended that control measures be introduced for its prevention despite the apparently low incidence rates recorded probably to keep it in check (Oluwasola and Ogunbiyi, 2003). This study may provide a rational scientific basis for such an action or approach. In another report from Nigeria, it was reported that 11.6% of patients who had Upper Gastro Intestinal Endoscopy (UGIE) conducted for upper gastrointestinal diseases had stomach cancer at Obafemi Awolowo University teaching hospital Ile-Ife, although no apparent cause was given for this (Agbakwuru *et al.*, 2006). This finding suggests that all hands must be on deck to prevent stomach cancer which may actually be on the increase in Nigeria. Thus, nutrition education is conceivably required as an important approach to curb the rising incidence of cancers.

Nutrition education which is an integral part of health education is one of the ways identified to prevent cancer spread especially diet related cancer amongst which is stomach cancer. Nutrition education achieves this remit by providing information on good nutritional habits which will lead to disease prevention. Nutrition is therefore, a major modifiable determinant of chronic diseases (Anderson *et al.*, 2004; Prell *et al.*, 2005; Ajala, 2006; Arroyo *et al.*, 2006; Ozcelik *et al.*, 2007; Yahia *et al.*, 2008). Dietary adjustment may not only influence the present health but may determine whether or not an individual develops diseases such as cancer and other chronic diseases later in life. The successful reduction in the incidence of stomach cancer in some countries (America, United Kingdom, Australia and Canada) that had a good statistics about the prevalence of the disease has been achieved through dietary modifications (Young and Wilson, 2002; Gunderson *et al.*, 2004; Mimi and Iris, 2004; National Cancer Institute (NCI), 2007). In Nigeria, there appears to be no evidence of similar effort to reduce stomach cancer through dietary efforts.

Many undergraduates are youths; youths encounter numerous health risks along the path to adulthood, many of which affect quality of life and life expectancy. Studies have revealed the vulnerability of youths to poor eating habits. They are said to be in the habit of eating "junks"

(Papadaki and Scott, 2002). In a study, carried out in the United States, it was also reported that university students consume a lot of fast food which is high in fat and low intake of fruits and vegetables (Arroyo *et al.*, 2006; Kolodinsky *et al.*, 2007; Yahia *et al.*, 2008). This type of eating habits has also been observed among Nigerian undergraduates (Ajala, 2006).

It is perceived that, these poor eating habits arise from lack of knowledge of the cumulative effects of their eating habits. This is of a grave concern in Nigeria where there is an increase in fast food centres in its urban cities (Akinwusi and Ogundele, 2005; Ajala, 2006). Most of these fast food restaurants sell “junk” food. The “junks” consumed by most undergraduates contain dense calories which are cancer promoting; and this poor eating habits may predispose them to diet related cancers with stomach cancer being a prominent one of such cancers (Popkin, 1998; Rickert and SusaJay, 1996; Turconi *et al.*, 2008; Delisle *et al.*, 2009).

Most undergraduates (youths) are most likely to be responsible for their diets for the first time (away from home); therefore, they need guidance on how to make informed choices (Satia *et al.*, 2004). This study therefore, examined the effect of nutrition education on the eating habits of undergraduates in order to ensure continuous prevention and low incident rate of stomach cancer in South-west Nigeria.

MATERIALS AND METHODS

Research protocol approval by ethics committee: The research protocol was approved by the Ethics Committee of the Oyo State Ministry of Health Ibadan, Nigeria and the reference number is AD 13/479/110. A written consent was sought from the participants in this study.

The nutrition education intervention programme in this study adopted a quasi-experimental design of the pretest-posttest method. The study was carried out between November 2009 and March 2010. The participants of this study were made up of undergraduates from two of the three first generation universities in south-west, Nigeria. One of the universities was randomly selected as control group and the other as the experimental group. Four hundred and thirty-six undergraduates (males and females) between 16 and 25 years of age were initially randomly selected for the study with a later attrition of 8.7%; therefore, a total of 398 finally participated in the study. The sampling procedure was as follows:

The faculties in each selected university were stratified into two namely: arts and science. Using simple random sampling with replacement, 50% of faculties in each stratum were selected. Then, 25% of the departments in the selected faculties were also randomly selected. Then, proportionate sampling procedure was used to select 5% of the students from each selected department; the participants in the selected departments were stratified into three groups using their levels of study (100-200; 300-400; 500-600); employing systematic random sampling technique; 5% the participants were selected from these strata. Males and females with age ranging from 16 and 25 years participated in the study. With this procedure two hundred and fifty-nine participants were selected from the experimental group while one hundred and seventy-seven participants were selected from the control group, this made a total of four hundred and thirty-six participants from both universities. However, three hundred and ninety-eight participants (91.3%) completed the study (with an attrition rate of 8.7%).

The nutrition education intervention: Before the nutrition education intervention, a Focus Group Discussion (FGD) was carried out to establish baseline information that indicated areas of attention that had to be addressed during the course of intervention. The focus group discussion

was conducted in four sessions in each University as follows: males: 100-300 level; 400-600 level; females: 100-300 level; 400-600 level. Each session comprised of 8-11 participants that were selected using purposive random sampling technique. The chief Investigator was the moderator of the FGDs, assisted by a secretary and a timekeeper/observer. Each discussion session took place in the students' halls of residence for duration of between 45-60 min. All the discussion sessions were recorded and transcribed subsequently.

Then was the development of the questionnaire used to collect the required information for the pretest and posttest in the study. The questionnaire was self-developed, self-administered and the content of the questionnaire was guided by the study objectives and review of literature on eating habits that may predispose to stomach cancer. The questionnaire sought information on the eating habits of the participants (QEHA). There were five items on the demographic attributes of the participants and nineteen items measuring the eating habits of the participants. The questions were based on a five-point Likert-scale type. The participants answered the questions in this section or provided comments by answering as follows "never" (not at all), "rarely" (at least once a month), "occasionally" (at least once a week), "often" (four times a week) and "very often" (at least once a day). Each item had a score of 1-5 marks (negative to positive) and the total mark obtainable was 95 marks. The participants were then rated as follows: 0-35 = poor, 36-55 = fair, 56-75 = good and 76-95 = very good. The psychometric properties of the questionnaire were determined by carrying out item analysis of each question and Cronbach Alpha was used to determine the reliability coefficient and this yielded 0.82.

Before the training on nutrition education of the experimental group, the questionnaire was administered and same was administered immediately after the intervention and repeated eight weeks after the intervention to ascertain the actual effect of the intervention. The intervention was teaching sessions for eight weeks and the lectures held one hour weekly. The control group also had the questionnaire administered before and after giving them a placebo treatment on HIV/AIDS stigmatization which also lasted eight weeks. Ten research assistants who were undergraduates were used for the study and on the spot collection of the questionnaires were ensured.

The nutrition education lectures on eating habits predisposing to cancer were developed and included: introduction on the objective of the study, a brief anatomy of the stomach, aetiology of cancer and specific causes of stomach cancer, an overview of cancer and diet, specific dietary factors of stomach cancer, preparing a meal using food pyramid, importance of nutrition facts and food labels, healthy feeding in relation to stomach cancer and unhealthy feeding in relation to stomach cancer. The intervention programme took place for one hour weekly and lasted for eight weeks. An initial pretest was administered to the participants, followed by the nutrition education; then posttest was given which was the same as the pretest. The control group had a placebo lecture on HIV/AIDS stigmatization.

Data analysis: All data collected were coded and entered into computer for analysis, using Statistical Package for Social Sciences (SPSS) programme package version 15. Descriptive statistics of frequency distribution and percentages were used to describe the demographic data, independent t-test and analysis of covariance (ANCOVA) were used for the variables studied; Multiple Classification Analysis (MCA) was utilized to determine the direction and strength of the intervention in the experimental and control groups. The decision criterion for accepting or rejecting all the variables of the study was set at 0.05 level of significance ($p < 0.05$).

RESULTS

In this study, 398 participants (8.7% attrition) participated in the training programme on nutrition education targeted in ameliorating the eating habits that may predispose undergraduates to stomach cancer.

Characteristics of the sample: Table 1 shows the demographic characteristics of the participants. The total number of participants in the experimental group was 225 which represented 56.5% of the participants and the number of participants in the control group was 173 which represented 43.5% of the participants. Gender distribution shows that the total number of male participants was 203 (106 in the control and 97 in the experimental); which is 51.0% of the participants; and the female participants were 195 (67 in the control and 128 in the experimental) which is 49.0% of the total participants. The age distribution in the two age groups used for the study shows that 127 (56 in the control group and 71 in the experimental group) of the participants were between 16 and 20 years of age (31.9%) while 271 (117 in the control group and 154 in the experimental group) of the participants were between 21 and 25 years of age (68.1%). The distribution of the participants by the level of study shows that 189 participants (68 in the control group and 121 in the experimental group) of the total participants were in the group of 100-200 level (47.5%), 178 participants (80 in the control group and 98 in the experimental group) of the total participants were in the group of 300-400 level (44.7%) while 31 participants (25 in the control group and 6 in the experimental group) were in the group of 500-600 level (7.8%).

Table 1: Demographic characteristics of the participants

Characteristics	Frequency	Percentage	Total (%)
Experimental	225	56.50	
Control	173	43.50	398 (100)
Gender			
Male			
Experimental	97	24.40	
Control	106	26.60	203 (51)
Female			
Experimental	128	32.20	
Control	67	16.80	195 (49)
Age range			
16-20 years			
Experimental	71	17.80	
Control	56	14.10	127 (31.9)
21-25 years			
Experimental	154	38.70	
Control	117	29.40	271 (68.1)
Level of study			
100-200 level			
Experimental	121	30.40	
Control	68	17.10	189 (47.5)
300-400 level			
Experimental	98	24.60	
Control	80	20.10	178 (44.7)
500-600 level			
Experimental	6	1.50	
Control	25	6.30	31 (7.8)

After the intervention, the description of the participants' scores assessed from the eating habits scale was as follows:

Experimental		Control	
Poor	= 15% of the participants	Poor	= 30% of the participants
Fair	= 25% of the participants	Fair	= 50% of the participants
Good	= 50% of the participants	Good	= 15% of the participants
Very good	= 10% of the participants	Very good	= 5% of the participants

The effect of nutrition education intervention on the eating habits of the participants was shown in Table 2 below after analysing with ANCOVA. There was a significant difference ($p < 0.05$) in the eating habits after the intervention. The multiple classification analysis in Table 3 further shows the contribution of the participants to the significant difference and the percentage contribution of the intervention. The experimental group contributed more to the significant results with a mean score of 61.48 than the control group with a mean score of 56.64, respectively (derived by adding the unadjusted variation to the grand mean). The coefficient of determination in $R^2 = 0.086$. This implies that 8.6% of the significant effect was accounted for by the intervention.

Table 4 shows the analysis of the level of study on the eating habits of the participants. The level of study in the participants significantly affected their eating habits ($F_{(3,394)} = 4.768$ $p = 0.009 < 0.05$).

In showing the direction of how the eating habits is affected by the level of study, Table 5 shows that, 100-200 level had the mean of 60.70; 300-400 level had the mean of 58.29 and 500-600 level had the mean of 57.52. The coefficient of determination which is presented in $R^2 = 0.024$. Therefore, 2.4% of the difference was accounted for by the intervention.

Table 2: Effect of intervention on the eating habits of the participants

Source of variation	Sum of squares	df	Mean square	F	Sig.
Covariates					
Eating habit scale (pretest)	18.722	1	18.722	0.301	0.58
Main effects					
Treatment groups	2279.187	1	2279.187	36.664	0.00*
Explained	2297.910	2	1148.955	18.842	0.00*
Residual	24555.060	395	62.165		
Total	26852.970	397	67.640		

* $p < 0.05$

Table 3: Analysis showing the direction of the eating habits of the participants grand mean = 59.37

Variable + category	N	Unadjusted variation	Eta (ϵ)	Adjusted for independent + covariates deviation	Beta (β)
Treatment groups					
Experiment group	225	2.10		2.1	
Control group	173	-2.74	0.29	-0.273	0.290
Multiple R^2					0.086
Multiple R					0.293

Multiple Classification Analysis (MCA)

Table 4: Analysis of level of study on the eating habits of the participants

Source of variation	Sum of squares	df	Mean square	F	p-value
Covariates (pretest eating habits)	18.722	1	18.722	0.282	0.596
Main effects (level of study)	634.142	2	317.071	4.768	0.009*
Explained	652.864	3	217.621	3.273	0.021*
Residual	26200.100	394	66.498		
Total	26852.970	397	67.640		

*p<0.05

Table 5: Analysis showing the direction of level of study on eating habits grand mean = 59.37

Variable + category	N	Unadjusted variation	Eta (ϵ)	Adjusted for independent + covariates deviation	Beta (β)
Level					
100-200	189	1.33		1.32	
300-400	178	-1.09		-1.07	
500-600	31	-1.86	0.16	-1.87	0.15
Multiple R ²					0.24
Multiple R					0.156

Table 6: Analysis of eating habits by gender and age

	Variables			Pretest		Posttest		
	Gender	N	Mean	t-value	p-value	Mean	t-value	p-value
Eating habits	Male	203	26.13	0.57	0.57	27.88	0.97	0.33
	Female	195	25.85			27.39		
Eating habits	Age (years)			0.2	0.86	27.74	0.27	0.79
	16-20	127	26.06			27.59		
	21-25	271	25.96					

Table 6 shows the result of examining the effect of age and gender on the eating habits of the participants. Age and gender did not significantly affect the eating habits of the participants (p>0.05).

DISCUSSION

Eating habits have been implicated in many chronic diseases including stomach cancer. In response to the mounting evidence that eating habits can be modulated with nutrition education (Guthrie and Frazo, 2002; Key *et al.*, 2002; Meydani, 2002; Greenwald, 2005; Kolodinsky *et al.*, 2007; Whitney and Rolfes, 2008). This study put up an 8 week intervention programme on the eating habits of undergraduates aimed at modulating the eating habits that may predispose undergraduates to stomach cancer in south-west, Nigeria.

In this study, the eating habits scaled examined after the nutrition education intervention shows that 50% of people in the experimental group had good eating habits while only 15% of people in the control group had good eating habits. In the ANCOVA analysis done, nutrition education intervention significantly affected the eating habits of the participants (p<0.05). The direction of significance as shown in the multiple classification analysis indicates that 8.6% of the result was accounted for by the nutrition education intervention given. The experimental group exhibited a higher mean score of 61.50 while the control group demonstrated a mean score of 56.64. This implies that the experimental group has demonstrated a more positive change in their

perception of eating habits by contributing a higher mean to the significant result than the control group. This result implies that the nutrition education given to the experimental group has been effective. The experimental group performed better than the control group and this may be attributable to the education they have received. In the FGDs had earlier with the participants, they were more interested in placing taste preference to the health benefits of the food they consumed. The nutrition education appears to have corrected this belief in the participants. The finding in this study confirms the assertion of other studies about the efficacy of nutrition education intervention as a potent tool in bringing about behaviour change (Sorensen *et al.*, 1999; Prentice and Paul, 2000; Oladepo, 2002; Ngwu, 2005; Ajala, 2006; Asinobi and Onimawo, 2007). The nutrition education has been able to improve the knowledge of the undergraduates such that they were able to make informed choices in their eating habits after the intervention.

The level of study of the participants significantly affected their eating habits. The students in the lower level of study performed better than students in higher levels of study as shown by higher mean scores of the students (Table 5). It can be implied from this result that it is a lot easier to impact changes or new knowledge in the junior ones than the senior ones. It is also noteworthy to mention that the finding in this study confirms the findings where it was reported that lower grades students had better eating habits than students in higher grades in similar studies (Westenhofer, 2005; Driskell *et al.*, 2005).

On the other hand, age and gender did not significantly affect the eating habits of the participants in this study and this finding appears to be at variance with other findings that reported that age and gender significantly affected the eating habits of college students (St-Onge *et al.*, 2003; Westenhofer, 2005). It may be assumed that the age limit of the participants in this study is probably not wide enough to bring about a significant difference.

CONCLUSION

In this study, eating habits have been positively modulated by nutrition education. The students in lower the lower level appeared to have been more favourably disposed to the nutrition education intervention given. It is concluded that nutrition education is a potent tool that can improve and modulate the eating habits of undergraduates; therefore can prevent the dietary risk of stomach cancer and other chronic diseases. It is thus advisable that more undergraduates especially from lower levels of study should undergo nutrition training on eating habits as change may be relatively easier to achieve at this stage of study.

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