Awareness and knowledge about diabetes mellitus and hypertension amongst adolescents in secondary schools, Oyo State, Nigeria – an interventional Study by the [+]SIDCAIN Research Group

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Original Article

Abstract

Background: Epidemic of obesity has propelled type 2 diabetes into an emerging health problem. Alongside hypertension, diabetes is now a foremost non communicable disease (NCD) in Nigeria.

Aims & Objectives: This paper reports the outcome of school health club awareness program amongst school children in Oyo State.

Methods: Health clubs were formed with the aim of making adolescents aware of NCDs, and their risk factors through health educational programs over a three year period (2010 – 2013). Data was obtained on awareness, knowledge, and traditional beliefs amongst club members and compared to responses from non-club members. SPSS version 17 was used for data analysis, and the level of statistical significance was set at ($p<0.05$).

Results: A total of 894 respondents were recruited with 456 (51%) from 20 health clubs while 438 (49%) were non-members. Mean age was 15.67 years (± 1.25 years) with279 (31.2%) males.Obesity, family history of diabetes, decreased physical activity, and stress were adjudged to be risk factors for diabetes by 77.3%, 75.4% 63.8% and 33.4% of the total respondents respectively. For hypertension, stress, family history of diabetes, obesity, decreased physical activity, and low consumption of vegetables were adjudged to be the risk factors by 83.3%, 64.1%, 63.1%, 57.2% and 50.3% of the respondents respectively. More health club members (95.0%) were aware of diabetes than non members (81.7%). Similar results obtained for hypertension (96.9% against 84.0% respectively).There was a wide gap between the knowledge of clubs members who received education and non members who did not, *$p<0.05$*

Conclusion: Knowledge plays an essential role in the early prevention, detection and future development of a disease. There is a need to expand educational activities on NCDs through viable policies and programmes in communities where risk factors are becoming highly prevalent even among young people.

Keywords: Awareness, knowledge, diabetes, hypertension, adolescents

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La sensibilisationet les connaissancessur le diabètesucré et l'hypertension chez les adolescents dans les écolessecondaires, dansl'Etatd'Oyo, Nigéria - uneétudeinterventionnelle par le [+]SIDCAIN groupe de recherche

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L'articled'origine

Résumé

Antécédents: épidémied'obésité a propulsé le diabète de type 2 dansun nouveau problème de santé. Parallèlement à l'hypertension, le diabèteestdésormais un lieu non maladies transmissibles (NCD) au Nigéria.

Buts etobjectifs: Le présent document expose les résultats de santé scolaire club programme de sensibilisation chez les enfantsd'âgescolairedansl'Étatd'Oyo.

Méthodes: clubs de santé ontétéformésdans le but de rendre les adolescents aux maladies non transmissiblesetleursfacteurs de risque à la santé programmes éducatifssurunepériode de troisans (2010 - 2013). On aobtenu des donnéessur la sensibilisation, les connaissances, et les croyancestraditionnellesparmi les membres du club et par rapport aux réponses de non-membres du club. SPSS version 17 a étéutilisé pour l'analyse des données, et le niveau de signification statistique a étéfixé à ($p<0.05$).

Résultats: Un total de 894 répondantsontétérecrutés avec 456 (51 %) de 20 clubs de santé tandisque 438 (49 %) étaient des non-membres. Moyenned'âgeétait 15,67ans (± 1,25 ans) avec 279 (31,2 %) étaient des garçons. L'obésité, les antécédentsfamiliaux de diabète, diminution de l'activité physique, et le stress ontjugéêtrefacteurs de risque du diabète par 77,3 %, 75,4 %, 63,8 % et 33,4 % du total des répondantsrespectivement. Pour l'hypertensionartérielle, le stress, les antécédentsfamiliaux de diabète, d'obésité, diminution de l'activité physique, et unefaibleconsommation de fruits et légumesontétéjugésêtre des facteurs de risque par 83,3 %, 64,1 %, 63,1 %, 57,2 % et 50,3 % des répondantsrespectivement. Plus la santé les membres du club (95,0 %) étaient au courant du diabèteque les non membres (81,7 %). Résultatssimilairesobtenus pour l'hypertensionartérielle (96,9 % contre 84,0 % respectivement) .Il y a un grand fossé entre les connaissances des clubs membres qui ontreçul'éducation et les non membres qui n'ont pas, $p<0.05$

Conclusion: La connaissance joueunrôleessentieldans la prévention, la détection et le développementfuturd'unemaladie. Il y a un besoin de développeractivitéséducatives de maladies non transmissibles par politiques et des programmes viables dans les communautésoùfacteurs de risquesont de plus en plus répanduemême chez les jeunes.

Mots-clés: la sensibilisation, les connaissances, le diabète, l'hypertension, les adolescents

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INTRODUCTION

The rising epidemic of obesity has propelled type 2 diabetes into an emerging health problem that is now affecting the younger populations in both developed and developing countries. Diabetes Mellitus (DM) is now one of the most common non-communicable diseases worldwide with an estimate of 366million in 2011(projected to increase to 552million by 2030), and is undoubtedly one of the most challenging health problems in the 21st century (1).Alongside hypertension, diabetes is now a foremost non communicable disease (NCD) in Nigeria.

In Nigeria, the prevalence of overweight individuals ranged from 20-3% - 35.1%, while the prevalence of obesity ranged from 8.1% - 22.2% (2). Similarly, the prevalence of abdominal obesity is high, and needs to be monitored because it is associated with increased cardiovascular risk. Many Nigerians adopt unhealthy lifestyle habits including reduced physical activity, excessive intake of calories and sedentary lifestyles, which directly contribute to the problem of obesity. Thus, there is a need to pay closer attention to combating obesity and related disorders including diabetes mellitus.

Diabetes exerts a significant burden in sub-Saharan Africa, and this is expected to increase. In Nigeria, the prevalence of diabetes is 2.2% (1999), although the current International Diabetes Federation gave an estimate of 4.04% for the year 2013. A three year community based risk assessment of 58,567 participants in Ogun State gave a figure of 5.05% (3).Nigeria has the largest number of people living with diabetes in Africa, and it is one of the countries with the highest mortality rates due to diabetes.

The first step towards prevention of a disease condition is creating awareness in the community towards the disease. Thus, the best weapon towards curbing the diabetes pandemic is educating the public on the adoption of healthy lifestyles. Emphasis is now being placed on implementing primary prevention, early detection, and educational prevention programmes. Therefore, concerted efforts should be made to prevent Type 2 diabetes mellitus and other NCDs such as hypertension through intensification of education strategies aim at combating obesity and the related problems including diabetes even from childhood.

In 2010-2013, the World Diabetes Foundation sponsored a project (WDF 10-515), with part-aim of promoting primary prevention of diabetes, through the establishment of health clubs in secondary schools in Oyo State, Nigeria. The establishment of the health clubs was aimed at making the youth aware of non-communicable diseases (NCDs) and their risk factors, and thereby encourages them to lead a healthy life style. The project was executed by the Strategies for Improving Diabetes Care (SIDCAIN) medical group.

This paper reports the outcome of the school health club awareness program amongst secondary school children at the end of the project period. The outcome hopefully, will serve as a basis for developing health education and control programmes for prevention and treatment of NCDs such as diabetes and hypertension as well as controlling their risk factors.

MATERIALS AND METHODS

Approach: The WDF 10-515 project is implemented by the SIDCAIN team (www.sidcain.org). The project focussed on two aspects; 1) improving diabetes and hypertension care by training health care professionals and establishing NCD clinics and 2) enhancing awareness through health promotion in school children by forming health clubs in secondary schools with the aim of changing behaviour and address future prevention.

Formation of school health clubs

School health clubs were formed in 91 secondary schools. The formed health clubs were aimed at making the youth aware of NCDs and their risk factors, and thereby encourage them to lead a healthy life style. Membership was free and students as well as teachers were invited to engage in health clubs activities. Several approaches

including education on healthy life style, physical activity, seminars, health quizzes, competitions, debates etc were used to actively engage the children in the clubs. At the end of the three year project period, a questionnaire was used to obtain data regarding awareness, knowledge, traditional beliefs, treatment practises and other issues from selected schools.

Study Design- A comparative interventional study of students educated on NCDs (DM& Hypertension) and uneducated "controls" with an endline analysis design.

Study Population- The study population was drawn from senior secondary school students across 20 schools out of the 91schools, selected by simple random sampling. Even though some teachers were members of the SIDCAIN health club, the study population consisted of only students.

Sample Size/ Sampling Technique issues- Using the formula for comparing two independent proportions, a minimum sample size (MSS) of 133 was calculated at 80% power for each group (based on the knowledge of respondents- diabetic population versus general population) on whether DM is on the increase from a previous study[4]. The MSS was doubled to 266 per group to ensure adequate number for cross tabulations, with each school supplying an average of 13 clubs and none club members each. However, only 256 of the educated group had completed questionnaire while 238 of the controls had completed questionnaire and these were then analysed and reported. The study populations were then finally chosen by a combination of stratified sampling and simple random sampling from the senior secondary schools (SSS) 1, 2 and 3.

Ethical consideration: The School Club Coordinators (assigned school teachers) viewed the questionnaires and gave their approval to use their students for the study. Ethical approval was sought and obtained from the Osun State University Human Research and Ethical Review Committee (HREC). Verbal consent was obtained from each study participant and permission was obtained from the coordinating teaching staff that oversees the clubs (since most of the respondents were below the age of consent). Having gotten written approval from the Osun State University HREC and verbal consent from the participants, it was no longer considered necessary to obtain written consent from the study subjects who were minors.

Composite score for knowledge of diabetes and Hypertension

The answers to the questions were analyzed and a scoring system was used as follows:

(A) For closed questions- (i) Is the prevalence of Diabetes/Hypertension increasing at present? (ii) Does Diabetes/Hypertension cause complication in other organs? (iii). Can Diabetes be prevented? Correct answers were graded as 1 and incorrect answers (inclusive of "don't know) as 0.

(B) For the question on causative/ risk factors for diabetes, highest score of 4 was awarded for subjects who ticked any of obesity, decreased physical activity or family history of diabetes, 3 was given for consuming more sugar and other high calorie or junk foods, 2 for stress and 1 for any other responses close to the above answers, while all other answers were scored 0.

Similarly for hypertension, highest score of 4 was awarded for subjects who ticked any of obesity, decreased physical activity, consuming more salt or family history of hypertension, 3 was given for stress, 2 for low consumption of vegetables and 1 for any other response close to the above answers, while all other answers were scored 0.

(C). Thus, for the scoring of the knowledge of both DM and HTN, the least possible score was 0 if all answers were incorrect and maximum score was 7, if all answers were correct.

(D) A composite score in percentage was then derived by dividing each individual's score by the maximum score possible e.ge if an individual had obtained 2 correct answers on knowledge of Diabetes for the closed

questionand ticked stress (score= 2) for the question on risk factors, then the composite score would be 4/7*100= 57.14% (4).

Statistics

The data generated were analyzed using descriptive statistics such as means, standard deviations, percentages and frequencies. Data analysis was done using the social sciences statistical package (SPSS) version 17 and the level of statistical significance for analysis was set at ($p<0.05$).

RESULTS

The study was done among a total of 894 respondents with 456 (51%) being members of the SIDCAIN Health club while 438 (49%) were not members of the SIDCAIN Health club.

Of the 894 respondents studied, 654 (73.15%) of them were aged between 14 and 16 years with the mean age being 15.67 years (± 1.25 years). All respondents were in the senior secondary classes of education**.** They comprised of 279 (31.21%) males and 615 (68.79%) females, mostly from public schools (81.7%) with about 2/3 (67.79%) of them being in the final year of their secondary education.

Awareness and general knowledge on diabetes and hypertension

A total of 88.5 percent of the total respondents were aware of diabetes while 90.6% was aware of hypertension. Obesity, family history of diabetes, and decreased physical activity were adjudged to be risk factors for diabetes by 77.3%, 75.4% and 63.8% of the respondents respectively. For the disease hypertension; stress, family history of diabetes, obesity, decreased physical activity, and low consumption of vegetables were adjudged to be risk factors for hypertension by 83.3%, 64.1%, 63.1%, 57.2% and 50.3% of the respondents respectively. Nearly similar proportions stated that diabetes and hypertension are increasing in prevalence (84.7% and 83.9%), can cause complications in other organs of the body (76.0% and 75.6%) and can be prevented (85.3% and 84.7%) respectively as shown in Table 2.

Comparison of Club members and non-members' responses to awareness and general knowledge on Diabetes Mellitus and Hypertension

The proportion of club members who were aware of diabetes (95.0%) was higher than those of none members (81.7%) while 90.8% of members also stated that the prevalence of diabetes is increasing compared to 78.3% of none members Similarly, 83.1% of members stated that obesity is a risk factor for DM while 71.2% of none members acceded to this, similar figures for members and none members for other risk factors were 81.1% and 68.4% for family history, 68.6% and 58.7% for decreased physical activity, and 35.1% and 31.7% for stress respectively. Only 0.4% of the total respondents could not correctly identify any risk factor for diabetes and they were all none members, 99.6% were aware of at least one risk factor for DM (not shown in Table). More than four fifths (85.5%) of club members stated that diabetes can cause complication in other organs of the body as opposed to two thirds (66.0%) of none club members while 91.0% of club members stated that Diabetes can be prevented as opposed to 79.5% of none club members. The proportion of SIDCAIN members who was aware of hypertension (96.9%) was higher than those of none members (84.0%) while 88.6% of members also stated that the prevalence of hypertension is increasing compared to 79.0% of none members. Similarly, 70.6% of the members felt consuming more salt contributes to development of hypertension while 61.4% of none members acceded to this. Also 69.7% of members stated that family history is a risk factor for hypertension while only 58.2% of none members acceded to this, similar figures for members and none members for other risk factors were 66.4% and 59.6% for obesity, 59.6% and 54.6% for decreased physical activity, 53.5% and 47.0% for low consumption of vegetables and 85.1% and 81.5% for stress respectively. The last three factors did not show any statistically significant difference between

the two groups. About 0.4% of the total respondents could not correctly identify any risk factor for hypertension and they were all none members (not shown). About 85% of club members stated that hypertension can cause complications in other organs of the body as opposed to 65.8% of none club members while 89.7% of members stated that hypertension can be prevented as opposed to 79.5% as shown in Table 3.

Comparison of means of aggregate and component scores on knowledge of Diabetes Mellitus and Hypertension (HTN) for club members and non-members using independent T-test.

The mean aggregate and component scores for knowledge of both diabetes mellitus and hypertension were higher in club members compared to none members (6.5482 and 5.9772 for aggregate score on knowledge of Diabetes, 6.3662 and 5.8014 for aggregate score on knowledge of hypertension, 93.5463% and 85.3880% for component score on knowledge of DM, 90.9460% &82.8766% for component score on knowledge of HTN respectively). All showed a statistically significantly difference between all the means for club members and none members. The means of aggregate and component scores on knowledge of Diabetes Mellitus and hypertension (HTN) for total respondents (n=894) is shown just below Table 4. The overall component score on knowledge of diabetes was 89.5% and that of hypertension was approximately 87%.

Comparison of members and non-members' knowledge of specific diabetic and hypertension complications.

About 91% of club members knew that kidney disease is a known complication of diabetes compared to 72.7% of none members. Similarly, 91.5% of club members recognised foot disease as a complication of diabetes compared to 69.9% of none members. The pattern of club members and none club members knowledge of complications was repeated for eye disease (87.2% against 60.9%,p<0.001), nerve disease (87.2% against 58.8%,p<0.001), hypertension (72.3% against 60.2%, p= 0.001), heart disease (71.8% against 58.8%,p<0.001) and stroke/ CVA (73.8% against 69.9%, however p= 0.256) respectively. The reverse was the case with two "complication variables", 'lungs/respiratory disease (51.5% against 59.9%,p=0.031), and 'liver disease'(51.0% against 59.9%,p=0.022), in which a higher proportion of none members identified them as complications more than club members and these were also statistically significant as shown in Table 5.

About 95% of club members knew that stroke/CVA is a known complication of hypertension compared to 67.4% of none members. Similarly, 93.6% of club members knew that kidney disease is a known complication of hypertension compared to 65.6% of none members. The pattern of club members and none club members knowledge of complications was repeated for eye disease (92.3% against 55.5%,p<0.001), heart failure/ hypertensive heart disease (93.6% against 50.0%,p<0.001), and liver disease (64.7% against 59.0%, however p= 0.133) respectively. The reverse was the case with two "complication variables", 'lungs/respiratory disease (51.2% against 61.5%,p=0.008), and 'foot disease'(47.4% against 50.3%,p=0.452), in which a higher proportion of none members identified them as complications more than club members as shown in Table 5.

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Discussion

About nine out of ten of the total respondents were aware of both diabetes and hypertension, thus most of the respondents were aware of the two leading non communicable diseases in Nigeria. This is similar to a previous study on diabetes mellitus done among students in Oman where 90% awareness was recorded (5). The proportion of those who were aware was higher than a previous community based study where the proportion of those who were aware of diabetes was three quarters of the population (4). Another study on diabetes knowledge recorded a far lower level of awareness among University students (6). A

study on hypertension among adolescents also showed a low level of awareness (<30.0%) (7).When disaggregated by club membership status, a significantly greater proportion of members of the SIDCAIN Health club were aware of diabetes and hypertension compared with none members. This is not unexpected as most of the members of the former have been exposed to education on NCDs and education has been shown to have an effect on knowledge and awareness of NCDs (8, 9).

More than four fifths of the total respondents stated that the prevalence of both hypertension and diabetes are on the increase. This was higher than what was found in previous studies (4,5).This might be due to increase in the awareness and knowledge of NCDs, as attention is gradually shifting from communicable to none communicable diseases even in developing countries like Nigeria. When disaggregated by club membership status, a significantly greater proportion of members of the SIDCAIN Health club were aware that prevalence of diabetes and hypertension were on the increase compared with none members. Globally, hypertension and diabetes have been shown to be on the increase even in developing countries (10, 11).

Concerning risk factors for diabetes, almost all the respondents could identify at least one risk factor for diabetes and this is similar to a previous study (5), unlike some other studies where a sizeable proportion of the respondents could not even identify one risk factor for diabetes (8,12). A little over three quarters of the total respondents believed that obesity and family history of diabetes contributes to development of DM, while a little over three fifths attributed DM to decreased physical activity and a third to mental stress. Although the proportion of those who identified family history and obesity has important risk factors for DM are higher than many previous studies (13-16), it is however a cause for concern that a greater proportion of the respondents (almost nine out of ten) believed that consuming more refined sugar contributes to development of DM, being placed above factors such as family history, obesity and decreased physical activity. When disaggregated by club membership status, a significantly greater proportion of club members were aware of risk factors for diabetes compared to none members especially for proven risk factors such as family history, obesity and decreased physical activity and this of course is attributable to the education they received.

Concerning risk factors for hypertension, more than four fifths of the total respondents attributed hypertension to stress and this was followed by two thirds of the respondents who attributed it to consuming more salt and just over three fifths stated that family history and obesity contributes to development of hypertension. Not up to three fifths attributed it to decreased physical activity and only half agreed that low consumption of vegetables may contribute to hypertension. Compared to previous studies (17-18), the knowledge of risk factors for hypertension was high and this can be attributed to the fact that a little over half of the respondents have been exposed to education on hypertension. When disaggregated by club membership status, a significantly greater proportion of club members were aware of risk factors for hypertension compared to none members especially for risk factors such as family history, obesity and consumption of more salt.

With regards to complications of diabetes, three quarters of the total respondents were aware that diabetes could cause complication in other organs of the body with kidney disease and foot problems ranking highest among known complications followed by eye disease, nerve disease, stroke/CVA, hypertension and heart disease. Knowledge on diabetes complications among the total respondents was greater than in previous studies (5,13). When disaggregated by club membership status, a significantly greater proportion of club members were aware of diabetes complications compared to none members. When asked about specific complications of diabetes, a significantly greater proportion of members of the SIDCAIN Health club were aware of specific

diabetic complications such as kidney disease and foot problems, eye disease, nerve disease, hypertension and heart disease compared to none members. Even though two thirds of the none members were aware that diabetes could cause complication, on the average, less than two thirds were actually aware of each specific complication showing that many of them are not fully aware of the spectrum of diabetic complications.

With regards to complications of hypertension, three quarters of the total respondents were aware that hypertension could cause complication in other organs of the body with stroke/CVA, kidney disease, eye disease and hypertensive heart disease being the most known complications. Compared to previous studies, the knowledge of complications of hypertension was also higher (13, 17). When disaggregated by club membership status, a significantly greater proportion of members of the SIDCAIN Health club were aware of hypertension complications compared to none members. When asked about specific complications of hypertension, a significantly greater proportion of members of the club members were aware of specific hypertensive complications such as Stroke/ CVA, kidney disease, eye disease and hypertensive heart disease compared to none members. Even though two thirds of the none members were aware that hypertension could cause complication, on the average, less than two thirds were actually aware of each specific complication showing that many of them are not fully aware of the spectrum of the complications of hypertension.

More than four fifths of the total respondents knew that diabetes can be prevented, and this is higher than in some previous studies (5,13).When disaggregated by club membership status, a significantly greater proportion of members of the SIDCAIN Health club were aware that diabetes can be prevented compared to none members. Similar results were gotten for hypertension.

Overall, for total respondents, the mean component score on diabetes- knowledge of its increasing prevalence, risk factors, complication and prevention based on a model from a previous study (4), was almost ninety per cent and it was virtually the same with hypertension, showing that the knowledge of diabetic and hypertension prevalence, risk factors, complication and prevention was higher than that of some previous studies.

However, this study is not without its limitations. This study only explored the knowledge of diabetes and did not examine the characteristics of the respondents that might reflect their awareness of diabetes and hypertension prevention, such as family history of DM or hypertension, thus some "confounding effects" on the level of knowledge cannot be ruled out. Similarly, the practice of their knowledge was not explored and the effects of their knowledge on their daily living were not determined. Another limitation was that club members and none members were chosen from the same schools and thus interference or cross fertilization of information across members and none members cannot be ruled out. The study was designed to examine knowledge of DM and hypertension in a cross sectional 'once for all' manner, but a better design would have been to do a baseline and endline collection of data for both groups so that the significant differences between the club members and none club members can truly be attributed to the education that was given to the club members. Nevertheless, the differences between the two groups were so highly significant that the disparity cannot just be attributed to chance.

In conclusion, awareness about diabetes and hypertension are high, this is likely boosted by the fact that about half of the study population have received some form of education on them. Despite the high awareness, knowledge of risk factors, prevention and complication of diabetes and hypertension though higher than in many previous studies seems to be poor especially among none club members who did not receive any education/ training on these leading NCDs. There was a wide gap between the knowledge of club members who received education and none members

who did not. Knowledge about a disease plays an essential role in its future development, early prevention and detection. Thus, there is a need to expand educational activities on NCDs via viable policies and programmes especially in developing countries where risk factors for NCDs are becoming highly prevalent even among young people.

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Table 1: Socio-demographic characteristics of respondents (N = 894)

Characteristic	Frequency %)	
Age group		
≤ 13years (early adolescence	197	(22.04)
14-16 years (mid-adolescence	654	(73.15)
≥ 17 years (late adolescence)	43	(4.81)
Gender		
Male	279	(31.21)
Female	615	(68.79)
Religion		
Christianity	750	(83.9)
Islam	144	(16.1)
Tribe		
Yoruba	739	(82.66)
Igbo	97	(10.85)
Hausa/Other	58	(6.49)
Class		
SS1	38	(4.25)
SS2	250	(27.96)
SS3	606	(67.79)
Family setting		
Monogamous	826	(92.39)
Polygamous	68	(7.61)

SS = senior secondary

Table 2: Awareness and general knowledge on Diabetes and Hypertension among total respondents (n=894)

Variable	Frequency		
	Yes(%)	No(%)	Total(%)
Diabetes related			
Awareness of Diabetes Mellitus (DM)	791(88.5)	103(11.5)	894(100.0)
DM prevalence is increasing at present	757(84.7)	137(15.3)	894(100.0)
Obesity contributes to DM	691(77.3)	203(22.7)	894(100.0)
Decreased Physical Activity contributes to DM	570(63.8)	324(36.2)	894(100.0)
Family history of diabetes contributes to DM	674(75.4)	220(24.6)	894(100.0)
Mental Stress contributes to development of DM	299(33.4)	595(66.6)	894(100.0)
Consuming more sugar contributes to development of D	766(85.7)	128(14.3)	894(100.0)
Diabetes mellitus can cause complication in other orgar	679(76.0)	215(24.0)	894(100.0)
Diabetes can be prevented	763(85.3)	131(14.6)	894(100.0)
Hypertension related			
Awareness of Hypertension	810(90.6)	84(9.4)	894(100.0)
Hypertension prevalence is increasing at present	750(83.9)	144(16.1)	894(100.0)
Obesity contributes to DM	564(63.1)	330(36.9)	894(100.0)
Decreased Physical Activity contributes to Hypertensior	511(57.2)	383(42.8)	894(100.0)
Family history contributes to Hypertension	573(64.1)	321(35.9)	894(100.0)
Stress contributes to development of Hypertension	745(83.3)	149(16.7)	894(100.0)
Consuming more salt contributes to Hypertension	591(66.1)	303(33.9)	894(100.0)
Low consumption of vegetables	450(50.3)	444(49.7)	894(100.0)
Hypertension can cause complication in other organs	676(75.6)	218(24.4)	894(100.0)
Hypertension can be prevented	757(84.7)	137(15.3)	894(100.0)

N.B: For all the questions apart from those on awareness, the “NO” answer included those who response was “Don’t know”.

Table 3: Comparison of Club members and non-members' responses to awareness and general knowledge on Diabetes Mellitus and Hypertension

A. "Variable" Statement on Diabet Mellitus (DM)	Membership Status Club Members Yes (%)	Non Club Members. Yes (%)	Total Respondents Yes (%)	Statistics
Awareness of Diabetes Mellitus (DM)	433(95.0)	358(81.7)	791(88.5)	χ^2 =38.31 p<0.001*
DM prevalence is increasing at present	414(90.8)	343(78.3)	757(84.7)	χ^2 =26.93 p<0.001*
Obesity contributes to DM	379(83.1)	312(71.2)	691(77.3)	χ^2 =17.97 p<0.001*
Decreased Physical Activity contributes to DM	313(68.6)	257(58.7)	570(63.8)	χ^2 =9.60 p=0.002*
Family history of diabetes contributes to DM	370(81.1)	304(69.4)	674(75.4)	χ^2 =16.58 p<0.001*
Mental Stress contributes to development of DI	160(35.1)	139(31.7)	299(33.4)	χ^2 =1.13 p=0.288
Consuming more sugar contributes development of DM	414(90.8)	352(80.4)	766(85.7)	χ^2 =19.79 p<0.001*
DM can cause complication in other organs	390(85.5)	289(66.0)	679(76.0)	χ^2 =50.76 p<0.001*
Diabetes can be prevented	415(91.0%)	348(79.5)	763(85.3)	χ^2 =26.76 p<0.001*
B. "Variable" Statement on Hypertensio				
Awareness of Hypertension	442(96.9)	368(84.0)	810(90.6)	χ^2 =43.75 p<0.001*
Hypertension prevalence is increasing at prese	404(88.6)	346(79.0)	750(83.9)	χ^2 =15.33 p<0.001*
Obesity contributes to Hypertension	303(66.4)	261(59.6)	564(63.1)	χ^2 =4.51 p=0.034*
Decreased Physical Activity contributes to Hypertension	272(59.6)	239(54.6)	511(57.2)	χ^2 =2.36 p=0.125
Family history contributes to Hypertension	318(69.7)	255(58.2)	573(64.1)	χ^2 =12.88 p<0.001*
Stress contributes to development of Hypertens	388(85.1)	357(81.5)	745(83.3)	χ^2 =2.06 p=0.151
Consuming more salt contributes to Hypertensi	322(70.6)	269(61.4)	591(66.1)	χ^2 =8.44 p=0.004*
Low consumption of vegetables	244(53.5)	206(47.0)	450(50.3)	χ^2 =3.48 p=0.053
Hypertension can cause complication in other organs	388(85.1)	288(65.8)	676(75.6)	χ^2 =48.27 p<0.001*
Hypertension can be prevented	409(89.7)	348(79.5)	757(84.7)	χ^2 =18.19 p<0.001*

N=456 for club members and 438 for none club members. *Statistically significant at p≤0.05,df= 1 for each row

Table 4: Comparison of means of aggregate and component scores on knowledge of Diabetes Mellitus and Hypertension (HTN) for club members and none members using independent T-test.

Parameter/ Variable	T-Statistic	Df	P-Value	Mean For Club Members n=456	Mean For Non Club Members N=438	Mean Difference	95% Confidence Interval	
							Lower	Upper
DM aggregate score fo knowledge	7.813	892	< 0.001*	6.5482	5.9772	0.57108	0.42762	0.71453
HTN aggregate score for knowledge	7.055	892	< 0.001*	6.3662	5.8014	0.56486	0.40772	0.72200
Component score for knowledge on DM in percentage	7.813	892	<0.001*	93.5463	85.3880	8.15823	6.10885	10.20761
Component score for knowledge on HTN in percentage	7.055	892	< 0.001*	90.9460	82.8766	8.06939	5.82450	10.31429

*- Statistically significant at p<0.05. N.B: For total respondents (n=894), Mean for DM aggregate score for knowledge=6.2685,Meanfor HTN aggregate score for knowledge= 6.0895, Mean for Component score for DM in percentage= 89.5493, Mean for Component score for HTN in percentage= 86.9926

Table 5: Comparison of members and none members' knowledge of specific diabetic and hypertension complications

A. Complications of DM	Club Members N=390	Non Club Members N=289	Statistics
Foot disease	355(91.0)	202(69.9)	χ^2 =50.280 p<0.001*
Kidney disease	357(91.5)	210(72.7)	χ^2 =42.930 p<0.001*
Eye disease	340(87.2)	176(60.9)	χ^2 =62.841 p<0.001*
Nerve disease	340(87.2)	170(58.8)	χ^2 =11.019 p= 0.001*
Hypertension	282 (72.3)	174(60.2)	χ^2 =71.394 p<0.001*
Heart Disease	280(71.8)	170(58.8)	χ^2 =12.496 p<0.001*
Stroke/CVA	288(73.8)	202(69.9)	χ^2 =1.289 p=0.256
Lungs/ Respiratory disease	201(51.5)	173(59.9)	χ^2 =4.648 p=0.031*
Liver disease	199(51.0)	173(59.9)	χ^2 =5.232 p=0.022*

B. Complications of Hypertension	Club Members N=388	Non Club Members N=288	Statistics
CVA/ Stroke	369(95.1)	194(67.4)	χ^2 =91.382 p<0.001*
Kidney disease	363(93.6)	189(65.6)	χ^2 =86.100 p<0.001*
Eye disease	358(92.3)	160(55.5)	χ^2 =124.397 p<0.001*
Heart Failure/ Hypertensive heart disease	363(93.6)	144(50.0)	χ^2 =167.258 p<0.001*
Lungs/Respiratory disease	199(51.2)	177(61.5)	χ^2 =6.926 p=0.008*
Liver disease	251(64.7)	170(59.0)	χ^2 =2.256 p=-0.133
Foot problems	184(47.4)	145(50.3)	χ^2 =0.566 p=-0.452

* Statistically significant at p<0.05. df=1 for each row