

Type 2 Diabetes in the Elderly in Obuasi: Management Strategies and Effect on Nutrition and Health

Boakye Kwame Yiadom^{1*}; Anthony Kwaku Edusei²; Boakye Boatema Akua³; Emmanuel Adombor⁴

¹Department of Nutrition, College of Nursing and Allied Health Sciences, Nalerigu, North-East Region, Ghana

²Department of Health Promotion and Disability Studies, School of Public Health, KNUST, Kumasi, Ghana

³Denkyira Dominase Adventist Hospital, Department of Nursing, Upper Denkyira West, Central Region, Ghana

⁴Research and Innovations Unit, College of Nursing and Allied Health Sciences, Nalerigu, North-East Region, Ghana

Corresponding Author:- Boakye Kwame Yiadom^{1*}

Abstract:- Type 2 Diabetes Mellitus (DM) is a chronic non-communicable disease which requires effective management strategies, especially in the elderly, in order to maintain good nutrition and ensure optimal health. The main objective of the study was to assess the management strategies of Type 2 DM in the elderly as well as the effects of Type 2 Diabetes Mellitus on the nutrition and health of persons aged 60 years and above in Obuasi Municipality. Using a cross sectional study design 100 respondents comprising Type 2 diabetic patients were selected purposively to respond to the research instruments. Questionnaire and a mini nutritional assessment tool were the main instruments for the study. The findings of the study indicated that majority of the respondents were within the age range of 60-65 years and were females. Also, most of the respondents had pharmacotherapy and diet therapy as their treatment options for the management of the type 2 diabetes. Again, majority of the patients were on anti-diabetic medications while few were on insulin. Furthermore, half of the respondents had physical activities as part of their management. About half (45%) of the respondents had hypertension as additional chronic disease. Most (52.7%) of the respondents aged 60-65 years had normal nutritional status. Also, majority (45.8%) of the female respondents were malnourished. There is the need for health authorities to develop local-specific diabetes management guidelines for the patients. Dietitians/Doctors should intensify awareness and education diabetes to reduce the prevalence of diabetes and improve outcomes for the persons with the disease.

Keywords:- Type 2 Diabetes, Elderly, Nutritional Status, Diet Therapy, Pharmacotherapy, Anti-Diabetic Medications, Comorbidities and Physical Activities.

I. INTRODUCTION

Diabetes mellitus is a metabolic condition characterized by elevated levels of blood glucose caused by abnormal insulin production, insulin activity or both (Hinkle & Cheever, 2010). Type 1, type 2 and gestational diabetes

are three primary types of diabetes. (WHO, 2008). It is projected that the majority of people with diabetes have Type 2 Diabetes Mellitus (WHO, 2016). Persons with Type 2 diabetes are estimated to be around 90% to 95% of all patients suffering from diabetes (Hinkle & Cheever 2010; CDC, 2017). In the world, about 422 million adults were having Diabetes Mellitus in 2014. The prevalence of diabetes in the adult population has risen to 8.5% from 4.7% in 1980 (WHO, 2016). According to International Diabetes Federation, the global figure has risen to 463 million, out of which over 19 million adults are projected to be living with diabetes in Africa. Diabetes is a disease on ascendency as the IDF has projected that by 2045, 47 million people in the 32 member countries will be living with diabetes in Africa (IDF, 2019).

In Ghana, studies on DM have focused on prevalence, causes and determinants of diabetes in the adult population. However, there have been minimal studies on the management of Type 2 DM and its effects on nutrition and health of the elderly. It was reported on Joy News that about 154,790 people in Ghana were projected to be living with diabetes in 2016 (“Ghana ranks 6th on diabetes table in Africa, 2017”). In 2017 alone 518,400 diabetes cases were recorded in Ghana (IDF, 2018). Type 2- diabetes affects not less than 6% of adults in urban Ghana. It is associated with ageing and obesity (Amoah, 2003). The contemporary Ghanaian is more sedentary and consumes a lot of obesogenic foods that predispose them to Type 2- diabetes as they grow older. Also, the increasing prevalence of Type 2- diabetes in the adult population is an issue of worry to health managers in Ghana. Kumasi, the Ashanti regional capital, has diabetes prevalence of 9%. Again, 6% of the people in Kumasi have Type2- diabetes (Danquah *et al.*, 2012; Agbogli *et al.*, 2017). This is not surprising as statistics indicates that 2/3 of people with diabetes live in urban areas (IDF, 2018).

Ageing is associated with changes in glucose metabolism and hepatic glucose production. These changes in addition to the individual’s genetic predisposition increase the frequency of the disease with aging (Meneilly,

2006). The increasing incidence of Type 2- diabetes and the degenerative changes associated with ageing worsen the nutritional status of older people compromising their overall health. According to the United Nations, persons aged 60 or over are classified as older persons (UN, 2015). Older people have a greater risk of developing Type 2 Diabetes Mellitus (ADAPPC, 2022). It is essential to find out the management strategies use in caring for the elderly with Type 2 diabetes in clinical care settings and to assess its effectiveness on their nutrition and health.

II. METHODOLOGY

The data collection was done at the outpatient diabetes clinics of Obuasi Adventist Hospital and Government hospital respectively. The two hospitals are located in the Obuasi Township which is the capital of the Obuasi municipality in the Ashanti region. The two hospitals generally provide services such as general medicine, gynecological, antenatal, child welfare and others to the people of Obuasi and its surrounding towns and villages. A cross sectional study type was used for the study. In this study, persons aged 60 years and above with Type 2- diabetes in the Obuasi municipality who attended diabetes clinics at the Obuasi government and Adventist hospitals respectively were the target population. However, persons with Type 2-diabetes aged below 60 years were excluded from the study population

In estimating the sample size for the study, Yamane's (1967) statistical formula was used. The formula is; $n = \frac{N}{1 + N(e)^2}$. The population size (N) was 138 with the level of precision (e) as 0.05 and a non-response rate of 5%, the sample size was determined. The sample size used for the survey was 100. Proportionate stratified and simple random

sampling methods were used in choosing participants for the study. Older Type 2 diabetic patients from the 2 hospitals who were within the inclusion criteria formed the strata from which the sample was obtained proportionally. Both closed ended and open ended questions were used. The instrument was piloted to make sure the questionnaire was free of unclear items, which can make it challenging to obtain accurate and consistent replies from respondents. The data were entered using EPI INFO statistical software. Responses to variables were coded and interpreted on a separate excel spreadsheet. The data were then exported to SPSS Statistical Package for further analysis. Descriptive statistics was made for both multivariate and bivariate logistic regression models to identify associated factors. Odds ratio and their 95% confidence interval were computed and variables with less than p-values 0.05 were considered for significant association with outcome variables. Chi-square analysis was used to establish association between Type 2 Diabetes management, Nutritional, Health Status and the relationship between the socio-demographic characteristics of the respondents and their nutritional status.

III. RESULTS AND DISCUSSION

Table 1 indicates the participants' socio-demographic features. More than half of the respondents 55(55.0%) were within the age range of 60 – 65 years whilst 5(5.0%) were 75 years and above. Again, most of the respondents 72(72.0%) were females as against 28(28.0%) males. An overwhelming majority 83 (83.0%) of the respondents were Christians while only 2(2.0%) were Traditionalist. More than half of the respondents 66(66.0%) were diagnosed as diabetic patients at the age of 50-60 years while 16(16.0%) had diabetes above 60 years as detailed in table 1.

Table 1 Socio-Demographic Characteristics of the Respondents

Variables	Frequency	Percent (%)
Age range		
60-65 years	55	55.0
66-70 years	26	26.0
71-75 years	14	14.0
Above 75 years	5	5.0
Total	100	100.0
Sex		
Male	28	28.0
Female	72	72.0
Total	100	100.0
Religion		
Christian	83	83.0
Muslim	15	15.0
Traditionalist	2	2.0
Total	100	100.0
Highest educational level		
No formal education	21	21.0
Primary	27	27.0
JHS	24	24.0
SHS	12	12.0
Tertiary	16	16.0
Total	100	100.0

Marital status		
Single	9	9.0
Married	80	80.0
Separated	2	2.0
Divorced	9	9.0
Total	100	100.0
Occupation		
Farming	29	29.0
Trading	46	46.0
Unemployed	7	7.0
Artisan	6	6.0
Miner	5	5.0
Salary work	7	7.0
Total	100	100.0
Total number of household people		
1-5 people	50	50.0
6-10 people	41	41.0
11 & above people	9	9.0
Total	100	100.0
Religion		
Christian	83	83.0
Muslim	15	15.0
Traditionalist	2	2.0
Total	100	100.0
Age at which patient was diagnosed as diabetic		
Below 50 years	18	18.0
50-60 years	66	66.0
61 and above years	16	16.0
Total	100	100.0

Source: Author’s Field Work, 2020

➤ *Management Strategies for Managing Diabetes in the Elderly*

Table 2 depicts the management strategies for managing diabetes in the elderly. Less than half of the patients 38(38.0%) had lived with the diabetes for 5-10 years while 15(15.0%) had lived with it for less than 5 years. Again, majority of the respondents 61(61.0%) had pharmacotherapy and diet therapy as their treatment options for the management of the type 2 diabetes. Whether the respondents were on antidiabetic medication, an overwhelming majority 91(91.0%) said yes. On type of medications, most of the respondents 52(52%) were on

Metformin while 15(15.0%) were on both Metformin and Daonil. Patients were again asked whether they were on insulin, majority of them 79(79.0%) said no. Also, most of the respondents 19(90.0%) took the insulin separately while 2(21%) took it with other antidiabetic drugs. An overwhelming majority of the respondents 94(94.0%) had been given diet counseling while 6(6.0%) had not received any diet counseling. On whether the diet management strategy had helped the respondents, most of them 95(95.0%) said yes while 5(5.0%) said no as detailed in table 2.

Table 2 Management Strategies for Managing Diabetes in the Elderly in Obuasi

Variables	Frequency	Percent (%)
Years patient had lived with diabetes		
Less than 5 years	15	15.0
5-10 years	38	38.0
11-15 years	26	26.0
Above 16 years	21	21.0
Total	100	100.0
Treatment options		
Pharmacotherapy	13	13.0
Diet therapy	2	2.0
Pharmacotherapy, physiotherapy & diet therapy	24	24.0
Pharmacotherapy & diet therapy	61	61.0
Total	100	100.0
Whether respondents were on antidiabetic medications		

Yes	91	91.0
No	9	9.00
Total	100	100.0
Type of medication		
Metformin	52	57.0
Daonil	24	26.0
Metformin & Daonil	15	17.0
Total	91	100.0
Are you on insulin		
Yes	21	21.0
No	79	79.0
Total	100	100.0
How do you take the insulin		
Separately	19	90.0
With other antidiabetic drugs	2	10.0
Total	21	100.0
Whether dietitian has prescribed physical activities as part of management		
Yes	50	50.0
No	50	50.0
Total	100	100.0
Whether respondents have been given diet counseling		
Yes	94	94.0
No	6	6.0
Total	100	100.0
Whether dietitian has planned a menu for respondents		
Yes	29	29.0
No	71	71.0
Total	100	100.0
Has the diet management strategy helped you		
Yes	95	95.0
No	5	5.0
Total	100	100.0
Has the diet management strategy helped you		
Yes	95	95.0
No	5	5.0
Total	100	100.0

Source: Author’s Field Work, 2020

From table 3, an overwhelming majority 84(84.0%) said they had other chronic diseases. Out of 84 patients with chronic diseases, 38(45%) had hypertension. Most of the respondents 94(94.0%) performed some physical activities as against 6(6.0%) who did not perform any physical

activity. Most of the respondents 60(64%) spent less than 60 minutes for their physical activities. On physical activities, 50(53%) of the respondents had 1-3 times in a week as detailed in table 3.

Table 3 Distribution of Comorbidity and Level of Physical Activity Among the Elderly with Type 2 Diabetes at Obuasi

Variables	Frequency	Percent (%)
Do you have any other chronic disease		
Yes	84	84.0
No	16	16.0
Total	100	100.0
If yes indicate the disease		
Hypertension & Chronic back pain	15	18
Myocardial infarction	9	11
Hypertension	38	45
Hypertension, Osteoarthritis, Osteoporosis, Chronic back pain &		
Visual impairment	8	10
Visual impairment	14	17
Total	84	100.0
Whether respondents perform any physical activity		
Yes	94	94.0

No	6	6.0
Total	100	100.0
Number of minutes for the physical activity		
Less than 60 mins	60	64
60-120 mins	30	32
121-180 mins	2	2
Above 180 mins	2	2
Total	94	100.0
How many times in a week do you perform physical activities		
1-3 times	50	53
2-4 times	35	37
7 times	9	10
Total	94	100.0
Indicate the exercise		
Walking, jogging, bicycling & domestic work	7	7
Jogging & domestic work	33	33
Walking	19	29
Walking & jogging	35	35
Total	94	94.0
Activities performed independently		
Eating	55	55.0
Bathing	21	21.0
Grooming	6	6.0
Washing	18	18.0
Total	100	100.0
Activities performed with assistance		
Eating	6	6.0
Bathing	18	18.0
Grooming	6	6.0
Washing	70	70.0
Total	100	100.0

Source: Author’s Field Work, 2020

➤ *The Effects of Type 2 Diabetes on the Nutritional Status of the Elderly.*

Figure 1 shows the effects of type 2 diabetes on the nutritional status of the elderly. Less than half of type 2 diabetic patients 48(48.0%) were at risk of malnutrition while 9(9.0%) were malnourished.

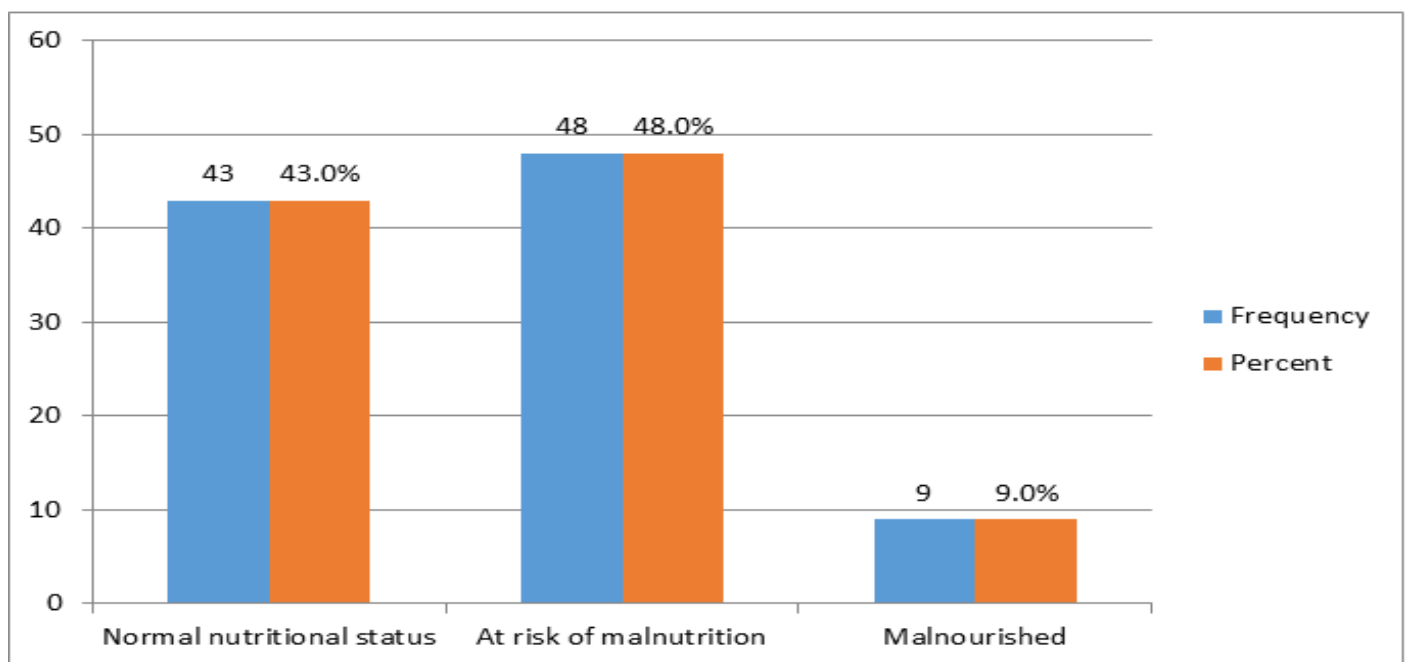


Fig 1 Shows the Effects of Type 2 Diabetes on the Nutritional Status of the Elderly

Source: Author’s Field Work, 2020

➤ *The Association between the Socio-Demographic Characteristics of Type 2 Diabetic Patients and their Nutritional Status*

An overwhelming majority of the respondents aged 60-65 years (52.7%) had normal nutritional status while 3(5.5%) were malnourished. However, the association between age and nutritional status of the diabetics was statistically significant (p-value=0.02) as detailed in table 4.4. Also, majority of the female participants (45.8%) were malnourished. However, the association between gender and nutritional status was not statistically significant (p-value=0.520). Again, majority of the Christians 39 (47.0%) were at risk of malnutrition as against 9(10.8%) who were malnourished, the association was not significant (0.729). There was no statistical association between educational level of the respondents and their nutritional status as

majority of respondent who had tertiary education were at risk of malnutrition (p-value=0.238). With statistical significance (p-value= 0.001), majority of the married respondents 39(48.8%) had normal nutritional status as against 3(3.8%) who were malnourished. Most of the respondents 21(45.7%) who had trading as their occupation had normal nutritional status while 3(6.5%) were malnourished (p-value= 0.699) as detailed in table 4.4. With no statistical significance (p-value= 0.063), most of the respondents who had 1-5 people in their household had normal nutritional status as against 3(6.0%) who were malnourished. More than half 28(42.4%) who were diagnosed as type 2 diabetic patients from age of 50-60 years had normal nutritional status while 6(9.1%) were malnourished. However, the association was not statistically significant (p-value= 0.446).

Table 4 The Association between the Demographic Characteristics of type 2 Diabetic Patients and their Nutritional Status

Variables	Malnutrition indicator score				$\chi^2(p\text{-value})$
	NNS F (%)	At risk of malnutrition F (%)	Malnourished F (%)	Total F (%)	
Age					15.016(0.02)
60-65 yrs	28(50.9)	23(41.8)	3(5.5)	54(100)	
66-70 yrs	13(50.0)	11(42.3)	2(7.7)	26(100)	
71-75 yrs	1(7.1)	10(71.4)	3(21.4)	14(100)	
Above 75 yrs	1(7.1)	4(80.0)	1(20.0)	6(100)	
Total	43(43.0)	48(48.0)	9(9.0)	100(100)	
Sex					1.306(0.520)
Male	10(35.7)	16(57.1)	2(7.1)	28(100)	
Female	33(45.8)	32(44.4)	7(9.7)	72(100)	
Total	43(43.0)	48(48.0)	9(9.0)	100(100)	
Religion					2.035(0.729)
Christian	35(42.2)	39(47.0)	9(10.8)	83(100)	
Muslim	6(40.0)	8(53.3)	1(6.6)	15(100)	
Traditionalist	1(50.0)	1(50.0)	0(0.0)	2(100)	
Total	43(43.0)	48(48.0)	9(9.0)	100(100)	
Highest education					10.406(0.238)
No formal education	4(19.0)	13(61.9)	4(19.0)	21(100)	
Primary	13(48.1)	12(44.4)	2(7.4)	27(100)	
JHS	14(58.3)	8(33.3)	2(8.3)	24(100)	
SHS	5(41.7)	6(50.0)	1(8.3)	12(100)	
Tertiary	7(43.8)	9(56.2)	0(0.0)	16(100)	
Total	43(43.0)	48(48.0)	9(9.0)	100(100)	
Marital status					23.1386(0.001)
Single	2(22.2)	6(66.7)	1(11.1)	9(100)	
Married	39(48.8)	38(47.5)	3(3.8)	80(100)	
Separated	0(0.0)	1(50.0)	1(50.0)	2(100)	
Divorced	2(22.2)	3(33.3)	4(44.4)	9(100)	
Total	43(43.0)	48(48.0)	9(9.0)	100(100)	
Occupation					7.276(0.699)
Farming	12(41.4)	13(44.8)	4(13.8)	29(100)	
Trading	21(45.7)	22(47.8)	3(6.5)	46(100)	
Unemployed	2(28.6)	3(42.9)	2(28.6)	7(100)	
Artisan	2(33.3)	4(66.7)	0(0.0)	6(100)	
Miner	3(60.0)	2(40.0)	0(0.0)	5(100)	
Salary worker	3(42.9)	4(57.1)	0(0.0)	7(100)	
Total	43(43.0)	48(48.0)	9(9.0)	100(100)	
N^o in household					8.922(0.063)
1-5	25(50.0)	22(44.0)	3(6.0)	50(100)	
6-10	17(41.5)	18(43.9)	6(14.6)	41(100)	

11 and above	1(11.1)	8(88.9)	0(0.0)	9(100)	
Total	43(43.0)	48(48.0)	9(9.0)	100(100)	
Age of diagnosis					
Below 50yrs	9(50.0)	9(50.0)	0(0.0)	18(100)	3.712(0.446)
50-60yrs	28(42.4)	32(48.5)	6(9.1)	66(100)	
61 & above	6(37.5)	7(43.8)	3(18.8)	16(100)	
Total	43(43.0)	48(48.0)	9(9.0)	100(100)	

Source: Author's Field Work, 2020

More than half of the participants (55.0%) were between 60 and 65 years of age, while 5.0% were 75 years of age and above. This may explain why most participants (80.0 percent) were married as the minimum age required for marriage is 18 years in Ghana. The higher number of respondents within the age group 60-65 might suggest why 46% of the respondents were traders since increasing in age above 60 years reduces the possibility of finding job especially government work. Also, 72.0% of the respondents were female. This might be due to the fact that in Ghana females have high life expectancy (WHO, 2015) than males and for that matter females dominate their male counterpart in old age. An overwhelming 83.0% of the respondents were Christians. This is no surprise because most Akans in the Ashanti region are Christians (Gyasi, 2015). The distribution of the clients in the study was mainly Christians and this might be as a result of the fact that the study was carried out in the Ashanti Region which is predominantly an Akan community. Less than half of the respondents (27.0%) attained Primary education as their highest level of education while only 12.0% of them attained the highest level of education (tertiary). This might be the reason why majority of the respondents (46.0%) were traders. Most of the respondents (50.0%) had 1-5 people in household while 9.0% had 11 and above people. This might be as a result of the ages of the respondents because most of their children might be working elsewhere. An overwhelming majority of the respondents (66.0%) were diagnosed as diabetic patients within 50-60 years. This could be due to the fact that type 2 diabetes usually affects the aged. These findings are in line with a study conducted by Amoah *et al* (2002) where majority of their respondents' were more than 50 years and had Type 2 diabetes.

➤ *The Management Strategies for Managing Type 2 Diabetes in the Elderly*

Only 38.0% of the patients had lived with the diabetes for 5-10 years while (15.0%) had lived with it for less than 5 years. This might be as a result of proper management of the condition. Again, most of the respondents had pharmacotherapy and diet therapy as their treatment options for the management of the type 2 diabetes. This might account for the majority of the respondents on antidiabetic medication metformin. The import of this management option might be the role in which drugs and nutrition play in the management of diabetes type 2. According to ADA (2010) diabetic patients are effectively managed with Oral hypoglycemic agents, diet modification and physical activity. Patients were again asked whether they were on insulin, majority of them (79.0%) said no. The low insulin intake might be as a result of the features of the disease. It was formerly known as adult onset diabetes mellitus or non-

insulin dependent diabetes mellitus (Low, 2010; Olokoba *et al.*, 2012). Type 2 diabetes is characterized by hyperglycemia, impaired insulin secretion, insulin resistance, impaired glucose tolerance and impaired fasting glucose (WHO, 2013). Type 2 diabetes mellitus emerge from the interaction between genetic, behavioral and environmental risk factors. Overweight and physical inactivity or lack of exercise risk the development of type 2 diabetes mellitus but not insulin (Chen & Magliano, 2012). Type 2 diabetes is among the significant chronic conditions in older adults. Nearly 20% of adult aged ≥ 65 years are afflicted, although more than half of them are undiagnosed (Dunn & Dixon, 2013). All the above studies support the fact that diabetes type 2 in the aged is not caused by insulin secretion.

Again the respondents were asked whether the dietician/physician had prescribed physical activities as part of management, 50% of the patients said yes while 50% also said no. The low prescription of physical activities may be due the ages of the respondents since the majority of them were within the age range 60-65. This might account for the less than 60 minutes and 1-3 times a week physical activities performed by the respondents. It was also not surprised that majority of the respondents performed walking and jogging as their main physical activities. The health benefits of exercise in patients with diabetes is well recognized (Gill & Copper, 2008). Exercise has a significant role in regulating blood glucose, improves insulin action, metabolism of fats and protein and prevents complications of diabetes mellitus (Polikandrioti & Dokoutsidou, 2009; Smith *et al.*, 2016). Physical activity lowers blood sugar level by aiding insulin effectiveness, thus decreasing insulin resistance. Additionally, being active helps the body to build muscles which have more insulin receptors than the fat cells. All these studies recognize the importance of physical activities in the management of diabetes Type 2. Most of the respondents (71.0%) said their dietitians had not planned a menu for them as against 29.0% who said they had received menu from their dietitians. On the statement whether the diet management strategy had helped the respondents, most of them (95.0%) said yes while 5.0%) said No. This shows that diet plays very important role in the management of Type 2 diabetes. Diet and physical activities have positive effect in controlling diabetes Type 2.

➤ *Distribution of comorbidities and level of physical activity among the elderly with Type 2 diabetes in Obuasi.*

An overwhelming majority (84.0%) said they had other chronic diseases. Out of 84.0% patients, most (45.0%) of them had hypertension as their additional chronic disease.

Diabetes is an alarming public health problem in developed and even in developing countries with complications and co-morbidities like hypertension more common in old diabetics than in young counterparts (Sloan *et al.*, 2008). An overwhelming majority (94%) said they performed physical exercises including walking, jogging, and bicycling. Exercise plays an important role in controlling blood glucose, strengthening the insulin response, fat and protein balance, and reducing diabetes mellitus disorders. In addition, exercise increases muscle stability and has positive impacts on cardiovascular health. (Colberg, 2007; Smith *et al.*, 2016). Physical activity has also been showed to have beneficial effect on the mental states of diabetic patients, because it increases the body's energy uses, improves self-esteem and slows depression (Polikandrioti & Dokoutsidou, 2009; Smith *et al.*, 2016). Results from this study indicates that out of the majority (94) of respondents who performed physical exercises, 32% and 64% of them do so less than 60 minutes and between 60 to 120 minutes per day respectively. According to LaMonte and colleagues, when sedentary and underactive patients participate in physical exercise for at least 30 minutes, a 30% reduction in risk of diabetic complication including cardiovascular disease is achieved for all types of diabetes mellitus (LaMonte *et al.*, 2005).

➤ *The Effects of Type 2 Diabetes on the Nutritional Status of the Elderly.*

On the effects of type 2 diabetes on the nutritional status of the elderly, 43 out of the total respondents (43%) had normal nutritional status while 9% were malnourished. About half of the respondents (48.0%) were at risk of malnutrition. This finding correlates with a study by Aliabadi and his colleagues (2016) in Mashhad which showed that 12% of the elderly under study in the city had normal nutritional status, 45% were at risk of malnutrition, and 3% were malnourished. In a related study by Rich and colleagues (2012) they also reported that 5.5% of the elderly in Pakistan were malnourished and 42.1% were at risk of malnutrition. On the other hand, this findings is inconsistent with a study by Masumi and colleagues (2012) in Rasht that found that 87.1% of the elderly had normal nutritional status and 12.9% were at risk of malnutrition and 4% had malnutrition. In a study by Joanna *et al.*, (2010), on assessing the nutritional status of elderly people aged over 60 in rural areas using Mini Nutritional Assessment, none of the subjects had malnutrition because nobody scored less than 17 points. About 16% of the elderly women and men were at risk of malnutrition. The number of people at risk of malnutrition should be given special attention as these people are potentially at risk of malnutrition and its consequences (Valery *et al.*, 2012).

➤ *Association between the Demographic Features of Type 2 Diabetic Patients and their Nutritional Status*

Most of the respondents aged 66-70 years (50%) had normal nutritional status while 7.7% were malnourished. However, the association was statistically significant (p-value=0.02). Their normal nutritional status could be due to the fact that majority of the respondents had menu and nutritional counseling from their dietitians. This finding is

contrary to several studies like Masumi *et al.* (2012), research in Rasht, where there was no significant relationship between age and nutritional status. Again, it is in sharp contrast with Valery *et al.*, (2012) where they noticed no significant relationship between age and nutrition in the study of the elderly in the urban areas. Also, most of the female respondents (45.8%) had normal nutritional status. However, the association was not statistically significant (p-value= 0.520). This might be as a result of the number of female respondents (72% as against 28% of males). This result correlates with Masumi *et al.* (2012) where they indicated no significant relationship between nutrition and gender in the elderly, and females were significantly more malnourished than males. In the research of Masumi and colleagues (2012), gender relationship with nutritional status was significant in screening stage, but the relationship between nutritional status and gender after the analysis was not significant. Again, majority of the muslims (53.3%) were at risk of malnutrition as against 6.6% who were malnourished; the association was not significant (0.729). From this study it can be stated that religion plays no role in diabetic patients' nutritional status. There is no meaningful relationship between nutrition and religion according to the findings of Pasdar and colleagues (2016). With statistical association (p-value= 0.001), majority of the married respondents 39(48.8%) had normal nutritional status as against 3(3.8%) who were malnourished. This may suggest the assistance couples got from in their marriage. However, this finding disagrees with the study by Marxi *et al.*, (2017) which concluded that there was no significant relationship between nutrition and marital status. The association in the two studies could be due to the variations in the study areas and population. Most of the respondents (47.8%) who had trading as their occupation were at risk of malnutrition while 45.7% had normal nutritional status.

IV. CONCLUSION AND RECOMMENDATIONS

More than half of the respondents were within the age range of 60 – 65 years. Also, majority of the respondents were females. Again, most respondents had no formal education and majority of the respondents were married. Most of the respondents had pharmacotherapy and diet therapy as their treatment options for the management of the type 2 diabetes. Majority of the patients were on antidiabetic medications while few were on insulin. Again, half of the respondents had physical activities as part of their management. An overwhelming majority of the respondents had hypertension as additional chronic disease. Most of the respondents performed some physical activities for less than 60 minutes and 1-3 times per day respectively. Less than half of the Type 2 diabetic patients were at risk of malnutrition. Therefore, there should be intensive public awareness and education on Diabetes Mellitus (Type 2 diabetes to inculcate positive lifestyle modification during the early adulthood stage to reduce the incidence of the disease. There is the need for health authorities to intensify diet counseling for all persons suffering from Type 2 diabetes to improve their nutritional status and manage the condition effectively. Both newly diagnosed and old diabetes patients should have access to all members of the

diabetes management team especially dieticians, psychologists and physiotherapists so as to support them improve on their dietary control, physical activity strategies, as well as their psychosocial and emotional conditions. Lastly, Future study of similar nature could be carried out as community-based study in order to include defaulted diabetes Type 2 patients.

ACKNOWLEDGEMENTS

We wish to thank Dr. Tayo Abayomi and Dr. Nyarko of Adventist Hospital and Obuasi Government Hospital respectively for all their help and encouragement. Again, our sincerest thanks go to Ms. Yaa Aframah Ackah, Principal-COHS, for encouraging us to complete this work. Lastly our profound gratitude goes to all who contributed in diverse ways to make this research a success.

➤ Funding

The cost of the work was funded solely by the authors.

➤ Conflict of Interest

We hereby declare that there is no conflict of interest related to this study

REFERENCES

- [1]. Agbogli, H., Annan, R., Agyemang-Duah, E. & Mak-Mensah, E. (2017). Prevalence and Risk factors of Diabetes Mellitus Among the inhabitants of Kumasi Metropolis; Archives of Clinical and Biomedical Research. DOI: 10.26502/acbr.50170025
- [2]. Aliabadi, M. , Kimiagar, M., Ghayour Mobarhan, M. & Ilati Feiz Abadi, A. (2016). *Prevalence of Malnutrition and Factors Related to it in The Elderly Subjects in Khorasan Razavi Province Iran*. NSFT 2007; 2(3): 45-56.
- [3]. American Diabetes Association Professional Practice Committee (2022). 13. Older Adults: Standards of Medical Care in Diabetes-2022. *Diabetes care*, 45(Suppl 1), S195–S207. <https://doi.org/10.2337/dc22-S013>
- [4]. Amoah A. G. (2003). Sociodemographic variations in obesity among Ghanaian adults. *Public health nutrition*, 6(8), 751–757. <https://doi.org/10.1079/phn2003506>
- [5]. Amoah, A.G., Owusu, S.K., & Adjei, S. (2002). Diabetes in Ghana: a community based prevalence study in Greater Accra. *Diabetes Res Clin Pract*, 56, 197–205.
- [6]. Avwokeni J.A. (2006). *Research Methods: Process, Evaluation & Critique*. Port Harcourt: Unicampus Tutorial Services.
- [7]. CDC (2017). National Diabetes Statistics Report: Estimates of Diabetes and its burden in the United States.
- [8]. Chentli F, Azzoug S, & Mahgoun, S. (2015). Diabetes mellitus in elderly. *Indian Journal of Endocrinology and Metabolism.*, 19(6), 744.
- [9]. Colberg, S. (2007). Physical activity, insulin action, and diabetes prevention and control. *Curr Diabetes Rev.*, 3(3), 176–84.
- [10]. Danquah, I., Bedu-Addo, G., Terpe, K. J., Micah, F., Amoako, Y. A., Awuku, Y. A., Dietz, E., van der Giet, M., Spranger, J., & Mockenhaupt, F. P. (2012). Diabetes mellitus type 2 in urban Ghana: characteristics and associated factors. *BMC public health*, 12, 210. <https://doi.org/10.1186/1471-2458-12-210>
- [11]. Dunn, A. & Dixon, S. (2013). Diabetes and cancer: addressing interrelationships and treatment recommendations. *Spring*, 21 (2).
- [12]. Hinkle, J.L. & Cheever, K.H. (2010). *Brunner & Suddarth's Textbook of Medical-Surgical Nursing* (14th ed). Philadelphia: Wolters Kluwer Health/Lippincott Williams & Wilkins Ghana ranks 6th on diabetes table in Africa (2017, November 17), Joynews. Retrieved from <https://www.myjoyonline.com/ghana-ranks-6th-on-diabetes-table-in-africa/>
- [13]. Gill, J.M. & Cooper. A. (2008). Physical activity and prevention of type 2 diabetes mellitus. *Sports Medicine*. 2, 38(10), 807–24.
- [14]. IDF (2019). IDF Diabetes Atlas. (9th ed.). Retrieved from <https://www.diabetesatlas.org/>
- [15]. Joanna, S.C., Bare, B.G., Hinkle, J.L. & Cheever, K.H. (2010). *Comprehensive Assessment of Malnutrition Risk and Factors in A Large Group of Community-Dwelling Older Adults*. JCN 2010; 29(4): 507-11.
- [16]. LaMonte, M. J., Blair, S. N., & Church, T. S. (2005). Physical activity and diabetes prevention. *Journal of applied physiology (Bethesda, Md. : 1985)*, 99(3), 1205–1213. <https://doi.org/10.1152/jappphysiol.00193.2005>
- [17]. Low, L. (2010). The epidemic of Type 2 diabetes mellitus in Asia-Pacific region. *Pediatr Diabetes*, 11, 212–5.
- [18]. Masumi, E.W., Beckles, G.L., Williamson, D.F., Leveille, S.G., Langlois, J.A. & Engelgau, M.M. (2012) *Diabetes and physical disability among older US adults*. *Diab Care*;23 (9):1272–7
- [19]. Meneilly, G.S. (2006). Diabetes in the Elderly. *Indian Journal of Endocrinology and Metabolism*, 90(5). DOI:<https://doi.org/10.1016/j.mcna.2006.05.011>
- [20]. Olokoba AB, Obateru OA, O. L. (2012). Type 2 diabetes mellitus: a review of current trends. *Oman Medical Journal.*, 27(4), 269.
- [21]. Pasdar Y. (2016). Determining nutritional status of elderly people covered by Kermanshah state centers: Its relation with biochemical markers. *Journal of Behbood*; 15(3): 178-85.
- [22]. Polikandrioti, M. & Dokoutsidou, H. (2009). The role of exercise and nutrition in type II diabetes mellitus management. *Health Science Journal.*, 3(4).

- [23]. Rich, Z., Halil, M., Kalan, I., Yavuz, B.B., Cankurtaran, M., Gungor, E. & Ariogul, S. (2012). *Comprehensive Assessment of Malnutrition Risk and Factors in A Large Group of Community-Dwelling Older Adults*. JCN 2012; 29(4): 507-11. DOI: 10.1016/j.clnu.2010.01.006
- [24]. Sloan, F. A., Bethel, M. A., Ruiz, D., Jr, Shea, A. M., & Feinglos, M. N. (2008). The growing burden of diabetes mellitus in the US elderly population. *Archives of internal medicine*, 168(2), 192–199. <https://doi.org/10.1001/archinternmed.2007.35>
- [25]. Smith, A. D., Crippa, A., Woodcock, J., & Brage, S. (2016). Physical activity and incident type 2 diabetes mellitus: a systematic review and dose-response meta-analysis of prospective cohort studies. *Diabetologia*, 59(12), 2527–2545. <https://doi.org/10.1007/s00125-016-4079-0>
- [26]. United Nations (2015). World Population Prospects: the 2015 Revision. Retrieved from http://www.un.org/en/development/desa/population/publications/pdf/ageing/WPA2015.._
- [27]. Valery, P. C., Ibiebele, T., Harris, M., Green, A. C., Cotterill, A., Moloney, A., Sinha, A. K., & Garvey, G. (2012). Diet, physical activity, and obesity in school-aged indigenous youths in northern Australia. *Journal of obesity*, 2012, 893508. <https://doi.org/10.1155/2012/893508>
- [28]. WHO (2016). Global Report on Diabetes. Retrieved from www.apps.who.int/iris/bitstream/10665/204871/1/9789241565257_eng.pdf
- [29]. Yamane, T. (1967). *Statistics, An Introductory Analysis*, 2nd Ed., New York: Harper and Row.



KWAME NKURUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY
COLLEGE OF HEALTH SCIENCES



SCHOOL OF MEDICAL SCIENCES / KOMFO ANOKYE TEACHING HOSPITAL
COMMITTEE ON HUMAN RESEARCH, PUBLICATION AND ETHICS

Our Ref: CHRPE/AP/103/20

10th March, 2020.

Mr. Kwame Yiadom Boakye
Department of Biochemistry
and Biotechnology
College of Science
KNUST-KUMASI.

Dear Sir,

LETTER OF APPROVAL

Protocol Title: *"Type 2 Diabetes in the Elderly in Obuasi: Management Strategies and Effect on Nutrition and Health."*

Proposed Site: *Adventist Hospital, Obuasi and Obuasi Government Hospital.*

Sponsor: *Principal Investigator.*

Your submission to the Committee on Human Research, Publications and Ethics on the above-named protocol refers.

The Committee reviewed the following documents:

- A notification letter of 27th February, 2019 from the Adventist Hospital, Obuasi (study site) indicating approval for the conduct of the study at the Hospital.
- A notification letter of 11th March, 2020 from the Obuasi Government Hospital (study site) indicating approval for the conduct of the study at the Hospital.
- A Completed CHRPE Application Form.
- Participant Information Leaflet and Consent Form.
- Research Protocol.
- Questionnaire.

The Committee has considered the ethical merit of your submission and approved the protocol. The approval is for a fixed period of one year, beginning 10th March, 2020 to 9th March, 2021 renewable thereafter. The Committee may however, suspend or withdraw ethical approval at any time if your study is found to contravene the approved protocol.

Data gathered for the study should be used for the approved purposes only. Permission should be sought from the Committee if any amendment to the protocol or use, other than submitted, is made of your research data.

The Committee should be notified of the actual start date of the project and would expect a report on your study, annually or at the close of the project, whichever one comes first. It should also be informed of any publication arising from the study.

Thank you, Sir, for your application.

Yours faithfully,

Osomfo Prof. Sir J. W. Acheampong MD, FWACP
Chairman