IMPACT OF COMMUNITY-BASED HEALTH EDUCATION PROGRAM ON ADHERENCE TO PHYSICAL ACTIVITIES AMONG PRE-DIABETIC OLDER ADULTS IN SELECTED LGAS IN OGUN STATE NIGERIA

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ABSTRACT: *Physical activity is a well-established preventive measure against diabetes, particularly Type 2 diabetes mellitus (T2DM). The increasing elderly population and changes in lifestyle behaviors have led to a higher prevalence of diabetes among older adults. Although community-based health education has shown promise in enhancing maternal and child health outcomes, its effectiveness in promoting physical activity adherence among pre-diabetic older adults remains underexplored in Nigeria. This study assessed the impact of a community-based health education program on adherence to physical activities among pre-diabetic older adults in selected LGAs in Ogun State, Nigeria. Methodology: A quasi-experimental design was employed. From a population of 1,005 pre-diabetic older adults, 60 participants were selected using power analysis, with 30 participants each assigned to the Experimental Group (EG) and Control Group (CG). The EG received two-hour health education sessions twice weekly for four weeks focusing on physical activity, while the CG received two-hour weekly sessions on personal hygiene. A structured and validated questionnaire with Cronbach's alpha reliability coefficients ranging between 0.71 and 0.80 was used for data collection at baseline, immediate post-intervention, and 12th-week follow-up. Data were analyzed using descriptive and inferential statistics at a 5% level of significance. Results: At baseline, adherence scores were low for both groups, with EG scoring 15.03 ± 1.50 and CG scoring 14.85 ± 1.54. By the 12th-week follow-up, the EG showed a significant improvement in adherence to physical activities with a mean score of 42.27 ± 11.51, compared to 14.50 ± 1.48 in the CG. Knowledge and perception scores also improved significantly in the EG compared to the CG. Statistical analysis revealed significant differences ($p < 0.05$) at post-intervention phases, demonstrating that the health education intervention substantially enhanced adherence, knowledge, and perception of physical activities among pre-diabetic older adults in the experimental group. Conclusion: The community-based health education program significantly improved adherence to physical activities, knowledge, and perception among pre-diabetic older adults in selected LGAs in Ogun State. These findings underscore the importance of integrating structured physical activity education into community health programs targeting older adults to prevent the progression of pre-diabetes to Type 2 diabetes mellitus.*

KEYWORDS: Health education intervention, Older adults, Physical activity, Physical inactivity, Pre-diabetic.

INTRODUCTION

Physical activity is an established strategy for diabetes prevention. The incidence of diabetes is inversely proportional to participation in physical activity. An increase in elderly population and shifts in lifestyle have led to a higher prevalence of diabetes mellitus among older adults (Strain et al., 2018). Presently, older adults, particularly those between 60-79 years old, experience a high rate of T2DM, with close to half of patients being 6-5 years or older (Bellary et al., 2021). Physical fitness is the ability to perform daily life tasks effectively and without fatigue, and includes a variety of components, such as aerobic fitness, muscle strength, flexibility, agility and balance (Caspersen, 2021). One of the most important aspects of physical fitness is its relationship with health, and in this context it can be understood as a demonstration of skills that are associated with a lower risk of prematurely developing Type 2 diabetes diseases.

The burden of T2DM is particularly high in developing countries, including those in Sub-Saharan Africa (SSA). Despite previously being considered rare in SSA, the prevalence of diabetes is on the rise, particularly in urban areas. Studies show that 4.5% of adults in SSA are living with diabetes, representing 24 million individuals, with significant variations across regions (Motala et al., 2022). The prevalence is driven by rapid urbanization, lifestyle changes, and an increasing shift from infectious to non-communicable diseases in these regions. However, research gaps exist due to inconsistent methodologies, leading to challenges in assessing the full scope of the diabetes epidemic in Africa (Gouda et al., 2019).

Physical activity can also lead to improvement in cardiovascular risk factors. With regards to hypertension, there is an inverse relationship between blood pressure and physical activity level, with greater responses noted in those with hypertension/prehypertension compared to individuals with normal blood pressure (Edwards & Weiman, 2023). Diabetes is associated with low levels of physical fitness, and people with this chronic disease have lower exercise tolerance than people without diabetes (Reusch et al., 2013). High levels of physical inactivity, overweight and obesity, poor glycemic control, history of cardiovascular disease, insulin resistance, endothelial dysfunction, impaired myocardial perfusion, changes in mitochondrial functions, and medication with influence on cardiovascular response to exercise, appear to be at the basis of these differences (Erdogan et al., 2020). Physical fitness, in particular aerobic fitness, is a strong predictor of cardiovascular events, and is inversely related to cardiovascular mortality and mortality from all causes in people to prevent type 2 diabetes.

In Nigeria, diabetes has become a public health challenge. The country has experienced a demographic shift in the epidemiology of diabetes, with a growing prevalence in regions that were previously unaffected. The pooled prevalence of diabetes mellitus in Nigeria stands at 5.77%, affecting over 11.2 million people (Uloko et al., 2018). Among these cases, diabetes accounts for over 90%. Nigeria's south-south region records the highest prevalence rates, while the north-western region reports the lowest rates. This geographic variation highlights the complex nature of diabetes epidemiology in the country, influenced by physical inactivity, lifestyle, socioeconomic status, and access to health care (Al-Worafi, 2023).

In Ogun State, Nigeria, research has shown alarming rates of T2DM, particularly among the elderly population. A study conducted in Abeokuta revealed that 11.4% of the elderly population had diabetes, with obesity, family history, and high blood pressure identified as significant risk factors (Adeniran et al., 2022). Despite these high prevalence rates, physical

activity was found to be uncommon among the elderly, and many relied on faith and traditional beliefs rather than seeking medical care (Adeniran et al., 2022).

Physical activity is known as a determinant of health and has been recognized as behavioural risk factors of diabetes among older adults (Bouchard et al., 2022). Physical activity plays a significant role in health, both together and separately. However, there is no data on the prevalence of deaths among older adults due directly to physical inactivity in Nigeria. However, a population prevalence of about one-quarter of all deaths due to physical inactivity-related NCDs is an urgent call to prioritize physical activity as a public health agenda in Nigeria. To scale up effective physical activity interventions against NCDs in Nigeria, there is a need to develop bold initiatives and implement policies that will increase physical activity across all sectors including transportation, urban planning, sports and recreation and workplaces and schools (Adeniran et al., 2022).

Research has shown alarming rates of diabetes in Ogun state, particularly among the elderly population. A study conducted in Abeokuta revealed that 11.4% of the elderly population had diabetes, with obesity, family history, and high blood pressure identified as significant risk factors (Adeniran et al., 2022). Despite these high prevalence rates, physical activity was found to be uncommon among the elderly, and many relied on faith and traditional beliefs rather than seeking medical care (Adeniran et al., 2022). These findings underscore the need for targeted health education interventions on the need for physical activity among older adults for the prevention of diabetes.

There is a pressing need to address the gaps in knowledge, particularly regarding preventive behaviors such as regular physical activity, and routine medical check-ups. Without targeted interventions, the prevalence of diabetes is expected to rise, leading to an increased burden on healthcare systems and the community at large.

This study explored the effectiveness of community-based health education programs in promoting physical activities, knowledge and perception among older adults in selected local governments in Ogun state, Nigeria. By focusing on Abeokuta, where the prevalence of diabetes is higher compared to other parts of Ogun State, this study assessed how health education programs can raise awareness, influence behavior change, and ensure physical activity among older adults.

By investigating the effect of health education intervention on physical activity for the prevention of type 2 diabetes among the elderly, the study would provide valuable information for preventing diabetes and also develop effective strategies in promoting exercise, regular checkup, and the adoption of healthy lifestyle in the prevention of diabetes.

METHODOLOGY

Study Design

For this study, a quasi-experimental design was employed, consisting of one experimental group and one control group, to assess the Impact of community-based health education programs on adherence to physical activities among pre-diabetic older adults in selected local governments in Ogun State, Nigeria. The choice of a quasi-experimental design is appropriate since the groups were not randomly assigned. This design has proven effective for similar studies as it allows for the identification of a comparison group or time period that closely resembles the treatment group or time period in terms of baseline characteristics. Prior to the intervention, a baseline data was collected from both the control and experimental groups. This was followed by the designed intervention in the experimental group for a period of six (6) weeks while the control group was given necessary attention but not the designed intervention. An outcome evaluation was carried out in both the control and experimental groups soon after the intervention. Then, at the twelfth (12th) week, from the date of the first data, an impact evaluation was carried out in the two groups.

A sample size of 30 older adults for each group was derived using Cochran's formula. Simple random sampling selection was used to select two Local Government Areas in Ogun State which are Abeokuta South and Ikenne Local Government Areas. This method is appropriate because every older adult is at risk of Type 2 diabetes. Abeokuta south was selected as the experimental group while Ikenne was the control group. EG was assigned to health education modules on adherence to physical activity for 1 hour once weekly and CG had training on exercise for 1 hour once a week, both for six weeks. A total of three research assistants were trained to this effect.

Research Instrument and Data Collection

The research method chosen for this study was quantitative in nature. To create a reliable and valid instrument for data collection, the researcher gathered information from various sources including a review of relevant literature, as well as examining instruments used in similar studies. With this information, an appropriate instrument was developed for use in collecting data from the participants. The instrument was designed to ensure that it aligns with the research objectives and the research questions. The instrument measured respondents adherence to physical activities among pre-diabetic older adults in selected local governments in Ogun State, Nigeria. The same instrument was administered at the baseline, immediate post intervention and 12-weeks follow up. A structured validated questionnaire with Cronbach's alpha reliability index ranging from 0.74 to 0.81 was used to collect data.

Table 1: Description of the Data Collection

Groups	Baseline Data	Interventions	Outcome Evaluation (end of intervention program)	Impact Evaluation (at 12th weeks)
Control Group	O	-	O	O
Experimental Group	O	X	O	O

Key: X = Intervention;   O = Outcome

Baseline data collection

Baseline was the first phase of data collection from the participants. The baseline data served as bases for comparison between the intervention and control. This also served as means of detecting changes attributable to the intervention. Data were obtained from the intervention and control groups with the use of the designed 68-item questionnaire through interviewers administered by the research assistants recruited for the purpose. The instrument comprised two sections that are control variables, independent variables and dependent variables. These variables are demographic characteristics and adherence to physical activity.

Immediate post-intervention data collection

Immediately after the experimental group received the 6-weeks intervention, the same data collection instrument used for baseline data collection was used to get responses from the intervention and control group for the second time. The control group received just a 1-day health talk on exercise, not related to the subject matter as recommended in the principles of ethics that the control group should also benefit from the study (SASLHA, 2011). The variables measured basically were the independent and dependent variables. Socio demographic data were kept throughout the study.

Endline Data Collection

The end line data collection was the third and the last phase of data collection. The end line data was obtained using the same data collection instrument and this was done at the 12th week follow up. Focus was more on the outcome variable which was the adherence to physical activity.

Study Variables

The independent/treatment variable of the study is health education while the dependent variable is adherence to physical activity.

Data Analyses

The data collected for the study was collated, entered and coded using the Statistical Product for Service Solutions (SPSS) version 23. The data was cleaned by running a frequency analysis on each item and checking responses to ensure that the values were accurately coded. Data was analysed using descriptive, and inferential statistics at 5% level of significance. Effect size (ES) was used to measure the magnitude of the intervention in the experimental group.

Ethical Clearance

An application for ethical approval for this study was submitted to the Babcock University Research Ethics Committee. The purpose of the study was explained to all participants, after which verbal consent was given by each participant, while they also signed the consent forms. All participants were assured of anonymity and the confidentiality of the information received from them.

RESULTS

Socio-demographic characteristics of the respondents

Baseline results comparison of the socio-demographic characteristics of the respondents among control and experimental groups

Table 2 provides a comprehensive overview of the socio-demographic characteristics of participants in the experimental and control groups at baseline. The mean age of the experimental group was M=64.30±3.50, while that of the control group was M=66.30±4.96. Although the control group had a slightly higher mean age, the difference between the groups was not statistically significant (p=0.501). Regarding gender, males and females were equally distributed in the experimental group (50.0% each), while the control group had a slightly higher proportion of males (56.7%) than females (43.3%). However, the gender distribution between the groups also did not show any significant difference (p=0.605).

Marital status and religion, however, did not show significant differences between the groups. Married participants constituted the majority in both the experimental group (83.3%) and the control group (76.7%). Divorce and widowhood were slightly more common in the experimental group, while no participants in either group reported being single (p=0.276). Christianity was the dominant religion across both groups, with 70.0% of participants in the experimental group and 55.0% in the control group identifying as Christians. A significant proportion of participants in the control group were Muslim (46.7%), but this difference in religious affiliation was not statistically significant (p=0.184). Overall, while most socio-demographic characteristics were comparable between the groups, significant differences were observed in educational attainment and ethnicity at baseline.

Table 4.1 Demographic characteristics of the participants in the study for each group at baseline

Variable	Experimental N=30	Control N=30	Total	
	N (%)	N (%)	N (%)	p-value
Age				
<650	20(66.7)	13(43.3)	33(55.0)	
66-70	9(30.0)	14(46.7)	23(38.3)	
71>	1(3.3)	3(10.0)	4(6.7)	0.501
Mean± SD	**64.30 ± 3.50**	**66.30 ± 4.96**	**65.30 ± 4.37**	
Religion				
Christianity	16(53.3)	21(70.0)	37(61.7)	
Islam	14(46.7)	9(30.0)	23(38.3)	0.184
Others	0(0.0)	0(0.0)	0(0.0)	
Gender:				
Male	15(50.0)	17(56.7)	32(53.33)	0.605
Female	15(50.0)	13(43.3)	28 (46.67)	

Educational attainment:				
Non-formal	0(0.0)	11(36.7)	11(18.3)	0.000*
Primary	2(6.67)	2(6.7)	4(6.7)	
Secondary	2(6.67)	14(46.7)	16(26.7)	
Tertiary	26(86.7)	3(10.0)	29(48.3)	
Ethnicity				
Yoruba	25(83.3)	22(73.3)	47(78.3)	0.000*
Igbo	5(16.7)	1(3.3)	6(10.0)	
Hausa	0(0.0)	7(23.3)	7(11.7)	
Others	0(0.0)	0(0.0)	0(0.0)	
Marital Status				0.276
Married	23(3.30)	23(76.7)	46(76.67)	
Single	0(0.0)	0(0.0)	0(0.0)	
Widow	5(16.7)	2(6.7)	7(11.67)	
Divorced	2(6.70)	5(16.7)	7(11.67)	

-Comparing certain demographic characteristics to demonstrate matched groups at baseline
*Significant at p<0.05

Baseline evaluation of adherence to physical activity among pre-diabetic older adults in selected local government in Ogun State, Nigeria

Evaluation of Adherence to Healthy behaviour Towards the Prevention of Type 2 Diabetes between control and experimental group

The baseline evaluation of adherence to healthy behaviour towards the prevention of Type 2 diabetes was assessed among prediabetic older adults in selected local governments in Ogun State, Nigeria. The adherence scores were measured on a scale of 0–48, with adherence categorized as low (0–20), moderate (21–35), and high (36 and above). The experimental group (EG) had a mean adherence score of 15.03±1.50, categorized as low, while the control group (CG) scored 14.85±1.54, also categorized as low. Although the experimental group exhibited slightly higher adherence scores compared to the control group, the difference was not statistically significant (p=0.654). These findings suggest that both the experimental and control groups demonstrated a generally low level of adherence to healthy behaviours at baseline. This includes practices such as maintaining a healthy diet, engaging in regular physical activity, and monitoring health indicators like blood sugar levels, which are crucial for the prevention of Type 2 diabetes.

The lack of significant difference between the two groups highlights the need for targeted interventions to improve adherence to healthy behaviours among both groups. Enhancing awareness, providing support systems, and addressing barriers to adopting these behaviours could potentially foster better adherence and contribute to the prevention of Type 2 diabetes.

Table 2: Statistical summary of major variable for adherence to healthy behavior towards the prevention of Type 2 diabetes

Variables	Maximum Points on Scale of Measure	Baseline Experimental Group N=30		Control Group N=30		
		X̄(SE)	±SD	X(SE)	±SD	t(p-value)*
Adherence Low (0-20), moderate (21-35), High (36>)	48	15.03(0.27)	1.50	14.85(0.30)	1.54	0.45(0.654)

* Test of significance for an independent sample t-test between control group (CG) and experimental group (EG). $t_{56}=0.45$, $p<0.05$

Post-intervention evaluation of adherence to physical activity among pre-diabetic older adults in selected local government in Ogun State, Nigeria

At the 12th week follow-up, the total adherence to healthy behaviour towards the prevention of Type 2 diabetes showed a significant difference between the experimental and control groups. For the experimental group (N=30), the adherence score was 42.27±11.51, while the control group (N=30) had a significantly lower adherence score of 14.50±1.48. The effect size (ES) was 3.44 (95% CI: 1.40 to 5.48), and the $t_{29}=13.1$ of p-value of 0.000. This indicates a statistically significant difference, demonstrating that the experimental group exhibited significantly higher adherence to physical activity compared to the control group after the intervention. This result suggests that the intervention had a substantial positive impact on the adherence to healthy behaviours in the experimental group, with the difference between the two groups being highly significant.

Table 3: Independent t-test summary for groups at post-intervention on adherence to physical activity among pre-diabetic older adults

| Variable | Maximum Points on Scale of Measure | 12th week Follow-up | | | | | |
		Experimental Group N = 30		Control Group N = 30		*ES (95%CI)	t(p-value)
		X̄(SE)	±SD	X̄(SE)	±SD		
Total Adherence to healthy behaviour towards prevention of Type 2 diabetes	48	42.27 (2.10)	11.51	14.50 (0.28)	1.48	3.44 (1.40 to 5.48)	13.10 (<0.001)

* Test of significance for an independent sample t-test. $t_{58}=79.17$

Analysis of the effect of the intervention on adherence to physical activity among pre-diabetic older adults at baseline and 12th week follow-up results for each group

For the control group (N=28), the adherence to physical activity showed no significant change between the baseline (14.85± 1.54) and the 12th week follow-up (14.50± 1.48), with a p-value of 0.87. The effect size was also small (ES=0.24, t29=0.87, 95% CI: -0.15 to 0.62), indicating that the intervention did not lead to a significant improvement in adherence to physical activity in the control group. In contrast, for the experimental group (N=30), there was a significant increase in adherence to physical activity from baseline (15.03± 2.55) to 42.27± 11.51 at the 12th week follow-up. The effect size was large (ES=3.38, t30=12.85, 95% CI: -5.41 to -1.3), with a highly significant p-value of 0.000, indicating a strong positive impact of the intervention on adherence to physical activity among the experimental group. Conclusively, the intervention significantly improved adherence to physical activity in the experimental group, while the control group did not show any significant change.

Table 4: Pair t-test analysis of the effect of the intervention on adherence to physical activity among pre-diabetic older adults at baseline and 12th week follow-up for groups

VARIABLES	Maximum Points on Scale of Measure	Control group					
		Baseline		12th week follow-up			
		X(SE)	±SD	X (SE)	±SD	*ES (95%CI)	t(p-value)
adherence to physical activity among prediabetic Older Adults (N=28)	48	14.85 (.30)	1.54	14.50 (.28)	1.48	0.24 (-0.15 to 0.62)	0.87 (.391)
		Experimental group					
		Baseline		12th week follow-up			
		X(SE)	±SD	X (SE)	±SD	*ES (95%CI)	t(p-value)
adherence to physical activity among prediabetic Older Adults (N=30)	48	15.03 (.27)	1.50	42.27 (2.10)	11.51	-3.38 (-5.41 to -1.3)	-12.85 (<.001)

CG: t_{29}=0.87, EG: t_{30}=12.85

DISCUSSION

This study assessed the impact of a community-based health education program on adherence to physical activities among pre-diabetic older adults in selected Local Government Areas (LGAs) in Ogun State, Nigeria. The findings highlight the transformative potential of structured, theory-based health education interventions in promoting sustained physical activity behavior in a vulnerable aging population.

At baseline, both the experimental group (EG) and the control group (CG) exhibited low levels of adherence to physical activity. The mean adherence scores were 15.03 ± 1.50 for the EG and 14.85 ± 1.54 for the CG, indicating no significant differences between the groups prior to the intervention. This finding is consistent with previous literature suggesting that older adults, particularly those at risk for diabetes, often demonstrate poor adherence to recommended physical activity guidelines due to socio-cultural, behavioral, and environmental barriers.

Following the implementation of the community-based health education program, a marked improvement was observed among participants in the experimental group. At the 12th week follow-up (P2), the mean adherence score for the EG had significantly increased to 42.27 ± 11.51, whereas the CG maintained a low adherence score of 14.50 ± 1.48. The difference between the groups was statistically significant ($p < 0.05$), with a large effect size, confirming the positive impact of the educational intervention on adherence to physical activity.

These findings align with global evidence supporting the effectiveness of community-based educational interventions in promoting lifestyle changes, particularly among older adults at risk for chronic diseases. Structured programs that are community-driven and culturally tailored have been shown to improve knowledge, self-efficacy, and motivation towards physical activity. The health education sessions in this study, conducted twice weekly over a four-week period, leveraged local resources, engaged participants in interactive discussions, and provided actionable strategies to incorporate physical activity into daily life, contributing to the sustained behavioral change observed.

The intervention's success can be attributed to its theoretical foundation, primarily the Health Belief Model (HBM) and the Precede-Proceed Model (PPM), which informed the curriculum design. By addressing perceived susceptibility, perceived benefits, and barriers to physical activity, and reinforcing enabling and motivational factors, the program effectively improved participants' attitudes, beliefs, and behaviors toward engaging in regular exercise.

Furthermore, the increase in adherence levels was not only statistically significant but also practically meaningful. Participants reported integrating activities such as regular walking, stretching exercises, and participation in group fitness sessions into their routines. These changes are critical, considering that regular physical activity reduces the risk of progressing from pre-diabetes to type 2 diabetes and improves overall health outcomes in older adults.

In contrast, the control group, which received general health education on personal hygiene, did not exhibit any significant improvement in physical activity adherence, reinforcing the specificity and importance of targeted educational content in driving behavioral change.

The results of this study provide compelling evidence that community-based health education programs, when appropriately designed and implemented, can significantly enhance adherence to physical activities among pre-diabetic older adults. The findings underscore the need to

integrate such interventions into broader public health strategies aimed at reducing the burden of non-communicable diseases among aging populations in Nigeria and similar contexts.

CONCLUSION

This research highlights the effectiveness of a Community-Based Health Education Program in improving adherence to physical activity among pre-diabetic older adults in Ogun State, Nigeria. The study revealed that tailored interventions addressing barriers such as low knowledge, negative perceptions, inadequate social support, and lack of access to enabling resources can significantly enhance physical activity adherence in this population. By targeting multiple dimensions, including knowledge, perceptions, reinforcing factors, and enabling factors, the program successfully fostered a supportive environment that encouraged positive behaviour change. The experimental group demonstrated remarkable improvements in knowledge about physical activity and diabetes prevention, a more favourable perception of physical activity, greater motivational support, and better access to physical activity resources. These changes were accompanied by a substantial increase in adherence to physical activity, reflecting the holistic impact of the intervention. The findings underscore the importance of incorporating health education programs into community health strategies, particularly for older adults at risk of chronic conditions such as Type 2 diabetes. By leveraging theoretical frameworks like the Health Belief Model and Social Cognitive Theory, the intervention addressed individual and environmental factors that influence behaviour change. This study reinforces the value of community-based approaches in promoting health and preventing lifestyle-related diseases in vulnerable populations

RECOMMENDATIONS.

1. First, scaling up community-based health education programs is crucial. The success of this intervention demonstrates the value of localized, tailored approaches in addressing the unique needs of pre-diabetic older adults.

2. Strengthening social support systems is essential. The findings highlighted the importance of emotional and reinforcing support in motivating individuals to maintain physical activity.

3. Increasing access to enabling resources should be prioritized. Local governments and policymakers must collaborate to improve infrastructure, such as safe walking paths, fitness centers, and affordable exercise programs.

4. Integrating physical activity education into primary healthcare systems is recommended. Healthcare providers should receive training on delivering brief physical activity interventions and counseling during routine visits.

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