

Effect of structured lifestyle modification counselling on lifestyle practices and glycaemic control among Type-2 Diabetes patients in northern Nigeria (SLIC-T2D trial): A Randomised Controlled Trial

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Research Article

Keywords: Counselling, type-2 DM, glycaemic control, lifestyle practices, primary care

Posted Date: March 2nd, 2026

DOI: <https://doi.org/10.21203/rs.3.rs-8658846/v1>

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Additional Declarations: No competing interests reported.

Version of Record: A version of this preprint was published at BMC Endocrine Disorders on September 22nd, 2026. See the published version at <https://doi.org/10.1186/s12902-026-02592-5>.

Abstract

BACKGROUND

Optimal glycaemic control is crucial in diabetic care as it minimizes complications. Adherence to a healthy lifestyle positively impacts diabetic care. This study aimed to investigate the effect of structured lifestyle modification counselling on lifestyle practices and glycaemic control.

METHODS

The study was a randomised controlled trial (RCT) conducted among Type-2 Diabetes Mellitus (T2DM) patients over 22 weeks from November 2023 to April 2024. Participants were randomly assigned to either intervention or control arms by block randomization in blocks of four using a table of random numbers at a 1:1 ratio, with 63 participants in each arm. Data were collected using an adapted WHO STEPS questionnaire on sociodemographic, clinical characteristics and lifestyle practices both pre- and post-intervention. A composite Health Behaviour Score (HBS) was used for scoring. Structured counselling was conducted using the 5A's framework, with five follow-up telephone reminders containing standard pre-recorded messages in Hausa (predominant language) and English.

RESULTS

The study found a significant post-intervention increase in healthy behaviour scores; intervention (73.8%) compared to control (26.2%). The difference was statistically significant ($\chi^2 = 29.3$, $p < 0.001$), while both arms had pre-intervention comparable baseline healthy behaviour scores ($\chi^2 = 0.145$, $p = 0.703$). The Wilcoxon signed-rank test indicated a statistically significant decrease in median HbA1c post-intervention in both arms (intervention: $z = -3.774$, $p < 0.001$; control: $z = -3.158$, $p = 0.002$). However, the effect of counselling on glycaemic control was not statistically significant ($\chi^2 = 3.517$, $p = 0.061$).

CONCLUSION

Structured lifestyle modification counselling significantly improved healthy behaviour among T2DM patients with no significant effect on glycaemic control. This suggests that counselling is effective for lifestyle change. Therefore, integrating structured lifestyle counselling with telephone reminders may serve as an innovative way to promote healthy lifestyles in the busy resource-limited primary care setting.

TRIAL REGISTRATION

The trial was registered by Pan African Clinical Trial Registry (<https://pactr.samrc.ac.za>) with registration number PACTR202601577207835 registered on 20th January, 2026.

INTRODUCTION

Diabetes Mellitus (DM) is a major cause of increased morbidity and mortality as well as a decreased quality of life.¹ DM also accounts for 1.9% of the global disability-adjusted years (DALY).^{1–4} According to the International Diabetes Federation Atlas 2021, there is progressive prevalence around the world that affected 537 million adults (20–79 years). The number is expected to rise to 643 million by 2030 and 783 million by 2045, with approximately 81% of those living with diabetes residing in low- and middle-income countries such as Nigeria.^{2,3} According to the World Health Organization (WHO), Ethiopia, South Africa, the Democratic Republic of Congo, Nigeria, and Tanzania were the top five African nations in 2017 with a high number of persons with diabetes mellitus (18–99 years).² In Nigeria, Uloko et al reported that Type-2 Diabetes Mellitus (T2DM) pooled prevalence in 2017 was highest in the south-south (9.8%) and lowest in the North-west (3.0%), posing a greater risk to the health system.^{3,5} The risk factors associated with T2DM and its management are both modifiable and non-modifiable. The modifiable risk factors are mostly behavioural and lifestyle practices such as excess use of high-calorie diet, lack of exercise, excess alcohol intake and cigarette smoking. Hence, there is a need to promote a healthy lifestyle via structured lifestyle modification counselling.

Early and intensive non-pharmacological intervention reduces the risk of microvascular and macrovascular complications and slows disease progression in T2DM.⁶ Good glycaemic control may be achieved through lifestyle modification counselling and adherence to structured lifestyle intervention, which in turn decreases morbidity/mortality/disability.⁷ In non-DM people, lifestyle modification helps to prevent T2DM or other cardiovascular risk factors.

There is a dearth of information on the combined use of lifestyle modification counselling and telephone reminders to promote adherence to healthy lifestyle practices in a busy setting like ours. This is imperative, given the doctor-patient ratio in resource-limited settings which will not allow one-on-one lifestyle modification (LSM) counselling of T2DM at every visit due to resource constraints. Hence, the need for this study, which assessed the effect of structured LSM which combines one-on-one single counselling with subsequent telephone reminders of pre-recorded messages in a language patients are more familiar with. This may be an innovative way to promote a healthy lifestyle and optimize glycaemic control among T2DM patients attending primary care in resource-limited climes like ours.⁸

METHODS

Study population and design

The study was a superiority parallel, 1:1 ratio randomised controlled trial conducted over a period of 22 weeks, among Type 2 diabetes mellitus patients aged 18 years and above who have been receiving the

routine care for ≥ 6 months at the Family Medicine Clinic of Aminu Kano Teaching Hospital (AKTH), Kano, Nigeria. Those excluded were patients who had diabetic emergencies, pregnant women and patients with documented cognitive impairment.

Sample size estimation

The desired sample size was estimated using formula $N = 2 \left[\frac{(Z_{\alpha} + Z_{\beta})^2}{(\delta)^2} \right] X S^2$ for continuous variable.^{9,10} Where, N Minimum sample size for each of the study arm

Z_{α} = Level of statistical significance at 95\% confidence level = 1.96

Z_{β} = Desired power of 80\% = 0.84

μ_1 = 7.9mmol/L, the mean fasting blood glucose (FBG) level from a previous study at AKTH.¹¹

S = Standard deviation = 2.8mmol/L.¹¹

δ = Effect size, which was the hypothesized clinically significant difference detectable in the mean FBG levels (assuming a 20% reduction from 7.9mmol/L) = 1.58mmol/L

N = 49.24 (Rounded up to 50 participants in each arm)

$N = N / (1-r)$, where, r was the loss to follow-up rate.

Therefore, the adjusted N = $50 / 0.8 = 63$.

Therefore, 63 participants were recruited per study arm, for a total of 126 participants.

Study procedure

Sampling method

A systematic sampling technique was used and 126 participants selected over a period of six weeks, with a sampling interval where every 6th participant was selected. The first participant was selected by simple random sampling through ballot. Informed written consent was obtained from all the participants and confidentiality was ensured.

Randomisation

After initial recruitment for 6 weeks, participants were randomly divided into blocks of four at random (using a table of random numbers), with half of the participants in each block assigned to the

intervention and the other half to the control arm. A trained and experienced research assistant with over seven years of involvement in similar hospital-based research facilitated the randomization process. Patients were recruited in blocks of four at a time such that there were six possible ways of allocating intervention with two patients allotted to group A and two patients allotted to group B per block. The six possible ways of allocating the blocks of size four include AABB, ABAB, ABBA, BBAA, BABA and BAAB. After generating the randomization sequence, allocation concealment was ensured by using sealed opaque envelopes containing a paper marked "A" or "B". Each batch consisted of two envelopes marked "A" and two marked "B", shuffled in a basket before the participant's selection. Upon choosing an envelope, each participant entered the designated consulting room and handed it to the principal investigator, who then opened it and revealed the arm allocation without participants' knowledge (Blinding). Participants assigned to "A" were placed in the intervention arm, while those assigned to "B" were placed in the control arm. This process continued until the sample size was achieved.

Intervention arm

A pretested questionnaire designed for this study was adapted from the WHO STEPS questionnaire and administered to the participants in both intervention and control arms. The questionnaire captured information on socio-demographic variables (age, sex, marital status, tribe, religion, hospital number, and address), lifestyle practices (smoking, alcohol intake, dietary habits, and physical activity) and anthropometric (weight and height for BMI) and clinical (blood pressure and HbA1c) data were also collected at baseline and post-intervention.²⁰ Their telephone numbers were collected for sending reminders on adherence to drugs and practicing a healthy lifestyle. A pre-recorded standardized short message, derived from script containing (Greetings to you. Watch your weight, limit unhealthy diet eating, take multivitamins, Drink clean water regularly, Avoid sugared beverages, Exercise regularly for 30–45 minutes three or more times a week, avoid excess or cut down alcohol consumption, stop cigarette smoking) was sent to each of them every three week (5 times over the period of the study), uniformly in English or Hausa (with Hausa being the predominant local language). The 5As counselling technique was used, with each participant's counselling session lasting 15–30 minutes depending on level of their understanding. The 5As is a validated counselling tool used globally and locally as follows: ¹³ASK: Have you set any goals for healthy eating, increasing physical activity, stopping smoking and decreasing or stopping alcohol consumption? ASSESS: Do you have any difficulty in sticking to your plans? Let's talk on how we can work on them together. ADVISE: Remember to eat more fruits and vegetables, remember to eat lean protein, whole grains, > 30 minutes of physical activity 3 times a week, stop smoking, stop or cut down alcohol consumption. ASSIST: Let's discuss some easier strategies and incorporate them into your daily activities. Use stairs not elevator, connect to support groups, the community, chew nicotine gums, use nicotine patch, eat more vegetables and fruits and more whole grains and cut down or stop alcohol consumption. ARRANGE: Let's schedule our meetings every four weeks to discuss any challenges and to keep track of your progress. ^{12–13}

The components of the WHO STEPS include:

Diet: The number of fast foods they ate, how many servings per day in a typical week, > 2 servings does not meet criteria = 0, none or less than 2 met criteria = 1. Vegetables and Fruits eating per day in a typical week: none (does not meet criteria = score of 0); < 1–2 servings (does not meet criteria = 0); >2 (met criteria = 1). Carbonated drinks: Consumption of carbonated soft drinks on a usual day of the week (a) 1–2 times= score of 1, > 2 time = 0

Physical Activity: per week for Age $\geq$ 18years: < 150 minutes / week = 0, > 150 minutes /week = 1.

Alcohol use: yes answer (does not meet criteria = 0), No answer (met criteria = 1).

Tobacco use (smoking): smoker = 0 (b) non-smoker = 1.

Lifestyle practices were assessed with the Healthy behaviour score (HBS): This tool tracks the number of healthy and unhealthy lifestyle(s) of an individual. It is a well-validated tool that measures and assigns a score to lifestyle practices.^{12,14} The score ranges from 1 to 4. The score of 1 is the lowest, while four is the highest. The score of 1 and 2 indicate an inadequate (unhealthy) Lifestyle, while a score of 3 and 4 indicate adequate (healthy) lifestyle practices. Participants who did not have a functioning phone were reached through their spouses, children or close relatives (a total of two phone numbers, from the index patient and a close relative were obtained). Information leaflets on dietary education (in Hausa or English) were also given to each of them.

Glycated Hemoglobin (HbA1c): Measured based on the widely accepted guidelines by the American Diabetes Association (ADA), and the International Diabetes Federation (IDF), an HbA1c level of less than 7% indicated good glycaemic control, while values 7% and above was recorded as poor glycaemic control.¹⁵

Control Arm

Each participant in the control arm had the questionnaires administered in English and Hausa and received standard care for diabetic patients. Their blood samples were collected for HbA1c. They received neither structured lifestyle counselling nor telephone call reminders. However, they were given dietary education leaflets.

Follow up

There was follow-up at the 4th week and 12th week (a total of 16 weeks) for the intervention arm only. Participants in both arms were seen at the 16th week for the post intervention follow-up, depending on their recruitment week, for re-assessment of lifestyle practices/clinical parameters. At the end of the intervention period, follow-up measurements were taken for both the intervention and control arms at the 16th week, including HbA1c, blood pressure, weight, and height (for BMI). These parameters were

used to evaluate the effect of the intervention on glycaemic control and other lifestyle-related outcomes. The study adheres to and was reported according to CONSORT guidelines as depicted in Fig. 1.

<Insert Fig. 1>

Data Analysis

The collected data were analysed using IBM® SPSS version 23. The categorical variables, such as sex, residence, marital status, occupation, were expressed in frequencies and percentages, while mean and standard deviation were used for continuous variables such as age, FBG, HbA1c, BMI or median and interquartile range where appropriate. Chi-square was used for the association between categorical variables and Wilcoxon signed ranked test was used to find the median decrease in glycaemic control. A p-value of < 0.05 was considered statistically significant.

Ethical Consideration

Ethical approval

was obtained from the Health Research Ethics Committee of Aminu Kano Teaching Hospital (Appendix A: NHREC number 28/01/2020/AKTH/EC/3439AKTH). The study was conducted according to the Helsinki Declaration.

RESULTS

Baseline socio-demographic and clinical characteristics of study participants

The data of 119 participants were analysed out of the 126 participants initially recruited for the study, with an attrition rate of 6%. The majority 60 (50.4%) of the participants belonged to the middle-aged group with a mean age of 55.9 ± 11.54 years. Females constituted a larger proportion of the participants 77 (64.7%), and full-time housewives 45(37.8%), was the predominant occupation. Most participants were Muslims, 116 (97.5%), urban dwellers, 101(84.9%) and had Qur'anic level of education. Majority of the study participants, 77 (64.7%) came from monogamous families. At baseline there was no statistically significant difference in sociodemographic and clinical characteristics between the intervention and control arms (Table 1 and Table 2).

Table 2
Baseline comparison of clinical characteristics

Variables	Control (n = 60)	Intervention (n = 59)	χ^2	p-value
FAMILY HISTORY OF DIABETES				
Absent	25 (61.0%)	16 (39.0%)	2.788	0.095
Present	35 (44.9%)	43 (55.1 (%))		
BMI			3.128*	0.396
Underweight	0 (0.0%)	3 (100.0%)		
Normal weight	22 (50.0%)	22 (50 .0%)		
Overweight	19 (55.9%)	15 (44.1%)		
Obese	18 (48.6%)	19 (51.4%)		
FBS GLYCAEMIC CONTROL			0.014	0.906
Controlled	23 (51.1%)	22 (48.9%)		
Uncontrolled	37 (50.4%)	37 (50.0%)		
HbA1C GLYCAEMIC CONTROL			1.373	0.241
Controlled	5 (35.7%)	9 (64.3%)		
Uncontrolled	55 (52.4%)	50 (47.6%)		
*: Fisher’s exact test, Bold : Statistically significant				

<Insert Tables 1 and 2>

Table 1
Baseline comparison of the sociodemographic characteristics

Variables	Control (n = 60)	Intervention (n = 59)	Total (n = 119)	χ^2	p-value
AGE					
Young	5 (45.5%)	6 (54.5%)	11(9.2%)	0.438	0.786
Middle age	29 (48.3%)	31 (51.7%)	60(50.4%)		
Elderly	26 (54.2%)	22 (54.8%)	48(40.4%)		
SEX					
Male	23 (54.8%)	19 (45,2%)	42(35.3%)	0.489	0.484
Female	37 (48.1%)	40 (51.9%)	77(64.7%)		
RESIDENCE					
Urban	53 (52.5%)	48 (47.5%)	101(84.9%)	1.128	0.288
Rural	7 (38.9%)	11 (61.1%)	18(15.5%)		
OCCUPATION					
Business/trading	21(51.2%)	20(48.8%)	41(34.5%)	1.439*	0.954
Full time housewife	21(51.2)	24(48.8)	45(37.8)		
Driving	1 (50.0%)	1 (50.0%)	2(1.7%)		
Civil servant	4 (44.4%)	5 (55.6%)	9(7.6%)		
Unemployed	8 (57.1%)	6 (42.9%)	14(11.8)		
Farmer	5 (62.5%)	3 (37.5%)	8(6.6)		
EMPLOYMENT					
Unemployed	29 (49.2%)	30 (50.8%)	59(49.6%)	0.075	0.784
Employed	31 (51.7%)	29 (48.3%)	60(50.4%)		
MARITAL STATUS					
Single	2 (40.0%)	3 (60.0.)	5(4.2%)	2.148*	0.558
Married	47 (54.0%)	40 (46.0%)	87(73.1%)		
Divorced	1 (25.0%)	3 (75.0%)	4(3.4%)		
Widowed	10 (43.5%)	13(56.5%)	23(19.3%)		
RELIGION					

Variables	Control (n = 60)	Intervention (n = 59)	Total (n = 119)	χ^2	p-value
Islam	58 (50.0%)	58 (50.0%)	116(97.5%)	0.005*	1.000
Christianity	2 (66.7%)	1 (33.3%)	3(2.5%)		
TRIBE					
Hausa	39 (48.1%)	42 (51.9%)	81(68.1%)	3.444	0.496
Fulani	11 (45.8%)	13 (54.2%)	24(20.2%)		
Yoruba	1 (100.0%)	0 (0.0%)	1(0.8%)		
Igbo	1 (100.0%)	0 (0.0%)	1(0.8%)		
Others	8 (66.7%)	3 (69.0%)	12(10.1%)		
EDUCATION					
None	0 (0.0%))	2 (100.0%)	2(1.7%)	2.566	0.633
Qur'an	28 (48.3%)	30 (51.7%)	58(48.7%)		
Primary	8 (53.3%)	7 (46.7%)	15(12.6%)		
Secondary	11 (52.4%)	10 (47.6%)	21(17.6%)		
Tertiary	13 (56.5%)	10 (43.5%)	23(19.4%)		
FAMILY TYPE					
Monogamous	37 (48.1%)	40 (41.9%)	77(64.7%)	0.489	0.484
Polygamous	23(54.8%)	19(45.2%)	42(35.3%)		

Baseline comparison of lifestyle practices

Table 3 shows the baseline comparison of the lifestyle practices of participants in both arms of the study. There were no significant differences in snack consumption, fruit consumption, vegetables consumption, fast-food consumption, carbonated drink consumption, physical activity levels and tobacco smoking status between the participants in the control and intervention arms of the study ($p > 0.05$).

Table 3
Baseline comparison of lifestyle practices

Variables	Control (n = 60)	Intervention (n = 59)	χ^2	p-value
SNACK CONSUMPTION			0.439	0.507
No	16 (45.7%)	19 (54.3%)		
Yes	44 (52.4)	40 (47.6%)		
FRUIT CONSUMPTION			3.396	0.183
None	5 (35.7%)	9 (64.3%)		
1 to 2 servings per day	11 (68.8%)	5 (31.3%)		
More than 2 servings per day	44 (49.4%)	45 (50.6%)		
VEGETABLE CONSUMPTION			0.320005	0.850
None	2 (66.7%)	1 (33.4%)		
1 to 2 servings per day	27 (50.0%)	27 (50.0%)		
More than 2 servings per day	41 (50.0%)	41 (50.0%)		
FAST FOOD CONSUMPTION			0.417*	0.817
None	34 (48.6%)	36 (51.4%)		
1 to 2 servings per day	3 (60.0%)	2 (40.0%)		
More than 2 servings per day	23 (52.3%)	21 (47.7%)		
CARBONATED DRINKS			1.455*	0.509
None	45 (47.9%)	49 (52.1%)		
1 to 2 servings per day	2 (50.0%)	2 (50.0%)		
More than 2 servings per day	13 (61.9%)	8 (38.1%)		
PHYSICAL ACTIVITY			0.784	0.676
None	10 (55.6%)	8 (44.4%)		
Less than 150 minutes per week	36 (47.7%)	40 (52.6%)		
More than 150 minutes per week	14 (56.6%)	11 (44.0%)		
SMOKING			1.000*	
Yes	1 (100.0%)	0 (0.0%)		
*: Fisher's exact test, Bold : Statistically significant				

Variables	Control (n = 60)	Intervention (n = 59)	χ^2	p-value
No	59 (50.0%)	59 (50.0%)		
*: Fisher's exact test, Bold : Statistically significant				

<Insert Table 3>

Pre- intervention lifestyle practices with healthy behaviour score

Figure 2 show that 53.6% of participants in the control arm and 46.4% in the intervention arm were engaged in unhealthy lifestyle behaviours. Conversely, 49.5% of the control arm and 50.5% of the intervention arm had healthy lifestyle behaviours. However, these relationships were not statistically significant ($\chi^2 = 0.145$ and p-value of 0.703).

<<insert Fig. 2 >

Post-intervention lifestyle practices with healthy behaviour score

Figure 3: Post-intervention, there was a significant difference in healthy behaviour scores between the control and intervention arms ($\chi^2 = 29.298$, $p < 0.001$); suggesting clearly, that the intervention had an effect on the participants' lifestyle practices.

<<insert Fig. 3>

Pre- and post-intervention glycaemic control.

Figure 4a and 4b shows the median FBG decreased in intervention arm from 7.8mmol/L pre-intervention to FBG was 6.0 mmol/L post-intervention, also in the control arm from 7.6mmol/L to 6.5 mmol/L there was a statistically significant improvement in FBG post-intervention among both intervention ($z = -4.124$, $p\text{-value} = < 0.001$) and control arm ($z = -3.225$, $p\text{-value} = 0.001$). Similarly, the median HbA1c in the intervention arm decreased from 8.4% pre-intervention to 7.0% post-intervention, while in the control arm it decreased from 8.2% to 7.1%. Using the Wilcoxon signed-rank test, this reduction was statistically significant in both the intervention arm ($z = -3.774$, $p < 0.001$) and the control arm ($z = -3.158$, $p = 0.002$). However, the effect of counselling on glycaemic control was not statistically significant ($\chi^2 = 3.517$ $p = 0.061$) as depicted in Table 4.

Table 4
Effect of Counselling on Glycaemic control

Variables	Controlled (n = 60)	Uncontrolled (n = 59)	χ^2	p-value	RR	CI
FBS glycaemic control			3.517*	0.061	0.82	0.60–1.02
Intervention	35 (58.3%)	25 (41.7%)				
Control	44 (74.6%)	15 (25.4%)				
HBA1C glycaemic control			0.005*	0.944	0.983	0.62–1.57
Intervention	22 (36.7%)	38 (63.3%)				
Control	22 (37.3%)	3 (62.7%)				
*: Fisher's exact test, Bold : Statistically significant						

<<insert Fig. 4a and 4b>

<Insert Table 4>

DISCUSSION

The lifestyle practices assessed in this study included physical activity, cigarette smoking, alcohol consumption, and dietary habits. The findings revealed that participants who received lifestyle modification interventions demonstrated improved knowledge, increased adoption of health-promoting behaviours, and better glycaemic control than those in the control group.

Similar to our findings, Kadriye et al, in Turkey, reported a good alignment between the counselling intervention and the Information–Behaviour–Motivation (IBM) model utilised.¹⁶ The intervention demonstrated a statistically significant difference between the intervention and control groups.¹⁶ This may be attributed to participants effectively applying the counselling received in familiar language with repetitive telephone reminders, thereby translating knowledge into appropriate lifestyle practices.

Similarly, Haque et al, in Malaysia, employed the use of weekly SMS messages to participants with various NCDs like lung cancer, obesity, metabolic syndrome, Chronic Obstructive Airway Disease COPD, Hypertension and Diabetes mellitus, as the primary counselling strategy.¹⁷ However, our study employed a structured one-on-one LSM counselling session delivered once, and three weekly reminders (5 sessions in all). Nonetheless, both studies share the common objective of promoting cost-effective lifestyle modification, highlighting the potential effectiveness of brief, engaging messages both in low-middle-income countries.¹⁷

Inversely, Marjanović et al, found that 43.3% of patients had unhealthy diets, 56.0% were physically inactive, and 26.3% were smokers and had poorly controlled glycaemia 36.8% because of poor adherence to lifestyle intervention counselling. The reason for dissimilarities could likely be related to the different lifestyle assessment tools, as we used the WHO Steps HBS composite score while they used the Perceived Stress Scale to examine stress in lifestyle behaviour.¹⁸

In this study, we documented a significant decrease in median HbA1c post-intervention in both arms. However, the effect of structured counselling on glycaemic control was not statistically significant. The improvement with no statistical difference may probably be related to the duration of the study, 22 weeks, less than six months, when the effect of most intervention is observed.

Conversely, Ibrahim et al, in Egypt, also reported that LSM counselling interventions can lead to improvements in glycaemic control and health outcomes among type-2 diabetic patients.¹⁹

In contrast to our findings, Kumari et al, found statistically significant improvements in fasting blood glucose and HbA1c levels post-intervention. The difference may be attributed to the use of a holistic model in counselling participants, which may have provided a more comprehensive and effective approach and a longer follow-up period of 12 months.⁷

The limitations of our study were related to duration of the intervention 22 weeks only and although the study was RCT been hospital-based limit its external validity. However, the strengths are the findings of this study suggest exploring other alternatives or adjunct interventions in the place of face-to-face LSM counselling sessions, such as telephone reminders, and mobile Apps use. These should be encouraged both in busy resource-limited and even resource-abundant settings. Further longitudinal long-term studies to assess sustained effects and investigate dose–response relationships between reminders and outcomes should be considered. Implementation science research on the cost effectiveness, appropriateness, acceptability, feasibility, of technology feedback loops should also be considered.

CONCLUSION

There was a statistically significant difference between the participants who were counselled on lifestyle practices and those who were not counselled. Although there was an improvement in glycaemic control post-intervention in both arms, the difference was not statistically significant. These findings highlight the value of lifestyle counselling in diabetes care and suggest that additional or complementary strategies may be needed to enhance glycaemic outcomes. Further research with larger sample sizes and extended follow-up is recommended.

Abbreviations

AKTH

Aminu Kano Teaching Hospital

BMI

Body Mass Index
DM
Diabetes Mellitus
FBG
Fasting Blood Glucose
HbA1C
Glycated Hemoglobin
HBS
Healthy behaviour score
LSM
Lifestyle Modification
RCT
Randomised Controlled Trial
T2DM
Type-2 Diabetes Mellitus

Declarations

Consent to Participate

All participants signed informed written consent and ethical approval was obtained for the study from the Health Research Ethics Committee of Aminu Kano Teaching Hospital (NHREC number 28/01/2020/AKTH/EC/3439AKTH).

Consent for publications – Not applicable

Data availability

Data will be available on reasonable request according to data privacy agreement of the institution.

Funding

The research was fully funded by the authors. There was no external funding received.

Acknowledgment

We appreciate all the participants for their time and voluntary participation.

Conflict of Interest

None to declare

Authors contribution

AAG, ZA - Research conceptualization and initial manuscript writing

ZA, FMD, ALO, AKS AAY- manuscript writing and review

AAG, TTO, ALO, ZA – data collection and analysis

ZA, AKS, FMD, ALO, TAB, GMC, BAG – Review figures, tables and senior advisory input

All authors- Review manuscript and provide final approval for publication.

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Figures

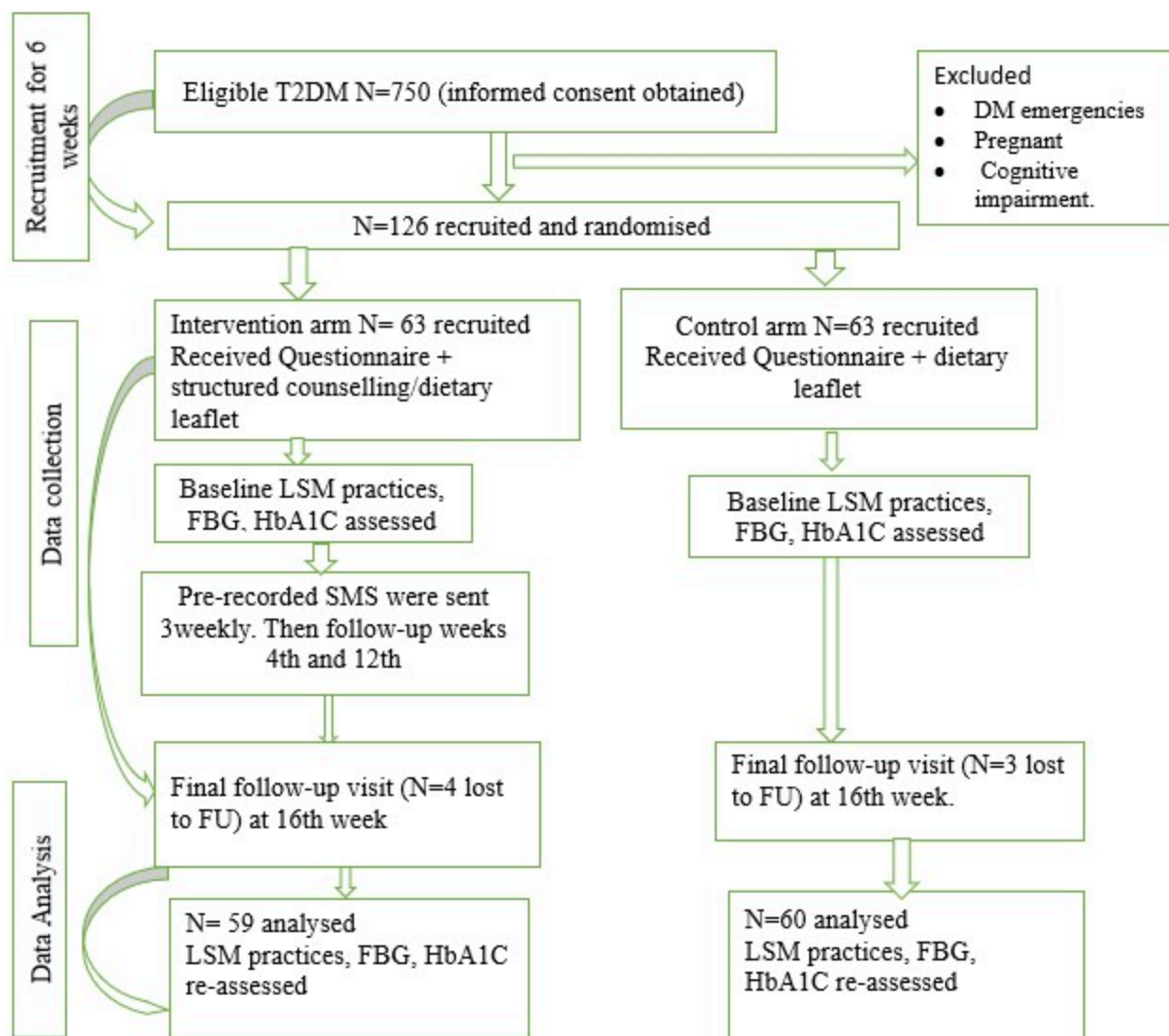


Figure 1

Consort flow chart of study participants

Preintervention comparison of Healthy Behaviour Score

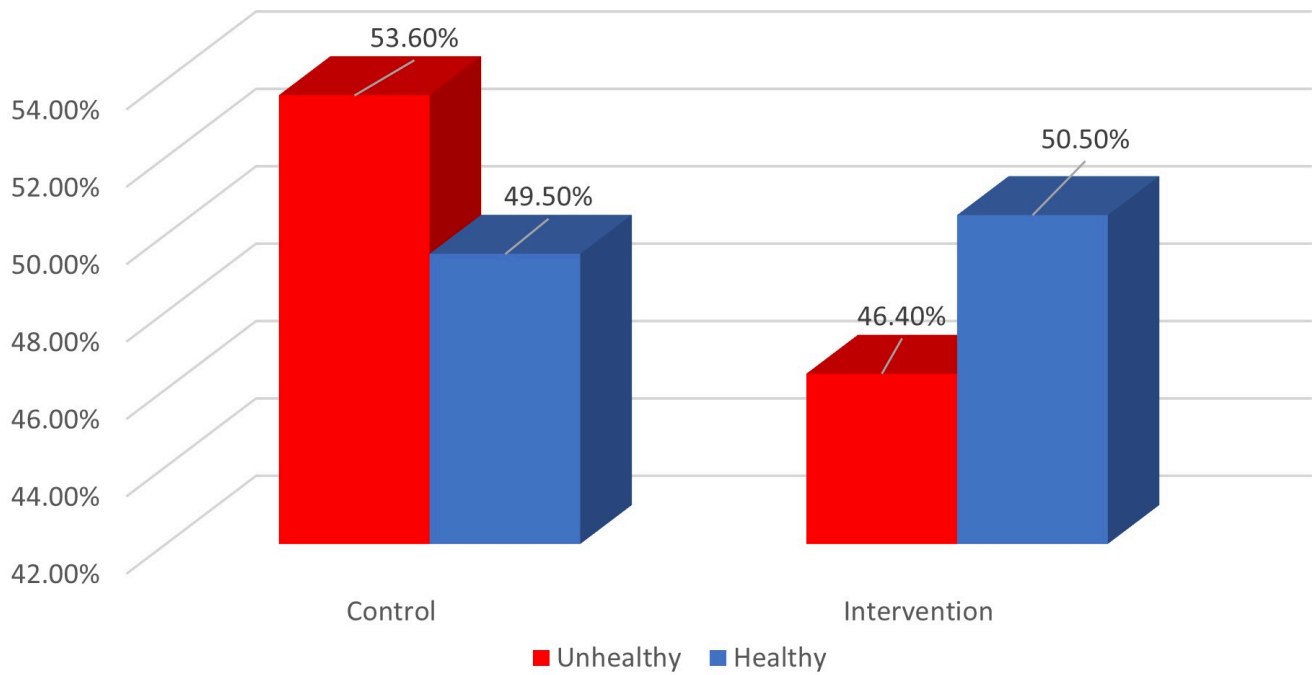


Figure 2

Pre-intervention Life style practices with Healthy behaviour Score

Post intervention comparison of healthy behaviour score

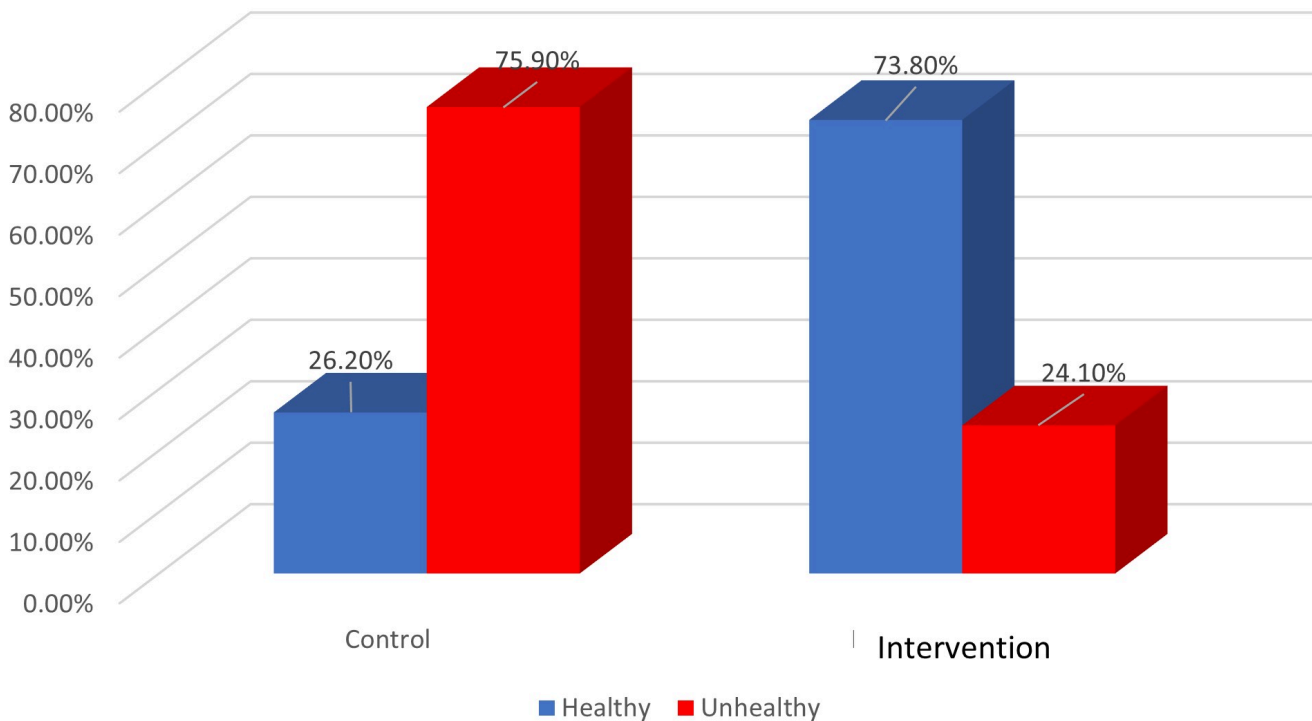


Figure 3

Post-intervention Life style practices with Healthy behaviour Score

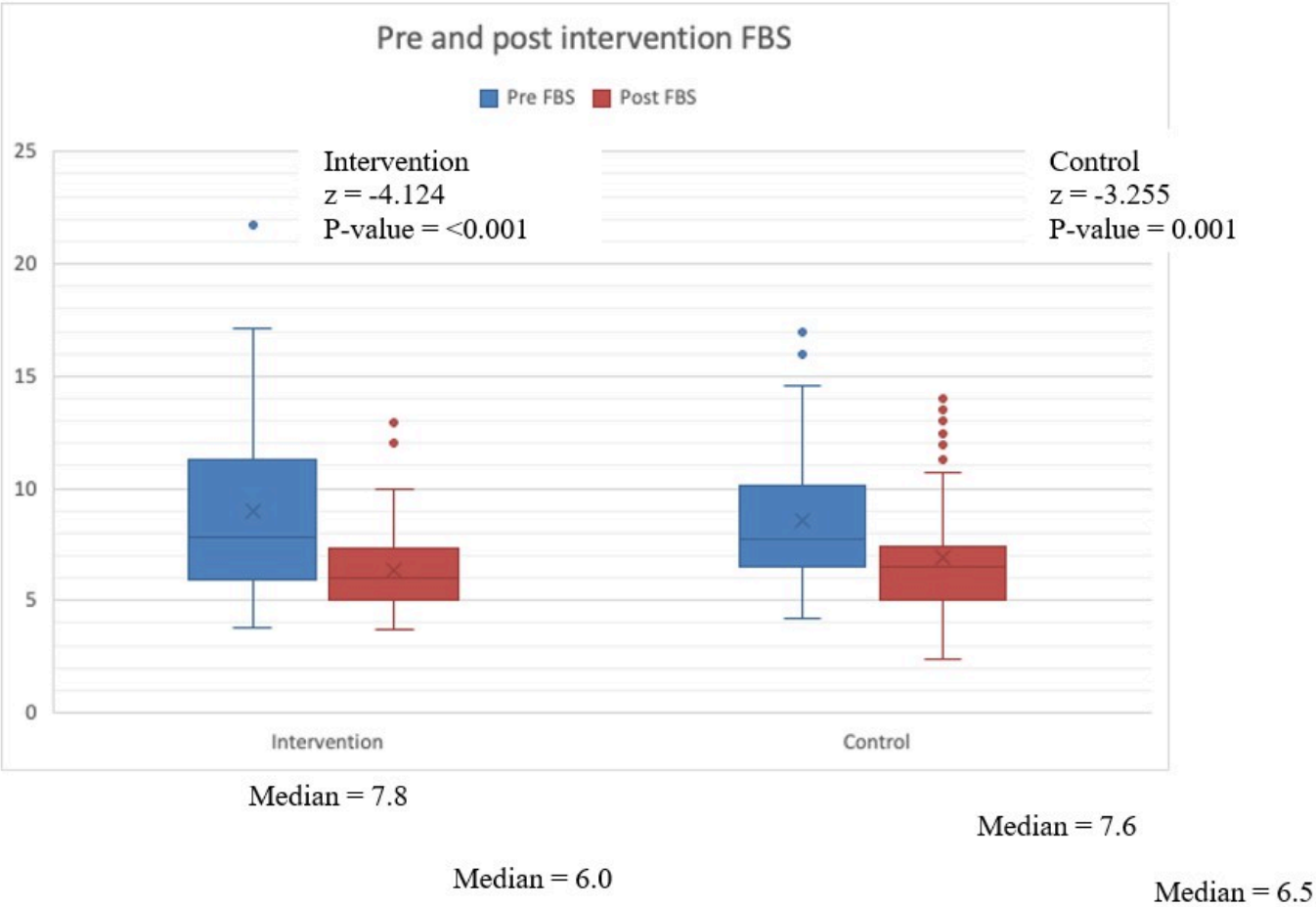


Figure 4

4a: Pre- and post-intervention glycaemic control with FBG

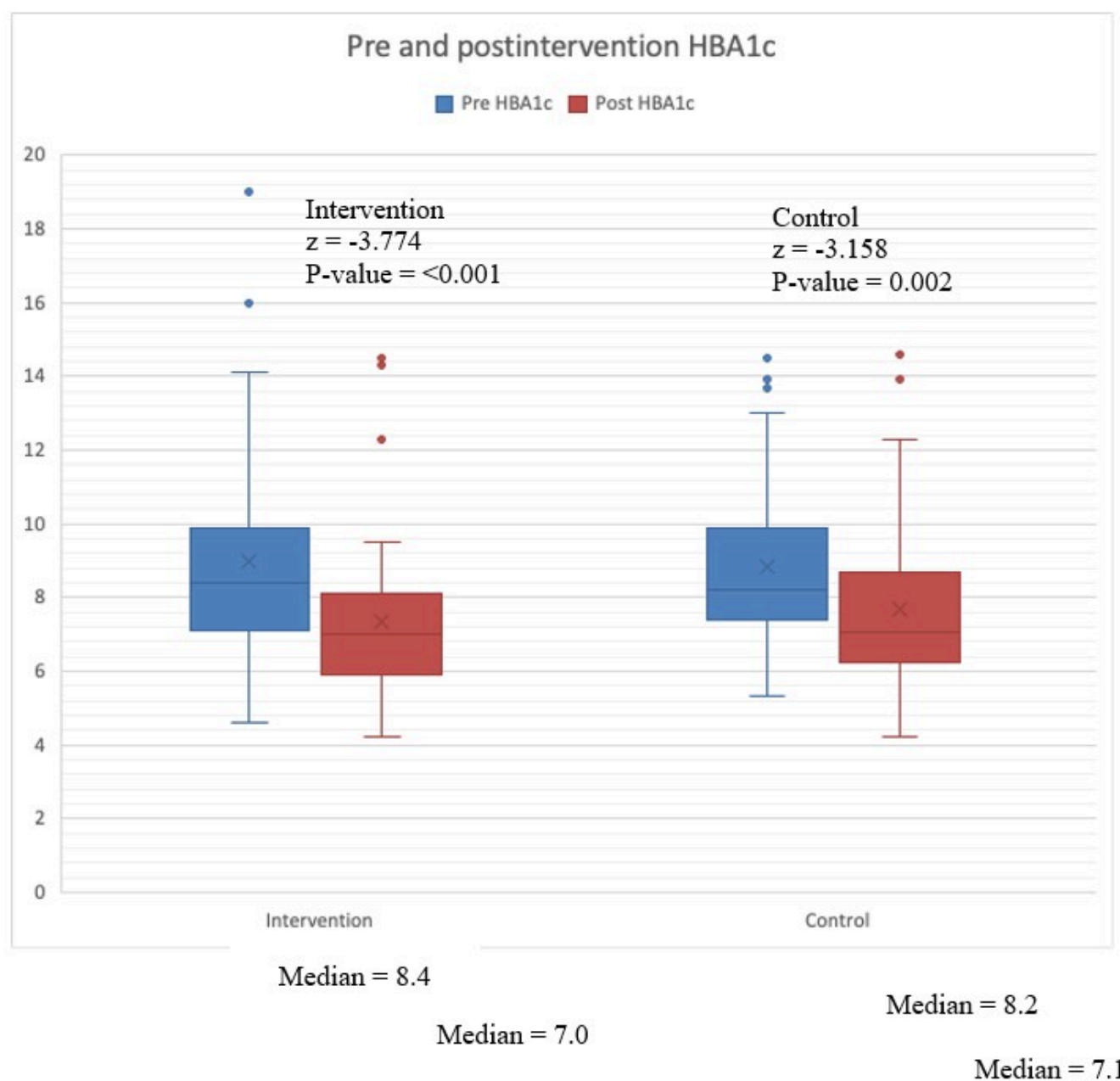


Figure 5

4b: Pre- and post-intervention glycaemic control with HbA1c

Supplementary Files

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