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The impact of a face-to-face peer-support intervention on adults with type 2 diabetes: a cluster-randomised trial

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Objective: To establish the impact of a face-to-face peer-support intervention on adults with type 2 diabetes in South Africa.
Methods: A cluster randomised controlled trial was conducted involving 288 adults with type 2 diabetes from six communities in the Free State province. Individuals ($n = 141$) in three communities were randomly allocated to the intervention group, and individuals ($n = 147$) in another three communities were randomly allocated to the control group. Trained community health workers led monthly group sessions and home visits. The control group received the usual care. The primary outcome of the study was glycated haemoglobin (HbA1c), measured at baseline and endpoint after four months. Secondary outcomes included blood pressure, body mass index and waist circumference, measured at baseline and endpoint. Descriptive statistics were calculated per group.
Results: No significant changes from baseline were found between groups regarding HbA1c ($p = 0.87$), body mass index ($p = 0.21$), waist circumference ($p = 0.24$) and systolic blood pressure ($p = 0.13$). Compared with the control group, the intervention group had a significant improvement in diastolic blood pressure ($p = 0.02$).
Conclusions: The face-to-face peer-support intervention delivered by trained community health workers in a semi-urban rural area resulted in a significant improvement in diastolic blood pressure of adults with type 2 diabetes.

Keywords: adults, community health workers, peer support, self-management, South Africa, type 2 diabetes

Introduction

Diabetes is a health pandemic that currently affects more than 463 million people globally. A further 374 million people are at risk of developing diabetes as a result of impaired glucose tolerance.[1] Likewise, South Africa has approximately 7.7% of males and 11.8% of females diagnosed with diabetes in a population of about 55.4 million people.[2] It is expected that 60% of this population is unscreened and undiagnosed.[3] Due to its chronic nature, ongoing support is an integral part of diabetes care. Peer support is a promising approach for providing ongoing support in the self-management of diabetes and other chronic diseases.[4] A peer can be interpreted in different ways. In this study, a peer refers to a community health worker (CHW) working and staying in the same area as the patients he/she serves. Within the South African context, CHWs have recently been integrated within the healthcare system, receiving a minimal wage, working a specified number of hours per week and often receiving random training related to basic health information.

CHWs can be expected to have strong connections with the community, since they share the same language, culture and value systems. These characteristics could make CHWs reliable and respected members of the community and, therefore, CHWs could have great influence on their community.[5] Literature acknowledges that CHWs could bridge the gap between the community and the healthcare system, since CHWs can inform the healthcare providers about community needs while also disseminating information to the community in a culturally appropriate manner.[6] CHWs may bridge the gap by providing accessible care in a specific area through emotional, appraisal, informational and instrumental support,[7] provided they are adequately prepared for this role through training.[8] Various studies support the integration of CHWs in health systems.[4,6] It is, therefore, clear that peer support by CHWs could be a vehicle for providing ongoing support to encourage the self-management of diabetes.

The management of diabetes is often less than ideal in semi-urban rural areas. Typically, semi-urban rural areas may refer to households with limited access to electricity, piped water and a sewage disposal system. Additionally, access to internet and computers may be very low in these areas.[9] Healthcare centres in these areas may experience insufficient staffing, inadequate resources, such as basic equipment necessary for diagnosis and monitoring and unavailability of medicine, little to no patient education and a large patient burden. Healthcare professionals in these areas are often demotivated and may integrate patient management protocols poorly.[10] Additionally, patients with diabetes commonly exhibit low levels of knowledge, negative attitudes and practices contrary to those recommended.[11] This situation could be compounded by the presence of language barriers and low patient literacy.[12]

The specific focus of the Thaba Nchu Botshabelo (TNB) Peer Support Study, as reported on in this study, was informed by the development of a health dialogue model for patients with diabetes, and who lived in a predominantly semi-urban rural area. During this model development, diabetes-related knowledge and practices of CHWs were found to be moderate and they have a positive attitude towards diabetes.[13] The model, furthermore, highlighted the preference of patients for one-on-one and group-based health communication instead of other forms of communication such as internet-based communication. Patients valued interaction with trained health workers and fellow patients in their own language.[13,14]

There is substantial literature supporting the positive effects of peer support on diabetes outcomes.[7,15] However, research on peer support programmes in diabetes, suitable for this context, is limited. The aim of this study was, therefore, to establish the impact of face-to-face peer support intervention on adults with type 2 diabetes in South Africa.

Methods

Study design
The TNB-Peer Support Study is a cluster-randomised trial conducted in accordance with the requirements of the Consolidated Standards of Reporting Trials (CONSORT) statement.[16]

Participants
Six communities in a semi-urban rural area were recruited for the TNB-Peer Support Study by means of information sessions held at primary healthcare centres (PHCs). Communities were eligible if they made use of CHWs at PHCs. Three communities were randomly allocated to the intervention group and three to the control group. Within communities, participants were either individuals with type 2 diabetes who would receive peer support or CHWs who would provide peer support. There were two phases in recruitment. In Phase 1, the author recruited individuals from each community during routine PHC appointments. Individuals were purposively selected and were eligible to participate in the study based on the following criteria: aged ≥18 years; diagnosed with type 2 diabetes by a physician; willing to participate; and home language Sesotho. This language criterion was significant as nearly three-quarters of the provincial population use Sesotho as the home language.[17] Individuals acutely ill and with known psychiatric/psychological disorders that may impair judgement and memory were excluded.

Only the intervention group underwent a second phase of recruitment. The author purposively recruited CHWs ($n = 31$) from the communities and invited them to participate in the study. In total, about 10 CHWs from every intervention community were selected based on the following criteria: had completed 12 years of schooling successfully; resided in the same community as participants; possessed good interpersonal skills; and were self-motivated.[18] Selected CHWs took part in monthly interactive training sessions conducted in English lasting 60–120 minutes for four months at the respective PHCs. The following topics were addressed during the training: Session 1: an overview of diabetes; Session 2: healthy eating; Session 3: physical activity and handling stress, and Session 4: complications of type 2 diabetes. The author conducted the training sessions using the principles of motivational interviewing and by using active listening, asking open-ended questions and making reflections.[19] The International Diabetes Federation's *Peer Leader Manual* guided the content of training.[20]

Ethics approval was obtained from the Health Sciences Research Ethics Committee of the University of the Free State (UFS-HSD2017/1546). All individuals with type 2 diabetes and CHWs gave written informed consent.

The researchers decided on a sample size of 200 participants, due to time and budgetary constraints: 100 in the intervention group and 100 in the control group. To allow for the effect of losses to follow-up, additional participants were randomised.

Eventually, the actual sample size was 288 participants. A retrospective statistical power calculation of 70.2% was determined for the study.

Randomisation was carried out by computer-generated random numbers. Due to the nature of the intervention, it was not possible to blind either individuals with type 2 diabetes, or CHWs.

Interventions
Usual care
Individuals in the control group received usual care at the PHCs. Usual care involved collecting medication at the PHC every month, random health talks in the waiting area and consultation with the clinical nurse practitioner or doctor once every three months.

Peer support intervention
Individuals in the intervention group received peer support in addition to usual care for four months. CHWs conveniently selected to their care five individuals who lived closest to them. These individuals met the same CHWs in a private area at the PHC every month for four months. The CHWs facilitated face-to-face group sessions lasting about 60 minutes. The CHWs presented the group sessions in the individuals' home language, following the same principles used during training. The author and other healthcare professionals were present on site if the CHWs needed assistance, but no healthcare professionals were present during the group sessions. The CHWs also conducted home visits once a month to reinforce knowledge and skills, to listen to the concerns of the individuals and to work with them to solve problems. CHWs worked in pairs to support each other during group and home visits.

The author supported the CHWs throughout the study. Debriefing sessions were provided for the CHWs on a monthly basis to discuss their experiences and challenges related to the peer-support intervention. The author was able to give feedback to the CHWs on their monthly performance, as group sessions were audio-recorded and a written report was provided of the home visits. A social media group was created for the CHWs of each community, to allow the CHWs to communicate with the author at any time and to allow the author to provide support to the CHWs.

Measurements
The primary outcome of the study was to establish the impact of the face-to-face peer-support intervention on adults with type 2 diabetes with regard to HbA1c. Changes in this outcome were assessed from baseline to endpoint. In addition, secondary outcomes, such as blood pressure, body mass index (BMI) and waist circumference, were also assessed from baseline to endpoint.

At baseline, individuals in both the intervention and control groups completed, first, an adapted diabetes questionnaire that gathered demographic data and assessed quality of life and health,[21] and second, the Sesotho Health Literacy Test (SHLT), which measured the general health literacy level of the individuals.[22] The questionnaire and SHLT were available in the home languages of the individuals and were completed by trained research assistants at the respective PHCs. The author measured HbA1c levels using the BioHermes Automated Glycohemoglobin Analyzer (Wuxi BioHermes Biomedical

Technology Co Ltd, Jiangsu, China) and by applying standard techniques and controls. The blood pressure of individuals was measured using the Welch Allyn Automatic Blood Pressure Monitoring System (https://www.hillrom.com/).

Body weight, height and waist circumference (midpoint between the lower costal margin and iliac crest) were also measured. Blood pressure and BMI measurements were taken by the author and trained research assistants at the respective PHCs.

Data analysis

Descriptive statistics, namely, frequencies and percentages for categorical data and medians and percentiles for numerical data, were calculated per group. The change from baseline was calculated and described by means of the relevant statistical test, given the data distribution was skewed. The Kruskal–Wallis test was used to describe numerical data and, for categorical data, the chi-square test or Fisher's exact test for small samples was used. The change within a group was described by means of McNemar's test; p-values ≤ 0.05 were taken to indicate statistical significance. SAS software was used to analyse all data (SAS Institute, Cary, NC, USA).

Results

CHW recruitment began in December 2018 and recruitment of patients with type 2 diabetes began in January 2019, during their routine PHC appointments. From January 2019 to March 2019, the baseline testing of 288 individuals with type 2 diabetes from the six communities from a semi-urban rural area was completed. Endpoint testing took place from May to August 2019 during routine PHC appointments of individuals, with 242 individuals from the six communities being tested. In some cases, individuals were contacted by phone to complete endpoint testing. In total, 31 CHWs, about 10 from each of the three intervention communities, were recruited and trained to provide face-to-face peer support to the individuals selected in their area. One CHW withdrew after the first training session for personal reasons. Over the four months of the TNB-Peer Support Study, 27 (19.1%) in the intervention group and 17 (11.5%) in the control group were lost to follow-up; however, no statistical difference between the groups was noted ($p = 0.07$). The study had an average individual attrition rate of 50% across the peer-support group sessions. The individuals' self-reported reasons for attrition included transport problems, clinic visits interfering with work and time constraints. The flow of individuals is reported in Figure 1.

Table 1 shows the baseline characteristics and clinical measurements of the peer intervention group and the control group. The intervention and the control group were similar at baseline, although the control group had lower levels of education ($p < 0.001$), quality of life ($p = 0.003$) and general health literacy levels ($p < 0.001$).

Table 2 shows the clinical outcomes at endpoint and changes in clinical outcomes from baseline for the intervention and the control group. After four months, there were no differences in HbA1c between the intervention and control groups. Systolic blood pressure, BMI and waist circumference also showed no difference after four months. Individuals in the intervention group had significantly lower diastolic blood pressure measurements ($p = 0.01$) than those in the control group.

Discussion

The TNB-Peer Support Study demonstrated that a face-to-face peer support intervention had no effect on HbA1c, systolic blood pressure, BMI and waist circumference. However, a significant improvement in diastolic blood pressure was noted in the intervention group. The improvement in diastolic blood pressure is significant considering that hypertension is a major risk factor for cardiovascular mortality and morbidity in patients with diabetes.[23,24] The results of this study are consistent with another study related to diastolic blood pressure improvement.[25]

In the TNB-Peer Support Study, the median HbA1c of the intervention group at baseline was 7.9, while it was 7.5 for the control group, with no significant changes noted at endpoint. The results of this study are consistent with other studies on peer-support interventions related to type 2 diabetes that did not find significant differences in glycaemic index.[23,24] It is interesting to note that, in these studies, the baseline HbA1c of the participants is < 8%.

The TNB-Peer Support Study contrasts with other studies that demonstrated significant improvements in HbA1c.[26,27] These studies had participants with HbA1c levels > 8% at baseline. It therefore seems likely that, when the HbA1c is targeted, peer support will be more effective in participants with HbA1c level > 8%. Whittle et al. state that HbA1c level within normal limits or close to normal ranges is highly unlikely to be influenced by peer support.[28] Egbujie et al. recommend triaging and selection criteria for HbA1c, since participants with HbA1c level > 8% are more likely to benefit from peer support than participants with HbA1c level < 8%.[7]

The literature acknowledges the high patient attrition rate for face-to-face diabetic group sessions,[5,29] and factors such as transportation costs, family obligations and scheduling conflicts have been identified as self-reported barriers to attendance.[5] Thus, literature recommends that a combination of communication strategies (group-based, one-on-one, mobile telephone or web-based), tailored to the unique needs of individuals and groups, is incorporated during health communication.[24,30] A combination of communication strategies has been known to increase the impact and efficiency of the health message and expose as many people as possible to the health message.[30] The use of one-on-one home visits, as a second mode of peer support in the TNB-Peer Support Study, was, thus, a strength of the study. In this way, any information lost in the group sessions could be acquired during the home visits. The home visits also served as a platform to reinforce knowledge and skills,[23] to listen to the concerns of individuals and guide the individuals with regard to disease management.[31]

A second strength of the TNB-Peer Support Study was that facility managers at the PHCs supported the author with regard to the peer support model. There was open communication between the parties, which ensured the availability of the CHWs for training, a private area every month for patient group sessions and CHWs' training sessions. However, the reality of limited physical space in PHCs cannot be ignored.

A real-life limitation in the TNB-Peer Support Study was the challenges faced by CHWs in the healthcare system, such as delayed remuneration. CHWs commonly have employment contracts of short duration, which are extended or terminated randomly, and they are remunerated with a small stipend that
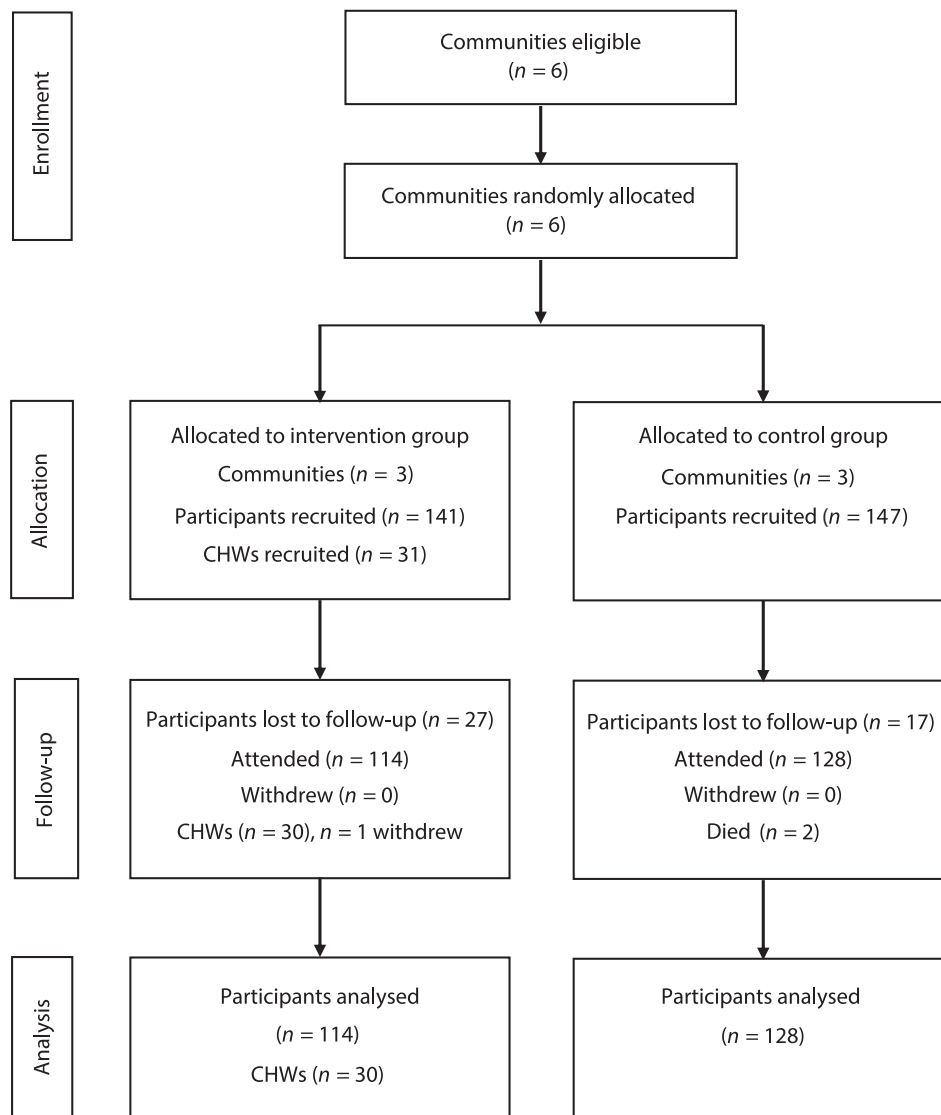
Figure 1: Participant flow.

is generally sporadic in nature.[32] At the time of the study, CHWs had not received their stipends for a few months and they were disgruntled. One group of CHWs was particularly demotivated and this attitude could possibly have affected patient group attendance. Despite the realisation that CHWs form an integral part of the healthcare system, policy guidelines for CHWs are unclear, which causes tremendous hardship, attrition and demotivation amongst CHWs.[33] CHWs are the crux of this particular model of peer support and, therefore, they need to be supported. The researcher offered each CHW a monthly transport fee as an incentive to do home visits. Another limitation of the TNB-Peer Support Study was the high individual attrition rate in the peer support group sessions, which was mitigated by home visits, as described above.

Conclusions

This cluster-randomised controlled trial indicates that it is feasible to implement a face-to-face peer-support intervention in adults with type 2 diabetes in a semi-urban rural area in the Free State, despite the modest results. The study resulted in a significant improvement in diastolic blood pressure of individuals. No differences were found, however, regarding the HbA1c, systolic blood pressure, BMI and waist circumference

variables. The following recommendations for the study are included.

The workload of the intervention was high due to the high follow-up of CHWs and this should be taken into consideration during the planning and implementation of a peer-support intervention. The study period was relatively short and may have limited other significant changes in variables from being observed, and a longer study period is recommended in future research.

If HbA1c is the primary outcome of such an intervention, researchers should consider triaging patients with HbA1c > 8% for inclusion in a peer-support programme.

Due to the significance of outcomes other than physiological outcomes in a randomised control trial, the researcher has explored the experiences of the patients who took part in the TNB Peer Support Intervention and reported it elsewhere.

Table 1: Baseline characteristics and clinical measurements of the intervention group and the control group

Demographic characteristics	Intervention group	Control group	*p*-value
Gender:			
Male, *n* (%)	22 (15.6)	24 (16.3)	
Female, *n* (%)	119 (84.4)	123 (83.7)	0.86
Age, years, median (IQR)	60 (54, 69)	62 (56, 69)	0.46
Level of education, *n* (%):			
No schooling	2 (1.4)	11 (7.5)	
Some high school	70 (49.7)	35 (23.8)	
Completed high school	21 (14.9)	23 (15.7)	
Certificate	0 (0)	4 (2.7)	
Diploma	1 (0.7)	0 (0)	
Primary school	47 (33.3)	74 (50.3)	*< 0.001
Quality of life, *n* (%), self-reported:			
Problems with walking	27 (19.2)	33 (22.5)	0.49
Problems with self-care	5 (3.6)	7 (4.8)	0.60
Problems with usual activities	9 (6.4)	15 (10.2)	0.24
Happy most days of the week	115 (81.6)	96 (65.3)	*0.003
Years living with diabetes, median (IQR)	6 (3,12)	8 (3,14)	0.20
Taking medication for other known illnesses, *n* (%)	120 (85.1)	132 (89.9)	0.23
Other known illnesses, *n* (%), self-reported:			
Cardiovascular	115 (95.8)	129 (97.7)	0.48
Asthma	2 (1.7)	5 (3.8)	0.45
Epilepsy	2 (1.7)	2 (1.5)	1.00
Mental illness	4 (3.3)	0 (0)	0.05
HIV/AIDS	4 (3.3)	3 (2.3)	0.71
Arthritis	6 (5.0)	5 (3.8)	0.63
Gastrointestinal	0 (0)	1 (0.8)	1.00
Renal	1 (0.8)	0 (0)	0.47
General health literacy level, *n* (%):			
Low	2 (1.4)	23 (15.7)	
Moderate	31 (22)	41 (27.8)	
High	108 (76.6)	83 (56.5)	*< 0.001
HbA1c, mmol/mol, median (IQR)	63 (43, 81)	59 (44, 80)	
HbA1c, %, median (IQR)	7.9 (6.1, 9.6)	7.5 (6.2, 9.5)	0.4
BMI, kg/m^2, median (IQR)	31.3 (27.7, 35.1)	34.7 (29.1,38.7)	*0.003
Waist circumference, cm, median (IQR)	102 (96.5, 113)	106 (97, 113)	0.2
Blood pressure, mmHg			
Systolic Blood pressure, Median (IQR)	139 (127, 156)	141 (124, 153)	
Diastolic Blood pressure, Median (IQR)	83 (76, 93)	85 (77, 90)	

Data are reported as median (IQR) for numerical variables, *n* (%) for categorical variables. IQR, interquartile range.
*p-value ≤ 0.05.

Table 2: Clinical outcomes at four months and changes in clinical outcomes from baseline.

Variable	Clinical outcomes at 4 months			Changes in clinical outcomes from baseline		
	Intervention	Control	*P*-value	Intervention	Control	*P*-value
HbA1c, mmol/mol (IQR)[1]	64 (48,83)	59 (49,79)				
HbA1c, %, Median (IQR)	8.0 (6.5, 9.7)	7.5 (6.6, 9.4)	0.92	0.4 (−0.5, 1)	0.2 (−0.2, 0.8)	0.87
BMI, kg/m^2, median (IQR)	31.7 (27.4, 35.9)	34.7 (29.1, 38.9)	0.26	−0.1 (0.7, 0.5)	0.1 (−0.6, 0.6)	0.21
Waist circumference, cm, median (IQR)	101.0 (96, 111)	106.0 (97, 114)	0.17	0 (−2.5, 1.5)	0 (−2, 1)	0.24
Blood pressure, mmHg:						
Systolic BP, median (IQR)	140 (130, 155)	145 (130, 160)	0.11	1 (−12, 18)	5 (−4, 20)	0.13
Diastolic BP, median (IQR)	80 (70, 90)	85 (77,91)	*0.01	−3 (−12, 7)	1 (−6, 8)	*0.02

Data are reported as median (IQR) for numerical variables, n (%) for categorical variables. IQR, interquartile range.
*P-value ≤ 0.05.

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