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RESEARCH ARTICLE

Baseline Assessment of Knowledge of Home Based Carers for People with Diabetes in a Rural Village in South Africa: A Quantitative Study

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Abstract:

Background:

In South Africa, Type 2 Diabetes Mellitus (T2DM) is a significant health problem causing disability and premature death. Home Based Carers (HBCs) who care for T2DM patients in a rural village in South Africa lack formal training, which may result in knowledge deficits on the provision of care.

Objective:

To describe knowledge of HBCs who care for T2DM patients in a rural village in South Africa.

Methods:

A self-administered questionnaire with closed-ended questions was used. The questionnaire included seven questions to assess biographic characteristics, 13 self-test statements to assess actual common practices and 29 statements to test diabetes knowledge. Data were captured and analysed using the Statistical Package for Social Sciences version 24.

Results:

More than 60% of the HBCs had between 5 and 10 years of experience with a mean of 9 years. Eighty-nine percent (89%) of HBCs had some kind of secondary education but 89% never attended an in-service training on T2DM. Only 27% of HBCs agreed with the statement they could instruct people with diabetes on daily personal care and 11% agreed they could identify the normal ranges of blood glucose. Where 57% of the respondents agreed with the statement they could not perform one method of blood glucose control, 1 out of 3 (32%) agreed with the statement they could not instruct people with diabetes on self-care management for a sick day. The results revealed that there was no significant relationship ($\rho = .055$, $N = 53$, $p = 0.69$) between HBCs years of experience and knowledge scores.

Conclusion:

The study showed that HBCs who care for people with diabetes lack knowledge with regard to diabetes mellitus. Therefore, people with diabetes in a rural village in South Africa are not managed well and there is a need for training of HBCs on T2DM.

Keywords: Knowledge, Practices, Diabetes mellitus, Home based carers, Type 2 diabetes mellitus, Non-communicable diseases.

Article History

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1. BACKGROUND

The global epidemic of Non-Communicable Diseases (NCDs) poses challenges to the health systems of many countries [1]. Incidence and prevalence of T2DM are increasing globally, resulting in secondary health problems despite numerous initiatives trying to prevent the disease [2]. T2DM is

the fourth leading cause of disease-related deaths globally and places a significant economic burden on healthcare systems and individuals suffering from the condition [3].

South Africa (SA) has an increasing number of adults aged between 21 and 79 suffering from T2DM, and the statistics indicated about 7% [4]. T2DM is a major health problem resulting in disability and premature deaths in all areas in SA [5]. The increasing burden of T2DM led to overcrowding and increased workloads at health facilities especially in Primary

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Health Care (PHC), and this results in the provision of poor services to health care users [6]. This significant increase in the burden T2DM in SA led to shortages of health care workers at PHC level, which makes it difficult to achieve better health outcomes for the prevention and control of T2DM [7].

The rise in T2DM has an impact on the demand for care of chronic diseases and this has pressed for the need to develop an alternative workforce [7]. The demand for care of chronic diseases including T2DM led to the utilisation of Home Based Carers (HBCs) as an alternative workforce to mitigate the human resources crisis⁶. Home Based Care (HBC) is a programme that emerged and expanded following HIV/AIDS and the introduction of Antiretroviral Therapy (ART) in many African countries, in which HBCs were recruited to offer services like treatment adherence and retention [8]. Currently, policies recommend the use of HBCs in T2DM and other NCDs-related prevention and control activities [9].

HBCs also known as Community Health Workers or lay counsellors are individuals believed to have an extensive understanding of the community culture and language [10]. However, some HBCs have received a shorter duration of non-standardised informal training for the purpose of providing culturally appropriate health services to the community. They have an unspecified level of education as a requirement for entry to the job. Although level of education is not considered when employing HBCs, the study conducted on supporting people with AIDS and their carers in rural South Africa indicated that they attended school up to basic education which is up to 12 years of education in SA and they work with little or no payment to cover their expenses [11]. HBCs are recruited by HBC organisations within and around the community in which they live, and give them some information to enable them to provide basic services as volunteer caregivers to people in their homes [12]. They participate in health promotion and disease prevention which involves basic treatment and collection of community health information [10]. HBCs join forces with other health care providers to educate patients, provide case management, coordinate care, and form part of support networks [12].

South Africa has a high number of people who require home-based care due to an increase in NCDs including T2DM [13]. The care provided by HBCs takes place within the homes of the patients. The South African National Department of Health (NDoH) required the support of all government and Non-Governmental Organisations (NGOs) to take part in their vision of healthy lifestyle for all people in SA [4]. In response to the need and effort of reaching as many patients as possible, the study conducted on NCDS indicated the need to deploy and train HBCs to provide appropriate care based on standard guidelines [1].

HBCs serve as a bridge between PHC nurses and patients in the community. They ensure that patients understand, remember and are motivated to follow their care plan [14]. HBCs are identified as a key component of many successful diabetes self-management programs [15]. Furthermore, HBCs enhance the health and competence of their community through the distribution of health information and assistance in carrying out diabetes interventions [15]. It was further indicated that

HBCs can effectively improve patients' management of their own condition through health education and promotion of healthy lifestyles [14].

In SA, HBCs supervised by the nurses at the PHC offer a package of care to community members, which include caring for people diagnosed with diabetes mellitus [8]. A study conducted in Cape Town, Khayelitsha (Western Cape) indicated that HBCs' knowledge, attitudes and beliefs about diabetes are not well developed [5]. Based on the problems stated above, this study seeks to determine the knowledge and practices of HBCs who care for people with diabetes at Ga-Dikgale village. Specifically, this study sought to answer the research question "What is the knowledge of HBCs who care for diabetes people related to diabetes in a rural village in South Africa?" The results of this study can inform the development and implementation of a training programme for HBCs based on the identified gaps, which may contribute to the improvement of service delivery, and patient satisfaction by HBCs.

2. METHODS

2.1. Study Design and Setting

A cross-sectional approach was used to assess the knowledge of HBCs who care for people with diabetes mellitus in a rural village in South Africa.

2.2. Population and Data Collection

A total of 65 HBCs working in a rural village in South Africa and associated with 4 regional clinics provide primary health care services to the rural village. These four clinics provide primary health care services to the entire village and are catchment areas for a tertiary hospital which is situated 18 kilometres away. The HBCs were recruited from HBC Centres functioning under the four clinics. HBCs report at the centres on a daily basis before going to see their patients, so they were approached and invited to participate in the study before leaving the centre. Eighty-one percent (81%) of the HBCs who were available during the period of data collection voluntarily agreed to be included in the study. The study excluded HBCs who were on leave during the period of data collection. All participants provided written informed consent.

Self-administered questionnaires were used to collect data for a period of four (4) weeks from September - October 2016. Diabetes knowledge was tested using questions adopted from diabetes knowledge questionnaires [17, 18]. Several questions were deemed, not relevant for this study and were excluded, *i.e.* questions about diabetes medical treatment schemes, questions to be answered by People Living With Diabetes (PWD) themselves and questions about Type 1 Diabetes Mellitus. The questionnaire was then translated to Sepedi (local language). The newly developed questionnaire consisted of the following three sections: Section A consisted of 7 (seven) multiple choice questions used to assess some biographic characteristics of the HBCs. Section B consisted of a 13 statements self-evaluation tool with a 5 point Likert type scale ranging from 1 (strongly disagree) to 5 (strongly agree) aiming to assess actual common practices of HBCs towards people

with diabetes. Section C consisted of 29 multiple choice questions to assess HBCs' actual knowledge related to diabetes. A scoring system was created for these knowledge questionnaires by giving one score for each correct answer and a 0 score for incorrect, uncertain or missing answers. The total score ranges from 0 - 29. Average scores were calculated and scores below average indicate low knowledge level. The HBCs filled the questionnaires for about forty-five minutes and the researcher was available in case they had clarity seeking questions.

2.3. Validity and Reliability

To ensure face validity, the questionnaire was submitted to the research supervisors, local experts and peers at research seminars and academic research committees to assess instrument validity [19, 20]. The questionnaire was also checked for the representation of all the components of the variables and the suitability for use [20] to ensure content validity.

To identify any problems related to the understanding and interpretation of the questionnaire, the whole inquiry questionnaire was pretested with 6 HBCs, not included in the study to ensure reliability. The results of the pre-test indicated that the respondents understand the questions included in the questionnaire. Internal consistency of the questionnaire was tested using Cronbach alpha. Section B of the questionnaire consisted of 13 items for HBCs self-evaluation questions indicating the value of 0.83. This suggests that the items have a relatively high internal consistency. Section C of the questionnaire comprised of 29 items and reliability analysis was also carried out including all the items. Cronbach alpha showed the value of 0, 57, suggesting that the items have low internal consistency.

2.4. Data Analysis

Data were captured and analysed using Statistical Package for Social Sciences (SPSS) version 24. The results were summarised and presented by frequencies and percentages. Correlation coefficients measured the association between knowledge scores and the HBCs years of experience. An alpha level of < 0.05 was considered to be statistically significant. Cronbach alpha was also performed to assess the internal consistency of the questionnaire.

Ethical clearance was obtained from the Turfloop Research Ethics Committee (TREC/76/2016: PG) and permission to conduct the study was obtained from the Limpopo Department of Health and from the Managers of HBC centres. Permission to conduct the study was also granted by the Department of Health and HBC centre managers. All analyses were conducted using Statistical Package for the Social Sciences (SPSS) Version 24.0.

3. RESULTS

3.1. Biographic Characteristics of HBCs

Approximately 60% of the HBCs' had between 5 and 10 years of experience (mean 9 years). Eighty-nine percent (89%) of the respondents had secondary education and 89% never

attended an in-service training on diabetes. Just above 9% HBCs indicated that they felt competent about caring for people with diabetes. Table 1 shows the characteristics of the HBCs in details.

Table 1. Summary of Characteristics of Home Based Carers (N = 53).

Characteristics	Frequency(n)	(%)
A1. Years of experience		
<5	6	11
5 – 10	32	60
>10	15	28
A2. Education level (n=53)		
Secondary education	47	89
Tertiary education	6	11
A3. In-service Education (n= 53)		
No	47	89
Yes	6	11
A4. Diabetes in family		
No	41	77
Yes	12	23
A5. Self-reported competency level		
Competent	5	9
Somewhat competent	20	38
Not very competent	28	53

3.2. Self-reported Knowledge on Type 2 Diabetes Mellitus

Table 2 presents the respondents' views on the management and treatment of people with diabetes. Only 27% of HBCs agreed that they can instruct people with diabetes on daily personal care and 23% indicated that they can describe diabetes-recommended diet instructions. In relation to the deviations of normal glucose values, 19% of HBCs agree they can manage the needs of people with T2DM experiencing hyperglycaemia or mild hypoglycaemia. However, only 10% agree they can explain the basic treatment for T2DM. Besides, 57% of the respondents agree they cannot perform one method of blood glucose control and 37% agree they cannot instruct people with diabetes on self-care management for a sick day.

3.3. Tested Knowledge on T2DM

The responses to the 29-item diabetes knowledge questions are presented in Table 3. The majority of the HBCs answered correctly questions relating to (1) how often should people with diabetes exercise or be physically active (70%); (2) and why people with diabetes are advised to test their own blood glucose (58%). However they scored poorly on questions relating to (1) management of type 2 diabetes (6%); (2) the effect of an illness on a diabetic's insulin requirements (9%), (3) the cause of hyperglycaemia (11%).

3.4. Diabetes Knowledge Scores

The sum of all the correct answers for individual HBCs related to diabetes knowledge was calculated and the average was 9 correct answers out of 29 questions. The diabetic knowledge scores ranged from 3 to 19. Only 6% of HBCs scored above 50% indicating good knowledge level.

Table 2. Self-reported HBCs knowledge on T2D (N=53).

Variables	Agree	Neutral	Disagree
	n(%)	n(%)	n(%)
B1. I can describe the cause of type 2 diabetes	8(16)	20(37)	25(47)
B2. I can explain the basic treatment for type 2 diabetes	5(10)	15(28)	33(62)
B3. I can manage the care of a diabetic patient with mild hypoglycaemia	10(19)	2(23)	30(58)
B4. I can interpret urine test results for a diabetic patient	5(10)	6(11)	41(79)
B5. I can describe the action and effect of the oral hypoglycaemic agents	8(16)	6(11)	37(73)
B6. I can describe the diet recommended for type 2 diabetes	12(23)	11(21)	29(56)
B6. I can instruct the diabetic patient on daily personal care	14(27)	18(35)	20(39)
B7. I can manage the needs of a diabetic patient experiencing hyperglycaemia	10(19)	17(33)	25(48)
B8. I can identify the normal ranges of blood glucose	6(11)	7(13)	40(76)
B9. I cannot instruct a diabetic patient on self-care management for a sick day	19(37)	15(29)	18(35)
B10. I cannot explain how stress affects diabetes control	17(32)	18(34)	18(34)
B11. I cannot explain how exercise affects diabetes control	15(28)	18(34)	20(38)
B12. I cannot perform one method of blood glucose control	30(57)	7(13)	16(30)

Table 3. Number of HBCs knowing the correct answer (N=53).

Questionnaire Items	Correct Responses n(%)
C1. What is an ideal range for blood glucose (sugar) levels for a Person With Diabetes (PWD)?	22(42)
C2. What is the correct diet for a patient with diabetes?	25(47)
C3. What are the characteristics of Type 2 diabetes mellitus?	10(19)
C4. Identify the age group in which Type 2 diabetes is mostly found	10(19)
C5. What is the characteristic of diabetes Type 2 mellitus?	8(15)
C6. Definition of the condition diabetes mellitus	21(40)
C7. Which statements about diabetes mellitus and diet are true?	18(34)
C8. Why is doing regular exercise or being physically active good for your health?	26(49)
C9. How often should people with diabetes exercise or be physically active?	37(70)
C10. Well-managed diabetes decreases the risk of which condition?	15(29)
C11. What foot problems are people with diabetes most at risk of?	24(46)
C12. Why are people with diabetes advised to test their own Blood Glucose (BG)?	31(58)
C13. What should a PWD do if s/he becomes ill?	20(38)
C14. Diabetic people need a medical check-up of their eyes/nerve and kidney function at least: (frequency)	7(13)
C15. Which one of the following statements about diabetes medication is true?	19(36)
C16. If a PWD has a hypo (low blood glucose level) reaction, s/he should ...	22(42)
C17. Which one of these statements about the management of T2D is true?	3(6)
C18. If a known PWD is found unresponsive, what assumptions about the person's blood glucose should guide your initial actions?	26(49)
C19. When should a well-controlled PWD always check urine for ketone?	19(37)
C20. What is a reported side effect of oral hypoglycaemic agents?	6(11)
C21. A symptom of hypoglycaemia (low blood sugar)	8(15)
C22. A symptom of hyperglycaemia (high blood sugar)	17(32)
C23. What is one cause of hypoglycaemia (low blood sugar) in a PWD who is taking insulin or oral hypoglycemic agents?	21(40)
C24. What is one cause of hyperglycemia (high blood sugar)?	6(11)
C25. What effect does illness (for example, a "sick day") have on a PWD's insulin requirements?	5(9)
C26. Identify long term complications associated with diabetes	17(32)
C27. Why is it necessary that PWD pay special attention to proper care of their feet?	22(42)
C28. A PWD has a small con on the right foot and wants it removed. What should be done first?	24(45)
C29. A PWD has just received a minor abrasion on the left leg. What should be done to treat the abrasion?	17(32)

3.5. Correlation Between Years of Experience and Knowledge

A Spearman's correlation coefficient was conducted to assess the relationship between the years of experience of HBCs and the rating of their knowledge level. The results revealed that there is no significant relationship between the two variables ($\rho = .055$, $p = 0.69$). Higher years of experience as HBC were not associated with higher levels of scores.

4. DISCUSSION

This study provides a picture of the knowledge of HBCs related to T2DM in a rural village, in South Africa. Their work requires them to be knowledgeable about the most prevalent diseases in the community including diabetes mellitus [22]. Our results which are consistent with other studies indicated that HBCs lack knowledge related to T2DM, making it difficult for HBCs to provide proper care to PWD because they do not know exactly what to do [5, 6, 21]. As a consequence, most HBC may feel incompetent and lack confidence. A study conducted in a rural village in South Africa revealed that HBCs who care for people with diabetes mellitus had knowledge deficits on the provision of care, in part due to lack of formal training [16]. There is no training programme for HBCs on the management of chronic conditions including diabetes mellitus in a rural village in South Africa. Furthermore, patients and health care providers reported that patients lack respect for HBCs due to lack of training [16]. The knowledge deficiencies were observed in the characteristics and age group of people with diabetes mellitus; management of type 2 diabetes mellitus and cause of hyperglycaemia. This raises concerns given the health promotion responsibility of HBCs that include discussing at-risk age groups and causes of hyperglycaemia. HBCs are not able to manage and treat people with type 2 diabetes mellitus. These indicate the need to come up with a solution to the problem because the health and safety of type 2 diabetes mellitus people are at stake. Indeed, enhanced training on common diseases including DM is needed for HBCs [23].

Poor knowledge levels found in this study have been observed by other researchers [6] and raises concerns of lack of understanding and compliance by patients, which may hinder them from changing behaviour or accessing services [24]. HBCs have not attended an in-service education about T2DM and this is consistent with the findings of other studies [25]. The implications of the results of this study are that the health of PWD may not improve while being managed by HBCs without relevant knowledge about the disease. Lack of training indicates that there is a need for training to equip them with the knowledge to enable them to render quality care for diabetic people.

Majority of the participants of this study have attended school up to the secondary level of education and the findings are consistent with the findings of other studies [6, 22, 26]. The fact that they have attended school suggests that they can be trained successfully on the care of diabetes people, to enhance their knowledge so that they will provide quality care to T2DM people. HBCs in this study have many years of experience taking care of PWD and the results are consistent with the

findings of another study [22]. However, years of experience working as HBCs are not associated with a high level of knowledge. So also HBC with a large number of years of experience are in need of training for them to be able to better serve T2DM patients and at-risk populations. The success and sustainability of HBC programmes require the ongoing commitment of quality training of HBCs [27].

Based on the study results, it is necessary to equip HBCs with knowledge related to T2DM to enable them to provide quality care to PWD. The need for training was supported by other studies by confirming that HBCs can be effectively trained to screen for and identify people at risk [5, 25, 28, 29]. The utilisation of trained HBCs with ongoing supervision and support will be beneficial in the prevention and care of people with diabetes [30]. Therefore, a training programme should be developed for training HBCs on diabetes mellitus to ensure that they provide quality care to diabetic people. The training programme should include the following topics; (1) basic knowledge and classification related to diabetes mellitus, (2) Prevention and control of diabetes and (3) Management of diabetes and prevention of complications by HBCs. The formal training of HBCs is necessary to align with the National Qualifications Framework [31]. HBCs hired to deliver diabetes education care interventions require additional training to enable them in the provision of those services [32].

This study had several limitations and strengths. The small sample size was a limitation in this study. However, the study was based on HBCs in a rural village in South Africa and all the HBCs in the four clinics were included. Despite the small sample, this was still an important study because it provided a picture on knowledge of HBC in relation to diabetes, and enabled the researcher to develop a contextualized training programme. Although the results cannot be generalized to other HBCs outside a rural village in South Africa, similar settings could find the results and recommendations useful. Internal reliability analysis on the 29 items in section B was 0, 57, suggesting that the items have low internal consistency, and this was another limitation for this study. The acceptable values of an alpha range from 0.70 to 0.95 and a low value indicates that the items on the questionnaire are not related [33]. The questions from the questionnaire were adopted and ex-back translation was not done which might have caused the problems to the questionnaire because of cultural different interpretations and the loss of meaning of some phrases during translation/back translation [34].

CONCLUSION

The study showed that HBCs who care for diabetic people lack knowledge with regard to the definition of condition diabetes mellitus, types of diabetes mellitus, age group in which T2DM is mostly found, ideal range for blood glucose, signs and symptoms of diabetes mellitus, diabetes diet, prevention and control of diabetes mellitus, the complications of diabetes mellitus and management of diabetic complications. To be able to improve the care for PWD in a rural village in South Africa, these knowledge gaps should be addressed by training HBC on diabetes mellitus in order to equip them with knowledge and skills necessary to provide quality care to

PWD. Training of HBCs is mandatory to help people with diabetes to implement lifestyle modifications and also to care for PWD, manage and control blood glucose and to prevent complications.

LIST OF ABBREVIATIONS

ART	=	Antiretroviral Therapy
HBC	=	Home Based Care
HBCs	=	Home Based Carers
NDoH	=	National Department of Health
NCDs	=	Non-Communicable Diseases
NGOs	=	Non-Governmental Organisations
PLWD	=	People Living With Diabetes
PHC	=	Primary Health Care
SA	=	South Africa
SPSS	=	Statistical Package for Social Sciences
TREC	=	Turfloop Research Ethics Committee
T2DM	=	Type 2 Diabetes Mellitus.
PWD	=	People with Diabetes.

AUTHOR'S CONTRIBUTIONS

MA contributed to the concept, design, and literature search, interpretation of data and drafting of the manuscript. TM contributed to study concept and revision of the manuscript. HB contributed to the study concept and revision of the manuscript. MM contributed to the analysis and interpretation of the results and revision of the manuscript. JW contributed to the analysis and revision of the manuscript. All the authors have read and approved the manuscript for submission.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Ethical clearance was obtained from the Turfloop Research Ethics Committee (TREC/76/2016; PG).

HUMAN AND ANIMAL RIGHTS

No Animals were used in this research. All human research procedures followed were in accordance with the ethical standards of the committee responsible for human experimentation (institutional and national), and with the Helsinki Declaration of 1975, as revised in 2013.

CONSENT FOR PUBLICATION

All HBCs received oral and written information and gave informed consent in writing and verbally before they can participate in the study.

AVAILABILITY OF DATA AND MATERIALS

The data sets used and/or analysed during this study are available from the corresponding author on request.

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CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

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Declared none.

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