

Diabetes-related knowledge, attitude and practices (KAP) of adult patients with type 2 diabetes mellitus in the Free State province, South Africa

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Introduction: Type 2 diabetes mellitus (T2DM) is a global health problem with high morbidity and mortality in patients who are mostly still economically active. The growing incidence and health implications for those affected make T2DM a major public health issue.

Objectives: To compile a demographic, anthropometric and knowledge, attitude and practices (KAP) profile of adult patients with T2DM in the public health sector of the Free State province, South Africa.

Design: A descriptive observational study was conducted.

Setting: A total of 255 participants attending public health facilities in the Free State were interviewed.

Outcome Measures: Questionnaires were completed in an interview to determine demographics and KAP. Anthropometric measurements were obtained by standard techniques.

Results: The majority of the participants ($n = 222$; 87.1%) were black women from urban areas, who were overweight and obese. The median age at diagnosis was 48 years (range 15–80 years), and 25 participants (9.8%) lacked formal schooling. In 212 participants (83.1%), a waist circumference above cut-off points was observed. Only half of the participants knew the normal range for blood glucose. Approximately 80% felt that they would be a different person if they did not have diabetes. Although 96.1% of participants were knowledgeable about the benefits of physical exercise, only 31.0% reported exercising on a daily basis. A statistically significant association was found between knowledge and attitudes, indicating that better knowledge about diabetes could be associated with a more positive attitude towards diabetes.

Conclusion: Poor knowledge, a negative attitude and poor practices related to diabetes were observed in a very high percentage of participants, which may contribute to morbidity and mortality. The fact that knowledge was associated with attitude indicates that interventions aimed at improving knowledge could benefit patients in more than one way. Interventions to equip patients to successfully manage their condition are urgently required.

Keywords Type 2 diabetes mellitus, knowledge, attitude, practices

Introduction

Type 2 diabetes mellitus (T2DM) is a global clinical and public health problem with high morbidity and mortality rates, presenting in patients of whom the majority are still economically active. The growing incidence and health implications for those affected make T2DM a major public health issue not only globally, but also in Africa as a whole and South Africa, as well as in the Free State.¹

South Africa has approximately 2.6 million people living with T2DM,² of whom 130 000 live in the Free State province.³ These figures represent the tip of the iceberg as screening surveys have shown that many undiagnosed cases of T2DM occur in South Africa as well as in the Free State.⁴ The prevalence can be mostly attributed to obesity and a sedentary lifestyle.⁵ Therefore, lifestyle modification is essential to address the burden of T2DM.⁶ Poor knowledge, unhealthy attitudes and poor practices related to T2DM further contribute to the problems associated with the condition.⁷

It is commonly accepted that being knowledgeable, having a positive attitude and following good practices (KAP) result in the successful management of T2DM.⁸ However, Ajzen *et al.*⁹ have argued that knowledge is no guarantee for healthy behaviour, nor is ignorance necessarily the main cause of unhealthy

behaviour. Furthermore, knowledge alone is not adequate to bring about behaviour change, and various determinants that are often hard and difficult to change influence health behaviour, e.g. the motivation to change the behaviour in question.⁹

Globally, knowledge related to diabetes management has been found to be insufficient, despite the fact that it is a critical aspect of this condition.¹⁰ In addition, the KAP of patients with T2DM has been reported to be poor in areas where the incidence of T2DM is high,¹¹ such as the Free State province.⁴ Despite the importance of including the KAP of patients with diabetes in the planning of relevant diabetes management interventions, information of this nature is very limited in the Free State province.

The objective of this study was to compile a profile of the demographic status and anthropometry of adult patients with T2DM, and to determine the diabetes-related KAP of these patients who attended facilities in the Free State province public health sector.

Methods

Study design, setting and participants

A descriptive observational study was conducted. For the purpose of this study, the population included adult patients

with T2DM visiting public health facilities in the five districts of the Free State.

A total of 255 participants who attended community healthcare (CHC) centres, primary healthcare (PHC) clinics and a district hospital in the five districts of the Free State province (Figure 1), were interviewed. All patients with T2DM who consented on the day of the visit were invited to participate (Table 1).

Questionnaire and anthropometry

An adapted South African Diabetes KAP questionnaire¹² was used to collect information about diabetes-related KAP, patients' perceived care and anthropometry. Information related to basic demographics, namely gender, age, home language and the participants' level of education, was also included.¹³ Questions were asked in a structured interview with each participant. Anthropometric variables, which included weight and height to calculate body mass index (BMI), and waist circumference (WC), were obtained for each participant by means of standard techniques.¹⁴

Knowledge scores were calculated simply as the sum of correct answers to the knowledge items. Thus knowledge scores could range between 0 and 22, with 0 indicating wrong answers to all

items, and 22 correct answers to all items. The practice and attitude items could indicate a positive (e.g. compliance with a recommended practice) or a negative (e.g. non-compliance with a recommended practice) component, as well as a neutral position. As such, the scoring was adjusted, so that agreement with the positive component of the item would have one score added, agreement with the negative component of the item would have one score deducted, and agreement with the neutral position would leave the score unchanged. Thus the practice scores could range between -10 (agreement with all negative item components) and +10 (agreement with all positive item components). Similarly, the attitude scores could range between -18 (agreement with all negative item components) and +18 (agreement with all positive item components).

While this did allow for direct comparison along the continuum of positive versus negative attitude, it did have one drawback, namely that middle-range scores could not distinguish between respondents who were neutral on most items, or those who were positive on some and negative on others.

Data analysis

Data were analysed by the Department of Biostatistics at the University of the Free State. Descriptive statistics, namely frequencies and percentages for categorical data and medians and percentiles for continuous data, were calculated. Associations between KAP and gender, level of education, visiting a counsellor, facilities visited, years of diagnosis, BMI and WC were also determined.

Because it was assumed that the KAP scores would be correlated, multivariate analysis of variance was computed using the general linear model (GLM-SAS proc GLM), using SAS/STAT® software, version 9.4 of the SAS System for Windows (SAS Institute, Cary, NC, USA) to establish whether differences existed in the knowledge, attitude or practice scores for different levels of the various categorical variables.

Ethics approval

This study formed part of Phase 1 of a bigger study with the title 'Health dialogue with adult patients with chronic diseases in the Free State: Towards a model for low- and middle-income countries'. Ethics approval was obtained from the Health Sciences Research Ethics Committee (HSREC) of the Faculty of Health Sciences, University of the Free State (ECUFS NR 39/2013). Participants gave informed consent for inclusion in the study.

Results

Patient profile

The median age of participants was 57 years (range 19–84 years) and the median age of diagnosis with T2DM was 48 years (range 15–80 years). The majority of the participants in this study were female (76.1%), and nearly two-thirds (64.3%) were Sesotho-speaking. Approximately one-third of participants (31.0%) had some level of high school education, followed by participants with some primary school education (29.0%), and 14.9% that had completed primary school. Twenty-two (8.6%) participants completed high school, only 3.9% of participants had a tertiary qualification, and 9.8% had no formal schooling.

Based on findings with regard to BMI, the majority of both men (70.5%) and women (91.7%) were either overweight or obese



Figure 1: Map of the Free State province showing the five districts. Source: <https://municipalities.co.za/provinces/view/2/free-state>

Table 1: Sampling of patients with type 2 diabetes mellitus (T2DM) from the five districts in the Free State province.

District	Type of facility			Patients with T2DM
	CHC centre	PHC clinic	NDH*	
Mangaung [#]	4	7	1	169
Xhariep [†]	1	–	–	11
Lejweleputswa [†]	1	–	–	2
Fezile Dabi [†]	5	–	–	63
Thabo Mofutsanyane [†]	1	–	–	10
Total	12	7	3	255

Notes: CHC = community healthcare; PHC = primary healthcare; NDH = National District Hospital; *National District Hospital represents three PHC clinics; #metropolitan municipality; †district municipality.

(Table 2). Furthermore, the waist circumference of 69% of men and 98% of women was above the cut-off points (Table 3).

Knowledge, attitude and practices (KAP) related to T2DM

The scores obtained on the KAP of the participants are presented in Table 4. Poor knowledge, a negative attitude and poor practices with regard to diabetes were observed in a very high percentage of the participants included in this study. The mean knowledge score was 8.9 out of 22 (42.4%; range 2–16) and the mean practice score was 2.2 in the possible range of –10 to +10 (with an achieved range of –8 to +8). The mean attitude score was 0.6 in the possible range of –18 to +18 (with an achieved range of –16 to +16).

A statistically significant correlation ($r = 0.33$, $p < 0.0001$) was found between knowledge and attitude scores, indicating that better knowledge about diabetes could be associated with a more positive attitude towards diabetes. However, no significant differences in KAP scores were found for different levels of any of the other variables in the study (Table 5).

Knowledge related to T2DM

The results on the participants' knowledge of T2DM are presented in Tables 6, 7 and 8. Table 6 represents the participants' knowledge on the risks and complications of diabetes and blood glucose levels, while Table 7 includes the results pertaining to knowledge on a variety of other aspects of the disease. In Table 8, the findings of the participants' knowledge regarding the classification of different types of food is summarised. Two-thirds of participants correctly indicated the factors that increase one's risk of developing diabetes. Approximately half of the participants (49.6%) correctly indicated the normal range of blood glucose and the most important thing to do

Table 2: Body mass index (BMI) of patients with T2DM ($n = 254^*$)

Category ¹³	BMI (kg/m ²) ¹³	n (%)
Underweight	< 18.5	2 (0.8)
Normal	18.5–24.9	32 (12.6)
Overweight	25–29.9	55 (21.7)
Obese	≥ 30	165 (65.0)
Class 1 (moderately obese)	30–34.9	79 (31.1)
Class 2 (severely obese)	35–39.9	44 (17.3)
Class 3 (morbidly obese)	≥ 40	42 (16.5)
Total overweight and obese	≥ 25	220 (86.6)

Note: *The BMI of one female patient could not be determined due to missing information on her height.

Table 3: Waist circumference of patients with T2DM

Variable	n	%
Men, > 94 cm	43	69
Women, > 80 cm	190	98

Table 4: Participants' ($n = 255$) mean scores for knowledge, attitude and practices (KAP) with regard to T2DM

Category	Min.	Max.	Mean	SD
Knowledge	2	16	8.99	2.47
Attitude	–16	16	0.64	6.20
Practice	–8	8	2.24	3.16

Table 5: Pearson correlation between knowledge, attitude and practices of participants with T2DM

Variable	n	Knowledge	Attitudes	Practices
Knowledge	255		0.33**	0.12
Attitudes	255			0.09

Note: ** $p < 0.01$ was considered significant.

Table 6: Participants' ($n = 255$) knowledge of T2DM: causes, blood glucose levels and complications of diabetes

Knowledge tested	n (%)
Risks of diabetes:	
Family history	96 (37.6)
Lifestyle or diet-related factors	69 (27.0)
Emotional triggers	42 (16.5)
Other medical conditions	5 (2.0)
Do not know	43 (16.9)
Normal range of blood glucose levels:*	
Correct	125 (49.6)
Incorrect	46 (18.3)
Unsure	81 (32.1)
Most common signs of high blood glucose:#	
Correct	227 (89.0)
Incorrect	17 (6.7)
Unsure	11 (4.3)
The most important thing to do when you feel the beginning of low blood glucose:	
Correct	150 (56.4)
Incorrect	63 (23.7)
Unsure	53 (19.9)
Types of health complications usually associated with diabetes:	
Correct	169 (66.3)
Incorrect	29 (11.4)
Unsure	57 (22.3)

Notes: *Three participants had incomplete data; #11 participants provided more than one answer. All answers were coded.

when experiencing low blood glucose (58.8%), while the majority were correct with regard to the common signs of high blood glucose (89.1%).

Most of the participants were relatively knowledgeable regarding questions asked about diabetes medication. Most of the participants correctly indicated that diabetes medication should be taken for life (85.9%), 72.9% knew that diabetes medication cannot cure diabetes, and 78.8% indicated that one should not stop taking diabetes medication when feeling sick. Two hundred (78.4%) participants indicated that poor control of diabetes could result in an increased possibility of complications.

Less than 60% (54.9%) of the participants correctly indicated that sore feet are common in people with diabetes. Approximately half of the participants (47.1%) correctly indicated that people with diabetes may have poor circulation of blood in their feet, while 20.0% incorrectly indicated that this is not the case, and a third (32.9%) were unsure.

Nearly all the participants (96.1%) correctly indicated that physical exercise is important for people with diabetes, and that it helps with blood glucose control. The majority of participants

Table 7: Participants' ($n = 255$) knowledge of T2DM: various other aspects of diabetes

Statement	Response		
	True n (%)	False n (%)	Unsure n (%)
Diabetes medication can cure diabetes	47 (18.5)	187 (73.3)	21 (8.2)
Diabetes medication should be taken for life	220 (86.2)	19 (7.5)	16 (6.3)
You should stop taking your diabetes medication when you feel sick	37 (14.5)	202 (79.2)	16 (6.3)
Poor control of diabetes could result in a greater change of complications	199 (78.0)	31 (12.2)	25 (9.8)
Eating less bread will make me lose weight	121 (47.4)	105 (41.2)	29 (11.4)
Salty food will prevent my sugar from dropping	86 (33.7)	133 (52.2)	36 (14.1)
Diabetes medication may cause swelling of the feet	78 (30.6)	106 (41.6)	71 (27.8)
Sore feet are common in people with diabetes	140 (54.9)	62 (24.3)	53 (20.8)
People with diabetes have poor circulation of blood in the feet	120 (47.1)	51 (20.0)	84 (32.9)
Physical exercise is important for people with diabetes	245 (96.1)	5 (2.0)	5 (2.0)
Physical work or regular exercise helps with:			
Blood glucose control	233 (91.3)	5 (2.0)	17 (6.7)
Painful feet	211 (82.2)	20 (7.8)	24 (9.4)
Weight loss	231 (90.6)	12 (4.7)	12 (4.7)
Factors worsening diabetes:			
High blood pressure	220 (86.2)	19 (7.5)	16 (6.3)
Epilepsy	192 (75.3)	15 (5.9)	48 (18.8)
Overweight	237 (93.0)	10 (3.9)	8 (3.1)

correctly indicated that exercise improves the chances of weight loss (91.0%). When participants were asked about factors that could make diabetes worse, 85.9% correctly reported that hypertension can make diabetes worse, and 92.9% indicated that being overweight can make diabetes worse.

Most of the participants were unsure about the classification of food into food groups and of those who did attempt to classify

them, mostly did so incorrectly (Table 8). Cooking oil (65.9%), porridge (54.9%), bread (49.8%) and milk (52.9%) were the only foods that were mostly classified correctly as sources of fat, carbohydrates and protein, respectively. Both fruit and vegetables were wrongly classified as protein by more than half of the participants (52.9%).

Attitude

The results related to the attitude of patients with T2DM are presented in Table 9. The majority of participants (81.2%) felt that they would be quite a different person if they did not have diabetes, and 63.9% felt that 'Having diabetes over a long period changes the personality'.

A large percentage (71.0%) felt that diabetes was the worst thing that had ever happened to them, and 51.0% agreed that 'Being told you have diabetes is like being sentenced to a lifetime of illness'. On the other hand, the majority of participants (71.0%) did not mind being referred to as 'a diabetic'.

Two-thirds of participants (65.9%) felt that most people find it difficult to adjust to having diabetes, 78.8% felt embarrassed about having diabetes and 65.9% avoided telling people that they had diabetes.

Although 87.1% of participants agreed with the statement 'I believe I have adjusted well to having diabetes', 45.1% agreed that 'There is little hope of leading a normal life with diabetes' and 42.0% agreed with the statement that 'There is not much I seem to be able to do to control my diabetes'.

Approximately half of the participants (51.0%) felt that their diabetic diet spoiled their social life. Although 54.1% agreed with the statement that 'The proper control of diabetes involves a lot of sacrifice and inconvenience', 89.0% felt that 'Diabetes can be controlled'.

Practice

The results related to the practices of patients are presented in Table 10. The majority of participants (83.1%) reported that they never forgot to take their medication. Only one-third of participants (31.0%) did physical work or exercise every day, of which 64.6% indicated that the physical work or exercise lasted for more than 30 minutes per day.

Table 8: Participants' ($n = 255$) knowledge of T2DM: classification of different food types as carbohydrate, protein or fat

Type of food	Response			
	Carbohydrate n (%)	Protein n (%)	Fat n (%)	Unsure n (%)
Cooking oil/fish oil	8 (3.1)	4 (1.6)	169 (66.3)	74 (29.0)
Porridge	141 (55.3)	24 (9.4)	1 (0.4)	89 (34.9)
Bread	127 (49.8)	37 (14.5)	1 (0.4)	90 (35.3)
Lentils	63 (24.7)	54 (21.2)	1 (0.4)	137 (53.7)
Baked beans	59 (23.1)	59 (23.1)	2 (0.8)	135 (53.0)
Chicken feet	13 (5.1)	31 (12.2)	49 (19.2)	162 (63.5)
Organ meat	15 (5.9)	26 (10.2)	63 (24.7)	151 (59.2)
Vegetables	34 (13.3)	136 (53.3)	85 (33.3)	0 (0)
Fruit	32 (12.6)	136 (53.3)	1 (0.4)	86 (33.7)
Milk	13 (5.1)	135 (52.9)	25 (9.8)	82 (32.2)
Sardines in tomato sauce	40 (15.7)	47 (18.4)	11 (4.3)	157 (61.6)

Table 9: Participants' (n = 255) attitudes related to T2DM

Statement	Response		
	Disagree n (%)	Neutral n (%)	Agree n (%)
If I did not have diabetes, I think I would be quite a different person	42 (26.5)	7 (2.8)	206 (80.7)
I dislike being referred to as 'a diabetic'	181 (71.0)	3 (1.2)	71 (27.8)
Diabetes is the worst thing that has ever happened to me	74 (29.0)	0 (0)	181 (71.0)
Most people will find it difficult to adjust to having diabetes	68 (26.7)	19 (7.5)	168 (65.8)
There is little hope of leading a normal life with diabetes	134 (52.6)	5 (2.0)	116 (45.4)
The proper control of diabetes involves a lot of sacrifice and inconvenience	107 (42.0)	11 (4.3)	137 (53.7)
I avoid telling people I have diabetes	86 (33.7)	1 (0.4)	168 (65.9)
My diabetic diet spoils my social life	118 (46.3)	8 (3.1)	129 (50.6)
Having diabetes over a long period of time changes one's personality	85 (33.3)	8 (3.1)	162 (63.3)
I often find it difficult to decide whether I feel sick or well	111 (43.5)	7 (2.8)	137 (53.7)
There is really nothing you can do if you have diabetes	143 (56.1)	2 (0.8)	110 (43.1)
I often think it is unfair that I should have diabetes when other people are so healthy	122 (47.8)	2 (0.8)	131 (51.4)

Approximately a third of participants reported that they never ate refined starch, such as white bread or cake (36.9%), fatty food, such as 'slap chips' (French fries) or 'vetkoek' (a small, unsweetened cake of deep-fried dough) (34.1%) and food with a high salt content, such as russians or polony, or used stock cubes in food preparation (34.9%).

Daily consumption of vegetables was reported by only 38.8% of participants, while fruit was eaten on a daily basis by only half of participants (50.2%). Diet 'lite' soft drinks were used by about a third of the participants and 25.9% consumed fruit juice that was diluted. Sweetened soft drinks were used by 34.1%. Some 20.0% of the participants consumed soft drinks 2–3 times a month, followed by 2–3 times a week (16.9%) and once a week (14.9%). The majority of participants reported that they had not had an alcoholic drink in the preceding month (82.0%).

Discussion

Patient profile

The median age of participants and their median age at the time of being diagnosed were consistent with the fact that the prevalence of T2DM increases in people aged over 45 years, which is the trend in low- and middle-income countries.¹⁵ Contrary to our findings, the Asian population is prone to developing T2DM at a younger age due to a greater tendency for abdominal obesity resulting in insulin resistance.¹⁶

The predominance of females (76.1%) in the present study was consistent with the findings of Erasmus *et al.*,¹⁷ who studied the coloured population in the Western Cape province. They attributed the increased risk for females to

develop T2DM to glucose intolerance, which is associated with higher visceral fat compared with men, who tend to be more physically active.¹⁷

The majority of black citizens in South Africa depend on public healthcare facilities for their health-related needs.¹⁸ More than 90% of the participants in our study spoke an African language at home, which is a reflection of the national population distribution where the majority of citizens are black (80%), followed by coloured (9%), white (8%) and Indian (3%) individuals.¹⁹ Approximately 64% of the participants in this study spoke Sesotho as a home language, which reflects the demographic profile of the Free State province where the majority of the population speak Sesotho (64%), followed by Afrikaans (13%).²⁰

In this study, only 8.69% of the participants had completed high school and 3.9% had a tertiary qualification. The finding that approximately 10% of the participants lacked formal schooling could be attributed to the inequalities in basic education in South Africa during the time of apartheid.¹⁰ Similar results were reported in the SANHANES-1 study in South Africa where 8% of the study sample was reported to lack formal schooling.²¹

Weight status

According to the participants' BMI findings, the combined figure for overweight and obesity was 86.6% (91.7% of women and 70.5% of men). It should be kept in mind that this figure is not representative of the general population, as the sample was drawn specifically from patients already diagnosed with T2DM. These findings concur with other studies undertaken in South Africa among different population groups, where women were found to be more overweight and obese than men.²² The SANHANES-1 study has also reported high rates of overweight and obesity in the general population, namely 65% of women and 31% of men.²¹ The high prevalence of overweight, obesity and high waist circumference in the South African population is of great concern as it obstructs the government's vision of 'a long and healthy life for all South Africans' due to higher morbidity and mortality rates related to obesity and its associated non-communicable diseases (NCDs).²³ A recent survey in Cape Town indicated that the situation is deteriorating as the rates of overweight and obesity have increased in females younger than 45 years over the past decades.²²

The rapid urbanisation in South Africans over the past 20 years has resulted in a nutrition transition, characterised by eating more refined foods and carbohydrates, animal protein, saturated fat, vegetable oils, salt and sugar, which was evident in the participants in this study as well. Contributing factors include socio-economic development resulting in higher income and purchasing power and lower energy expenditure, also resulting in overweight and obesity.²⁴

Knowledge

The low levels of schooling of participants might be a factor that contributed to the poor diabetes-related knowledge.²⁴ Similar results were reported among patients with T2DM in Limpopo province, whose levels of schooling were even lower than in the present study.²⁵

Regular monitoring of blood glucose is an important aspect of self-management to reduce HbA1c levels and to delay the onset of complications. In our study, only half of the participants knew the normal range of blood glucose. Approximately 90% knew the common signs of high blood glucose and two-thirds

Table 10: Participants' (n = 255) practices related to T2DM: medication, physical activity and eating habits

Variable	n (%)
Forgot to take diabetic medication in the last week:	
Not on medication	2 (0.8)
Never	218 (85.4)
Once a week	27 (10.6)
2–3 times a week	5 (2.0)
Nearly every day	2 (0.8)
Every day	1 (0.4)
Physical work or exercise done in the last week:	
Never	52 (20.4)
Once a week	27 (10.6)
2–3 times a week	64 (25.1)
Nearly every day	34 (13.3)
Every day	78 (30.6)
Average amount of time spent daily on physical work or exercise:	
10–20 minutes	6 (2.4)
20–30 minutes	40 (15.7)
More than 30 minutes	162 (63.5)
No physical work or exercise in the last week	47 (18.4)
Frequency of eating refined starch, such as white bread or cake:	
Never	94 (36.8)
Once a month	83 (32.6)
Nearly once a week	51 (20.0)
Nearly every day	14 (5.5)
Every day	10 (3.9)
Once per week	3 (1.2)
Frequency of eating fatty food, such as 'slap chips' (French fries) or 'vetkoek':*	
Never	87 (34.0)
Once a month	79 (31.0)
Nearly once a week	67 (26.3)
Nearly every day	19 (7.5)
Every day	1 (0.4)
Once per week	2 (0.8)
Frequency of eating food with lots of salt, such as russians or polony, or using stock cubes in food preparation:	
Never	88 (34.5)
Once a month	69 (27.1)
Nearly once a week	59 (23.1)
Nearly every day	28 (11.0)
Every day	9 (3.5)
Once per week	2 (0.8)
Frequency of eating vegetables:	
Never	1 (0.4)
Once a month	2 (0.8)
Nearly once a week	77 (30.2)
Nearly every day	71 (27.8)
Every day	99 (38.8)
Once per week	4 (1.6)
When I have money	1 (0.4)
Frequency of eating fruit:	
Never	8 (3.1)
Once a month	10 (3.9)
Nearly once a week	57 (22.4)

(Continued)

Table 10: Continued.

Variable	n (%)
Nearly every day	46 (18.0)
Every day	128 (50.2)
Once per week	1 (0.4)
When I have money	5 (2.0)
Mostly drinks:	
Diet/'lite' soft drinks	89 (34.9)
Sweetened soft drinks	87 (34.1)
Low-sugar soft drinks	3 (1.2)
Do not drink soft drinks	66 (25.9)
Unspecified	3 (1.2)
Diluted juice	7 (2.8)
Frequency of drinking these soft drinks:	
Never	1 (0.4)
Once a month	26 (10.2)
2–3 times a month	50 (19.6)
Weekly	39 (15.3)
2–3 times a week	43 (16.9)
Nearly every day	16 (6.3)
Every day	14 (5.5)
Do not drink soft drinks	66 (25.8)
Frequency of alcoholic drinks consumed in the last month:	
Never	209 (82.0)
Once a month	22 (8.6)
2–3 times a month	10 (3.9)
Weekly	10 (3.9)
Every day	1 (0.4)
Special occasions	3 (1.2)

Note: *Vetkoek: traditionally South African, a small, unsweetened cake of deep-fried dough.

were knowledgeable about complications associated with diabetes. These results concur with studies on patients with T2DM in India.²⁶

Most participants were ignorant about food groups, especially vegetables and fruit, which were mostly classified as protein. Similarly, only a few patients with T2DM in a Pakistani study could correctly answer questions regarding dietary requirements in diabetes.²⁶ More than half of the participants in this study reported that avoiding the intake of sweets was the only dietary restriction needed for diabetes control. The low level of nutritional knowledge of participants is of concern, as healthy eating habits are a pivotal aspect of management and being ignorant about food groups increases the risk of poor compliance, which is likely to result in unstable blood glucose levels and both short- and long-term complications.²⁷

The SANHANES-1 study reported that 56% of participants (not necessarily diabetic) in the Free State wrongly believed that 'starchy foods like bread, potatoes and rice make people fat'.²¹ The percentage of participants from other provinces in South Africa that held this misconception was even higher than in the Free State. These results concur with our findings, where nearly half of the participants reported that 'eating less bread will make me lose weight'. Despite the high prevalence of overweight and obesity in this study, more than 90% of the participants agreed that being overweight exacerbates diabetes-related health problems.

Attitude

The findings indicated a relatively negative attitude to T2DM among the participants. Patients with T2DM reported that stigma contributed to their negative attitude and impacted on their psychological well-being.²⁷ The challenges of adhering to a healthier lifestyle and taking medication to prevent complications were also contributory factors to negative attitudes among older diabetic patients. Similar findings have been described in an Ethiopian study undertaken in patients older than 50 years of age with T2DM.²⁸

Practices

Although behaviour changes and intensive lifestyle interventions are key components in the management of T2DM, the mean score obtained by the participants with regard to T2DM-related practices was very low. The poor practices could mainly be attributed to low levels of physical exercise and unhealthy eating habits. Furthermore, the environment may also contribute to poor eating habits due to healthy food not being affordable in communities. The majority of the participants were knowledgeable about the benefits of exercise, while only 30% reported exercising every day during the previous week. These findings were consistent with the results of a study on patients with T2DM in the United States,²⁹ which emphasises that education should be complemented with other interventions. Lack of adherence to lifestyle interventions seems to be a common challenge amongst patients with T2DM.

The participants' poor practices were also reflected in the high rate of overweight and obesity, which to an extent could result from a lack of physical activity and a sedentary lifestyle.³⁰ The fact that people tend to make use of public transport instead of walking and spend a large percentage of their time watching television contributes to sedentary lifestyles. Regular exercise was also the least practised behaviour among patients with T2DM in Ethiopia.³⁰

A certain degree of incongruence existed between the high prevalence of overweight and obesity and the relatively 'healthy' practices reported on some aspects of food consumption. Only 10% of participants reported regular consumption of refined starches, fatty and high-salt food, 70% ate fruit and vegetables regularly, and 30% consumed sweetened soft drinks. This finding could be attributed to the high percentage of participants who had previously received nutrition counselling (66%) and knew what they were supposed to eat, perhaps influencing their likelihood of giving the desired answers. Other possible reasons may be the reluctance of overweight and obese patients to change their eating habits due to the cultural acceptability of being overweight that has been reported in the Free State province.³¹

We acknowledge the following limitations. The percentage of female participants that were included in the study was higher than the percentage of male participants, yet data of the two genders were not analysed separately. The fact that diabetes is strongly associated with a number of co-morbidities that could also have impacted on the KAP of these patients may have impacted on the findings. Furthermore, not all factors that may have affected the KAP of patients with T2DM (e.g. foot care) were included in the questionnaire.

Conclusion

Patients with T2DM included in the current study were mostly older obese persons from disadvantaged backgrounds

undergoing a nutrition transition and suffering from a number of other co-morbidities.

Poor knowledge, a negative attitude and poor practices related to diabetes were observed in a very high percentage of the participants included in this study. The poor KAP observed among the participants was very likely to contribute to the morbidity of these patients. This finding highlights the fact that patients with diabetes from resource-poor settings are often not equipped or empowered to manage their condition. The fact that knowledge was associated with attitude indicates that interventions aimed at improving knowledge could benefit patients in more than one way, although no attribution of causality can be inferred from the results of this study.

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