

An assessment of the level of diabetic patients' knowledge of diabetes mellitus, its complications and management in Durban, South Africa

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Abstract

Epidemiological data shows that Diabetes Mellitus (DM) in South Africa is increasing with changes in lifestyles and ageing of the population. Early diagnosis and management of DM is an important factor for limiting visual and physical complications of the disease. The purpose of this study was to establish the level of knowledge about DM, its ocular complications and management protocol amongst diabetic patients. A questionnaire was provided to a total of 106 diabetic patients attending the Tongaat Community Clinic, the University of KwaZulu Natal Eye Clinic and the Diabetic Awareness day in Chatsworth. All patients were receiving treatment for DM. The questionnaire consisted of questions relating to the patients' knowledge of the disease, its ocular complications and its management. The respondents were mostly females (65%), aged between 30 to 85 years (mean = 52.45 ± 3.75 years). The majority (96%) of respondents knew about the existence of two main types of DM and 77% reported having Type 2 DM, 18% reported having Type 1 DM, and only 5% did not know the type of DM that they had. Many respondents thought that hereditary factors (78%), and diet and lifestyle modifications (77%), were important risk factors in the development of DM. Glucose level

control (84%) and duration (85%) were thought as important risk factors for its complications. Although many subjects (66.1%) were aware of the visual threat that DM posed, only 42%, 44% and 53% knew that DM could result in diabetic retinopathy, cataracts and glaucoma respectively. Less than half (48.3%) of the respondents had their last eye examination more than a year and a half ago. A significant proportion (60.8%) reported that the threat to vision was reason enough for them to have regular eye examinations. A large proportion (76%) of respondents reported that they had adequate knowledge of management of DM. Many (81%) of the respondents reported routinely controlling their DM through diet, 65% through exercise, 84% through sugar monitoring and 76% through regular medical examinations. The participants in this study had a significant knowledge of DM and its management. However, their knowledge of ocular effects was limited. These results highlight the need for educational programmes aimed at improving the knowledge of the effects of DM on the eyes including the need for regular eye examinations.

Key words: Diabetes mellitus (DM), knowledge of diabetes, complications of diabetes, management of diabetes.

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Introduction

Diabetes Mellitus (DM) is a clinical syndrome characterized by hyperglycemia due to an absolute or relative deficiency of insulin^{1, 2}. Insulin deficiency may arise in various ways such as destruction of β -cells of the pancreas, an organ responsible for the production of insulin². Insulin deficiency affects the metabolism of carbohydrates, proteins, fats, electrolytes and water leading to major organ function disorders throughout the body². Although the exact cause of the disease is uncertain, genetic and predisposing factors contribute to the onset of the disease³. DM has the potential to produce significant morbidity and mortality and is widely regarded as a major public health challenge⁴. DM may be broadly divided into two main groups, each with differences in pathogenesis, clinical appearance, management and treatment⁴. Insulin Dependent Diabetes Mellitus (IDDM) or Type 1 DM, is due to lack of insulin and has a peak incidence at 10-20 years⁴. It is less common and estimated to account for 5 to 10% of all diagnosed cases of DM worldwide⁴. Risk factors for Type 1 DM are less well defined and include autoimmune, genetic and environmental factors⁵. The standard care of Type 1 DM patients include multiple daily injections of insulin, monitoring of blood glucose through finger stick and digital glucometer⁵. Targets for blood glucose should be less than 180 mg after meals for Type 1 diabetics⁵. Non Insulin Dependent Diabetes Mellitus (NIDDM) or Type 2 DM is due to presence of factors that oppose the action of insulin⁶ and it has a peak incidence at ages 50-70 years and accounts for almost 90 to 95% of all diabetics⁷. Risk factors for Type 2 DM include increased age, physical inactivity, obesity, race and family history of the disease. The basic therapies for Type 2 DM include oral medications, and in severe cases the use of insulin, lifestyle modifications such as healthy eating, physical activity and regular monitoring of blood glucose^{7, 8}.

The most common symptoms of DM are frequent urination (polyuria) caused by increased filtered level of glucose in the kidney, excessive thirst (polydipsia) as a result of loss of fluids through increased urination and extreme hunger due to the inability to metabolize glucose resulting in increased eating (polyphagia)⁹. Other symptoms include weight and vision fluctuations, dry skin, numbness in the feet and hands, and poor wound healing caused by poor or loss in circula-

tion and high risk of recurrent infections which may lead to gangrene⁹.

About 171 million people worldwide suffer from DM with 3.8 million deaths reported annually from complications of the disease¹⁰. It is projected that the number of people with DM will rise to 366 million by the year 2030.^{10, 23} Prevalence data in South Africa estimate rates of about 5% amongst the black population and 11%-15% amongst the Indian populations for Type 2 DM¹¹. However, prevalence data on the two types of DM in South Africa is not complete¹¹. The incidence of visual and ocular complications increases with age and duration of the disease¹¹. Specifically, gender (males), race, control of diabetes, as well as pregnancy have been identified as risk factors for diabetic retinopathy^{2, 9, 11}. The ocular manifestations of DM have been well documented¹²⁻²¹. Ocular changes such as diabetic retinopathy and macular edema are leading causes of blindness amongst diabetic patients¹⁸⁻²⁰. The early phase of diabetic retinopathy (non-proliferative) is characterized by weakened vessels that leak forming haemorrhages¹⁸⁻²⁰. Cotton wool spots (micro-infarctions in the nerve cell layer), hard exudates and venous dilatation are also common features of diabetic retinopathy¹⁸⁻²⁰. The late phase (proliferative stage) is characterized by retinal detachment which results from retinal traction by scar tissue, often in the wake of haemorrhages after rupture of fragile new vessels (neovascularization)¹⁸⁻²⁰. Other visual and ocular complications include higher prevalence of cataracts, secondary glaucoma, tritan colour vision deficiencies and reduced corneal sensitivity *et cetera*²¹.

Studies have suggested that up to 25% of all Type 2 diabetics show some degree of diabetic retinopathy when they are first diagnosed and 60-80% of these patients show evidence of diabetic retinopathy after 15 years from the onset of diagnosis²². Early detection and treatment of DM may therefore reduce the risk of severe vision loss from diabetic retinopathy. It has been recommended that patients diagnosed with mild to moderate non-proliferative retinopathy require annual eye assessments, and those with severe non-proliferative retinopathy need 3 to 6 month ocular assessments²². The proliferative stage requires urgent referral to an ophthalmologist (within two to four weeks) as well as follow up monitoring within 2 to 3 months of the specialist visit²².



An estimated 12 000 to 24 000 diabetic sufferers lose their sight every year, making it one of the leading causes of blindness in adults between the ages of 20 and 74 years²³. The International Diabetes Foundation (IDF) estimates that the number of people in Africa suffering from DM will increase from 10.4% to 18.5% million by the year 2030.²³ In South Africa, 4.5% of the adult population is estimated to be suffering from DM.²⁴ It is estimated that the prevalence of DM in the urbanized black population in South Africa is 8%²⁴. The majority of diabetics, however, remain undiagnosed especially in the rural population²⁵. This is suggested as one of the reasons for the increased vision loss and blindness amongst this group as they do not have regular eye examinations²⁵.

Studies have been undertaken to investigate the consequences of DM and the knowledge that the public and diabetic sufferers have of the disease^{3, 26-28, 31-36}. Schmid *et al*²⁶ evaluated the knowledge of the ocular effects of DM among the general population and diabetic population of Australia. The results of the survey revealed that the level of awareness of the ocular effects of DM was high. Most of the respondents with DM tended to have more frequent eye examinations with ophthalmologists while those without diabetes consulted optometrists for eye care²⁶. But the other results from a study²⁷ in Chennai, India revealed major shortcomings in the awareness and knowledge of diabetes. This study showed that only 19% of the population sample (N=26001) knew that diabetes could cause complications with 11.9% reporting that they knew that obesity and physical inactivity were risk factors for diabetes²⁷.

An investigation into diabetic patients' knowledge of diabetes and its ocular complications in a Western Cape diabetic population (N=98) showed that the minority (42%) of the respondents knew about the existence of two types of diabetes²⁸. Although 96% of the respondents felt that it was important to have their eyes checked regularly, only thirty percent stated that they had actually had their eyes checked every year²⁸. The results of the study indicated that although the patients had a basic level of understanding of DM and its potential ocular complications, their daily management of the condition was not adhered to optimally, as they did not fully comprehend the essential need for undergoing comprehensive eye examinations²⁸.

The Diabetes Charter stipulates that a diabetic

patient has the right to see a doctor once every six months, to see an ophthalmologist or an optometrist, and to have information about DM, its complications and its therapy²⁹. Optometrists are an obvious choice for examining and monitoring diabetic retinopathy as they form part of the primary health care set up³⁰. Early detection of ocular changes can shift the emphasis of medical management from curative to a more preventative one and delay problems in visual functioning for a prolonged period³⁰. The key to diabetes self management is dependant on knowledge. Efforts aimed at empowering patients and health care providers with diabetic knowledge may help control the complications of the growing diabetes epidemic. There is a need for studies to establish knowledge about the disease; its ocular effects and management in every community. This would allow for better comparison between different communities and highlight areas that should receive attention. Similar studies have not yet been conducted in the Durban area. The aim of this study was to evaluate the level of knowledge of DM, its complications and management among diabetic patients in Durban, South Africa.

Methodology

A questionnaire modified from a previous study²⁸ was used to collect data for this study. The questionnaire (see Appendix) included questions designed to assess patients' general understanding of DM, its complications and management options. To overcome language barriers, the questionnaire was prepared in both English and isiZulu. The isiZulu version was proof-read by a qualified Zulu translator. The questionnaires were pilot tested among fifteen diabetic patients who were not part of the study population before the data collection. All queries from the pilot study were addressed to before the study was carried out. Prior to the commencement of the study, written permission was obtained from the superintendent of the Tongaat Community Clinic, the Co-ordinator of the Diabetic Awareness Campaign Clinic and Head of Optometry Department at the University of KwaZulu Natal. Ethical approval for undertaking this study was obtained from the Research and Ethics Committee, Faculty of Health Sciences, University of KwaZulu Natal. Written informed consent to participate in this study was obtained from all participants. Subjects included in the study were those diagnosed with DM, irrespective



of the type and onset of diabetes. They were attending the Tongaat Community Clinic, the University of KwaZulu Natal Eye Clinic or the Chatsworth Diabetes Awareness Clinic in Durban. Women who developed DM during the course of their pregnancy were however, excluded from the study, because in this group of DM patients' the diabetic condition usually subsides after delivery of their babies. The questionnaires were distributed by the researchers to the participants and collected after completion. Illiterate participants were assisted by verbal interviews based on the questions in the questionnaire and the appropriate responses were recorded. All information relating to the study was treated as confidential as participants were identified by their reference numbers, the key to which was known to the researchers. The data was captured and analyzed using the Microsoft Excel and Statistical Package for Social Sciences (SPSS 15.0).

Results

Demographic characteristics

The study sample was one hundred and six subjects (N=106), and were 38 (35%) males and 68 (65%) females. They included 57 (53.8%) Indians, 30 (28.3%) Blacks, 15 (14.2%) Whites and 4 (3.8%) Coloureds. Of the total sample, 20% were attending the University of KwaZulu Natal Eye Clinic, 35% the Tongaat Community Clinic and 45% the Chatsworth Diabetes Awareness Day Clinic. The ages of the subjects ranged from 30 to 85 years (mean = 52.45 ± 3.75 years). The age distribution was as follows: 30-39 years (3%), 40-49 years (12%), 50-59 years (31%), 60-69 years (36%), 70-79 years (16%) and 80-89 years (2%). Most (45%) of the respondents were pensioners, 26% were housewives, 22% formally employed and 7% were unemployed. The majority (66.1%) of the subjects stated that they were English-speaking, followed by isiZulu (28.3%) and Afrikaans (5.6%).

The majority (71.7%) of the respondents reported that they were diagnosed with DM by medical doctors, 14.2% by nurses, 2.1% by ophthalmologists, and others (12%) by pharmacists and endocrinologists. About half of the respondents (52.8%) reported that they had been advised on the need for routine eye examination, 39.6% reported that they did not receive such advice and others (7.5%) did not respond. In response to how long they had been diabetic, 55% reported 1-5 years, 31% 6-10 years, 11% 11-15 years,

2% 16-20 years, and 1% more than 20 years.

Patients' knowledge about diabetes mellitus

The majority (96%) of the respondents knew that there are two main types of DM and 4% reported that they were not sure. Most (77%) of the respondents reported that they had Type 2 DM, 18% reported having Type 1 DM and 5% did not know what type of DM they had. The majority (93%) of the respondents thought DM was a hereditary disorder and 7% did not know. Most respondents reported that duration and control of blood glucose levels were important risk factors for potential health complications as shown in Figure 1.

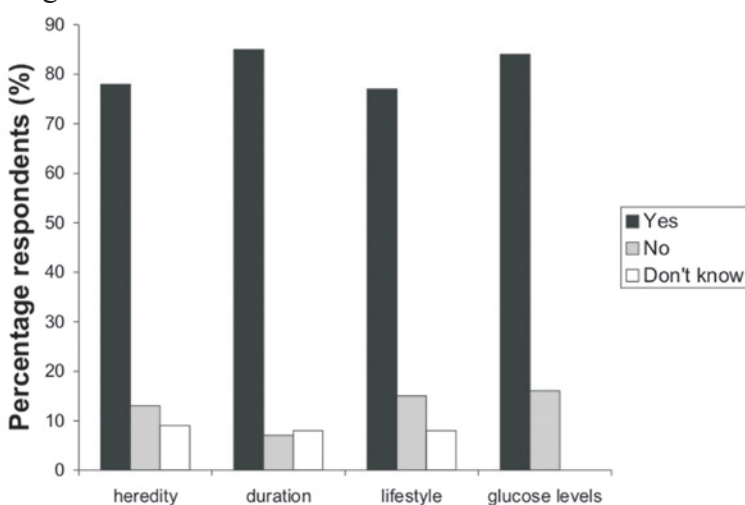


Figure 1: Percentages of respondents' knowledge regarding the risk factors for the development of DM and its complications.

Patient's knowledge about the ocular manifestations of diabetes mellitus

Many, (66.1%) were aware that DM could lead to visual problems and blindness, 30.4% were not aware, and others (3.5%) were not sure. Less than half of the respondents, 42% and 44% respectively knew that DM could result in diabetic retinopathy or cataracts. About half (53%) knew that DM could result in glaucoma. In response to whether the threat to vision encouraged them to have regular eye examinations, 60.8% responded "yes", 24.2% reported "no" and 15% did not respond. When asked when they had their last eye examination, 14.5% reported between 0-6 months, 16.4% 7-12 months, and 20.8% reported between 13-18 months. Nearly half (48.3%) of the respondents had their last eye examination more than a year and a half ago.



Patients' knowledge about control and management of diabetes mellitus

Many, (76%) reported having sufficient knowledge of management of DM, 19.2% reported not having sufficient knowledge and 4.8% did not respond. The responses to the questions on management of DM are shown in Figure 2 and the responses to the rating of relative importance of various factors in relation to controlling the DM are shown in Table 1.

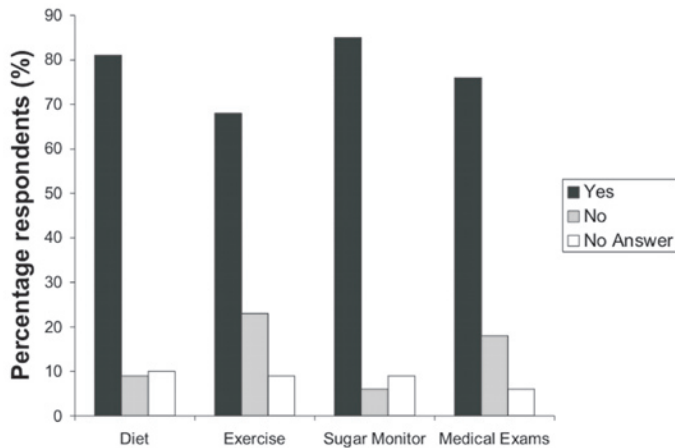


Figure 2: Percentage of respondents on the knowledge of the different modes of DM control. Many of the subjects had good knowledge of management protocols for DM.

Table 1: The various percentage ratings of factors that are involved in the management of DM. The majority of the respondents rated regular blood sugar monitoring and medication as very important factors.

Scale	Percentage of respondents (%)						
	Eating healthy	Exercise	Blood sugar check ups	Ideal body weight	Regular medication	Medical check ups	Eye exams
Not important	0	1	0	4	0	0	0
Slightly important	13	19	0	15	0	7	24
Very important	82	76	96	73	91	86	73
Do not know	5	1	4	8	8	7	3

In response to whether they were satisfied with information provided by optometrists with regards to the dangers of uncontrolled DM and the health of the eyes, 54% reported “yes”, 27% reported “no” and 19% were not sure. The proportion of the respondents with regards to information that they would like to get

from their clinicians is illustrated in Table 2.

Table 2: The information that the respondents would like to get from the clinicians and percentage of respondents. Others in the figure refer to specific symptoms of DM (e.g. gangrene).

Information required	Number	Percentage (%)
Effects of DM on the eyes	32	30.2
Exercise and DM	19	17.9
Precautions to be taken by diabetics	18	16.9
Diet and DM	15	14.2
Smoking and DM	12	11.3
General information on DM	7	6.6
Others	3	2.8

Many (66.1%) of the respondents would like information on DM to be provided in the handouts or pamphlets and others (33.9%) preferred video or tape format.

Discussion and conclusion

Most (45%) of the participants in this study were from the Chatsworth Diabetic Awareness Day, followed by Tongaat Community Clinic (35%) and then the UKZN Eye Clinic (20%). These sites were chosen because of their close proximity to the research-



ers and because a large number of diabetic patients attended these clinics. Females were more numerous than males. These gender findings are consistent with national trends^{28, 36}. The overall data across the three study sites indicates a higher response by the Indian (53.8%) than other population groups. This is possibly due to the higher number of Indians in the study population. Most (67%) of the respondents were from the elderly population between 50 to 69 years. Only 2% were above the ages of 80 years, and 3% between 30-39 years old. These results could be due to the fact that age is a risk factor for the development of diabetes^{1, 23}. These figures are consistent with previous studies^{28, 34, 36} that also showed high prevalence rates of DM amongst the elderly population.

A high proportion (71.7%) of diabetic patients in this study had their initial diagnosis done by general practitioner (medical doctor) and 2.1% by ophthalmologists. This result may be due to the fact that patients are more likely to consult a medical doctor than eye care professionals in dealing with signs and symptoms of medical conditions such as DM. Optometrists are also more likely perceived by patients as professionals who deal more with refractive conditions rather than medical problems, especially amongst the elderly population. However, the role of optometrists as part of primary health care in the screening and management of diabetic retinopathy has been recognized and documented^{37, 38} in the National Service Framework in Britain and the Strategy Implementation plan in Australia. In South Africa, there has been significant emphasis for all optometrists to become competent in the diagnosis and management of ocular manifestations of systemic conditions such as diabetes and hypertension³⁰. Although over half (52.8%) of respondents reported being advised by the diagnosing clinician about the need for regular eye examinations, a significant proportion (39.6%) of subjects reported not been advised about the need for regular eye examinations. This may be due to oversight or negligence on the part of the clinicians or patients.

The results of this study showed that diabetic subjects had adequate knowledge with regards to the types of DM and the influence of heredity and lifestyle as potential risk factors for the development of DM. Additionally, the majority of the respondents were knowledgeable of the important risk factors for complications of the disease. Unlike the study of Clarke-Farr *et al*²⁸ which reported that only 42% of respondents

with DM knew of the existence of the two main types of DM, compared to 96% of the respondents in the present study and of which 95% knew what type of DM they had. This is possibly due to the fact that there is easy access to advice in the medical facilities. The greater knowledge in the present study is good, as standard care and management of DM require that patients be aware of the type of DM they have, as well as being adequately informed of potential risk factors for the development of its complications³³.

Although a high percentage (66.1%) of the participants knew that diabetes could lead to visual impairment and blindness, only a small percentage were aware of the specific ocular complications of diabetes such as diabetic retinopathy, cataracts and glaucoma. Uncontrolled DM and undiagnosed diabetic retinopathy can lead to severe vision loss and blindness¹⁴⁻²⁰. There is a high prevalence of glaucoma in diabetic sufferers⁴⁰, which is the second leading cause of blindness in South Africa⁴¹. Furthermore, diabetic patients have been reported to have a high prevalence of cataracts⁴², the main cause of blindness in South Africa⁴¹. In view of these, it is important that diabetic patients have good knowledge of ocular complications of their condition. This may urge them to take management of the disease more seriously. Almost half of the subjects (48.3%) had their last eye examination more than a year and a half ago. Unfortunately, this does not augur well for diabetics as regular eye examinations are one of the most important factors to prevent visual impairment caused by the complications of DM^{18-19, 22}.

A cross tabulation between age and awareness of the visual threat posed by DM showed that the majority (53%) of patients 50 years and above were not aware of the dangers and visual complications of DM. Twenty three percent of this group had their DM diagnosed more than five years ago. Literature^{13, 19} has suggested that older individuals who have had DM for longer periods are more susceptible to retinal changes. The limited knowledge of ocular effects in this age group may be due to the fact that few participants were initially diagnosed by eye care professionals, who have skills and knowledge in making a diagnosis of the ocular effects of DM, and can advise on treatment and management options³⁸.

Most respondents reported having sufficient knowledge on the management of DM. This was found to be true as the assessment of management characteristics shows that most of the respondents were im-



plementing lifestyle (diet and exercise) and physical (regular blood sugar monitoring and medical evaluations) modifications in their daily management of the disease. These results suggest that these subjects are taking an interest in their condition, and that relevant information with regards to management is being given to them. Most respondents rated aspects of DM management and control such as diet, exercise, regular blood sugar monitoring, maintaining ideal body weight, regular intake of medication, medical and eye examinations as very important in the management of DM (see Table 1). This is possibly due to the fact that most of the subjects were diagnosed by medical doctors who would have advised them about the importance of management options in DM. Many respondents preferred awareness campaigns in the form of handouts and multimedia devices. This suggests the need for educational and awareness programmes that reinforces the need for regular eye examinations and ocular complications of the disease. These programmes should be encouraged as a matter of provincial health policy, as it may lead to reductions in the use and costs of eye services associated with managing ocular complications of DM.

Diabetes care is a lifelong responsibility and careful management and early treatment strategies may reduce the risk of complications, some of which are fatal. A multidisciplinary approach to management of DM which includes ophthalmologists, medical practitioners, optometrists, nurses and dieticians is advocated. Ophthalmologists and optometrists will examine for signs of retinal damage and other ocular complications such as cataracts, glaucoma *et cetera*. Medical practitioners and physicians will assess for any diabetes related complications such as signs of kidney failure, neurological and cardiovascular complications. Dieticians will assist with advice and support on healthy eating and maintenance of healthy weight.

Caution needs to be exercised when interpreting the results of this study. For example, these results were based on information obtained from only one hundred and six patients selected from two community health facilities and an eye clinic of urban areas in Durban. It can therefore not be generalized for the province and the country with regards to diabetic patients' knowledge and management thereof. An additional limitation of this study is that the educational and socio-economic status of the subjects was not in-

vestigated. This might have influenced the knowledge of participants on issues relating to DM.

It is recommended that further studies be done to evaluate diabetic knowledge in other provinces among the rural and urban population as well as on health care providers so that comparative inferences can be drawn. This will assist in empowering patients and health care workers with knowledge of DM and the importance of understanding treatment and management options.

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Appendix

Dear Participant,

This survey is being conducted to establish the level of diabetes mellitus knowledge, complications and management among diabetes patients. Please write the corresponding number that best describes your response on the right side of the table.

1. Gender: M [1] F [2]
2. Age (years):
20-29 [1]
30-39 [2]
40-49 [3]
50-59 [4]
60-69 [5]
70-79 [6]
>80 [7]
3. Race: Black [1] Asian [2] Coloured [3] White [4] Other (specify) [5]
4. Please indicate your occupation:
Pensioner [1]
Formal employment [2]
Housewife [3]
Unemployed [4]
Other (please specify) [5]
5. Home language: English [1] Afrikaans [2] Zulu [3] Other (please specify) [4]
6. Who first diagnosed you with diabetes mellitus?
General Practitioner [1]
Ophthalmologist [2]
Optometrist [3]
Nurse [4]
Other (specify) [5]
7. Were you informed by the personnel you chose in 4 above on routine eye examinations to monitor the health of your eyes? Yes [1] No [2]
8. How many years ago were you first diagnosed with this condition of diabetes mellitus?
1-5 [1]
6-10 [2]
11-15 [3]
16-20 [4]
>20 [5]
9. How many types of diabetes mellitus do you know? One type [1] Two types [2] Not sure [3] Do not know [4] Others (please specify) [5]
10. Which type of diabetes mellitus do you have? Type 1 (Insulin Dependent) [1] Type 2 (Non Insulin Dependent) [2] Do not know [3] Others (please specify) [5]
11. Do you think diabetes mellitus is hereditary? (inherited from parents) Yes [1] No [2] Do not know [3]
12. Do you think genetic and hereditary factors are risk factors for the development of diabetes mellitus? Yes [1] No [2] Do not know [3]



13. Do you think the duration of your diabetes mellitus is an important risk factor in the development of complications? Yes [1] No [2] Do not know [3]
14. Do you think that diet and lifestyle modifications are important factors in reducing problems associated with diabetes mellitus? Yes [1] No [2] Do not know [3]
15. Do you think the control of your blood glucose levels is an important factor in reducing complications of diabetes mellitus? Yes [1] No [2] Do not know [3]
16. Are you aware that diabetes mellitus can lead to visual problems and blindness? Yes [1] No [2] Not sure [3]
17. Do you know that diabetes mellitus can cause changes to the health of your retina (the back of your eye-diabetic retinopathy)? Yes [1] No [2] Not sure [3]
18. Are you aware that diabetes mellitus can cause clouding of vision or cataracts? Yes [1] No [2] Not sure [3]
19. Do you know that your diabetes mellitus can cause increase in the pressure of your eyes or glaucoma? Yes [1] No [2] Not sure [3]
20. Is the threat to your vision enough reason for you to have regular eye examinations? Yes [1] No [2]
21. How many months ago did you have an eye examination?
0-6 [1]
7-12 [2]
13-18 [3]
19-24 [4]
>24 [5]
22. Do you feel that you have sufficient knowledge about the management of your diabetic condition? Yes [1] No [2]
23. Do you follow a dietary modification to control your diabetes mellitus? Yes [1] No [2]
24. Do you perform regular sugar monitoring after being diagnosed with diabetes mellitus? Yes [1] No [2]
25. Do you perform regular exercises? Yes [1] No [2]
26. Do you have regular medical examinations? Yes [1] No [2]
N.B. For questions 27-33, please rate the importance of the following modifications in the management of diabetes mellitus? (Please use the following keys: Not important = [1], Slightly important = [2], Very important = [3], Do not know = [4]).
27. Eating healthy (diet)
28. Regular Exercise
29. Regular blood sugar check ups
30. Maintaining an ideal body weight
31. Taking medication regularly
32. Routine medical check ups
33. Routine eye examinations



34. Are you happy with the amount of information provided to you by your optometrist with regards to the dangers of uncontrolled diabetes mellitus and the health of your eyes? Yes [1] No [2] Not sure [3]
35. What information with regards to the complications of diabetes mellitus would you like to get from your clinicians?
- General information on diabetes mellitus [1]
 - Dietary control [2]
 - Precautions to be taken by diabetics [3]
 - Effects of diabetes mellitus on the eye [4]
 - Smoking and diabetes mellitus [5]
 - Exercise and diabetes mellitus [6]
 - Other (please specify) [7]
36. How would you like this information given to you?
- Handouts or pamphlets [1]
 - Videos or tapes [2]
 - Other (please specify) [3]

Thank you for taking time to complete this questionnaire!

