An assessment of the level of knowledge about diabetes mellitus among diabetic patients in a primary healthcare setting

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Abstract

Background

Diabetes mellitus is a global disease with an extreme effect on the quality of life of affected patients. In the past, South Africans diagnosed with diabetes mellitus were predominantly from the affluent urban community. Now, due to westernisation of the rural community, it is fast becoming prevalent in the rural African population. The increase in the number of peripheral clinics post-apartheid has provided essential health care to the masses. There has been an increase in screening for diabetes and easier access to treatment for outlying communities. An important point of consideration is the knowledge that diabetic patients have of their disease. This is an integral component for attaining optimal disease control. Knowledge of diabetes can thus prevent the impending chronic co-morbidities of diabetes mellitus, which impact significantly on the quality of life of the diabetic patient. It would thus be valid to assess the understanding of the primary healthcare patient of his or her disease state and the complications that may arise. This study was therefore aimed at clinics in the KwaZulu-Natal region, where 56,9% of the people live in rural areas, with an estimated 65% literacy rate and unemployment standing at over 50%. The patients at the rural clinics, who have limited access to the health care enjoyed by urban and private patients, would be of particular interest

Methods

This was a descriptive study involving 181 patients attending three primary healthcare clinics in KwaZulu- Natal (designated A, B and C). The clinics that were selected either bordered on or were in a rural area. The patients were chosen by convenience sampling. All patients visiting the diabetic clinic were chosen on a voluntary basis. Informed consent was obtained from each patient. The patients could be either type 1 or type 2 diabetics. A two-part patient questionnaire was designed. Section A investigated basic patient history (demographics and disease state), while section B was a basic knowledge test on diabetes mellitus. Section A investigated patient age, race, residence, number of years post-diagnosis and the type of diabetic medication being taken. Diabetes knowledge was assessed with a modified version of the Michigan Diabetes Research and Training Centre's Brief Diabetes Knowledge Test. A total of 13 multiple-choice questions were used, covering key areas in diabetic management, including hypoglycaemic symptom identification, plasma glucose level awareness, knowledge of diet, the possible chronic co-morbidities of diabetes, foot care, exercise, etc. Patients answering seven of the 13 questions correctly were considered as having passed the test.

Results

A total of 121 of the 181 patients (66.9%) passed the diabetic knowledge test (p<0.05). There was a higher pass in the female group than in the male group, with 69.8% of the female population passing compared to 60% of the male. The overall data across the three clinics indicate a better pass by the Indian than the African population, with 75.9% of the Indian patients passed in comparison to 52.2% of the African patients.

Conclusion

It should be emphasised that a difference in knowledge scores illustrates a lack of history in the particular group and is a legacy of apartheid, during which there were inequalities in education, health services and all other spheres of life. Further correlations were established regarding diabetes knowledge and age, number of years post-diagnosis of diabetes, counselling received and type of diabetic medication used. There is a problem with regard to the understanding of diabetes by the African population. The majority of the African study population, who were type 2 diabetics and older than forty, grew up during the apartheid era and consequently lacked the benefit of appropriate heath care and education. We therefore need to ensure that our healthcare providers are continuously trained and provided with the essentials in order to comprehensively care for diabetic patients. Furthermore, follow up evaluations should be performed on a regular basis in the clinical environment and re-training administered where appropriate.

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Introduction and background

The prevalence of diabetes in African communities is increasing with the ageing of the population and lifestyle changes. Traditional rural communities still have a low prevalence, at most 1 to 2%, whereas 1 to 13% or more adults in urban communities have diabetes mellitus.[1] Increasing sedentary lifestyles, coupled with rapidly growing urban cultures and modified diets, are predicted to triple the prevalence of diabetes mellitus in the next 25 years.[1] Epidemiological information amongst black people in Southern Africa reflects an increase in the incidence of asthma, diabetes and hypertension, diseases that previously were more prevalent in urban black populations.[2]

In view of the late diagnosis of type 2 diabetes mellitus, these patients experience various long-term complications, with the resultant morbidity increasing the burden of diabetes on healthcare systems in African countries.[3,4]

It is therefore in the interest of these countries, especially South Africa, which has one of the fastest rates of Westernisation, to design and implement suitable diagnostic, management and treatment protocols and appropriate education for these patients. Research into the management of diabetes at the primary healthcare level in South Africa has revealed that only a third of the patients are well managed and that only 40% of the patients have blood glucose levels within the study limits.[5] A review of the quality of care received by public primary care patients in five clinics in Cape Town revealed that the examinations for treatable complications were inadequate and that simple protocols and in-service education are likely to improve the care and health outcomes for diabetic patients at these sites.[6]

The greatest weapon in the fight against diabetes mellitus is knowledge.[7] Information can help people assess their risk of diabetes, motivate them to seek proper treatment and care, and inspire them to take charge of their disease for their lifetime.[8, 9,10.]

In view of the increasingly high incidence of complications in diabetic patients, it would be valid to assess the perception of the primary healthcare patient of his or her actual disease state and the problems that may arise. The KwaZulu-Natal region, where 56,9% of the people live in rural areas, with an estimated literacy rate of 65% and unemployment standing at over 50%, would therefore be a suitable area for investigation.[11] These patients who attend rural clinics and have limited access to the quality of health care enjoyed by urban and private patients would be of particular interest.

Methodology

This was a descriptive study involving patients visiting three primary healthcare clinics in KwaZulu-Natal (coded as Clinics A, B and C). Permission for the study was obtained from the Biomedical Research Ethics Committee of the University of KwaZulu-Natal, as well as from the Department of Health (KwaZulu-Natal). The selected clinics were on the outskirts of the city of eThekweni, either bordering directly on or actually within a rural area. Convenience sampling was applied and the number of patients chosen was adequate to provide a confidence level of 95% and a confidence interval of 5 to 7%.

A medium length, two-part patient questionnaire was designed, including an isiZulu version. Section A dealt with patient demographics (age, sex, race and residence) and the disease (time since diagnosis and type of treatment), while section B was a basic knowledge test on diabetes mellitus. Diabetes knowledge was assessed on the basis of an adapted and modified version of the Michigan Diabetes Research and Training Centre's Brief Diabetes Knowledge Test.[12] The test was created for adults with either type 1 or type 2 diabetes. Thirteen multiple-choice questions were created to assess basic patient knowledge.
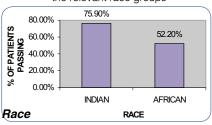
Results

(Patients who pass the test are defined as those who achieved more than 50% in the knowledge-based part of the questionnaire, i.e. patients answering seven or more of the 13 questions correctly. South Africans of Indian origin will be referred to as Indians and black South Africans will be referred to as Africans as per the Department of Home Affairs)

Population and gender

The total study population comprised 181 patients, with 77 patients (42.5%) from Clinic A, 66 patients (36.5%) from Clinic B and 38 patients (21%) from Clinic C. There were more female than male patients in the study population (69.7%, n = 126). The distribution between the male and female population is consistent with the findings of Omar et al.[13]

A total of 121 of the 181 patients (66.9%) passed the test. The best pass was in Clinic B (n = 49 or 74.2%) and the worst was in Clinic C (n = 19 or 50%). These results were statistically significant (p<0.05). There was a higher pass rate in the female group than in the male group, with 69.8% (n = 88) of the females passing compared to 60% (n = 33) of the male population (see Figure 1).

Figure 1: Percentage of patients passing in the relevant race groups

There were a larger number of Indian patients in the study, representing 61.9% (n = 112) of the population, and African patients comprised the remaining 38.1% (n = 69). The two races identified in the total study cohort (i.e. Indians and Africans) are predominant in the area under study and are dependent on public healthcare facilities. As many as 90% of African South African diabetics rely on public health facilities, with only 8% having access to private medical aid.[14]

There was a better pass in the Indian group (75.9%) than in the African group (52.2%) of patients. The discrepancy between the pass rates of the two race groups does not in any way imply lack of intelligence in either population group, but rather stems from inequalities of the past, as will be discussed later. The trend of female patients being more knowledgeable is clearly evident in the African group, where only 35% of the male population passed in comparison to 59.2% of the female population.
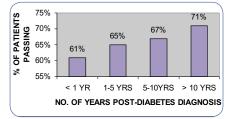
Language

The majority of the sample comprised the English-speaking group, which made up 64.1% (116) of the study population, with the remaining 35.9% (65) being Zulu speaking. There is a similarity between the language distribution and race distribution in the total study population and per clinic. The pass in the English-speaking group (75.9%) was significantly higher than in the Zulu-speaking group (50.8%). A sub-analysis indicates that African male patients who preferred Zulu were not as successful in the test as the English-speaking African

male patients. There was a 7.2% difference in the pass rate between these two groups. It is thus easier for the English-speaking African patient to respond to and benefit from the current method of counselling.

Residence
The geographical distribution of the study population was 66.3% (n = 120) urban and 33.7% (n = 61) rural. There was a particularly high failure rate in the rural male group, with only 22.2% passing the test in comparison to 58.1% of the rural female patients. The urban male patients had a similar pass rate to the female urban patients, with 78.4% and 75.9% respectively. Of the African rural patient population, 52.2% passed compared to 47.5% of the African urban dwellers. The better performance by urban African dwellers are not solely due to more accessible health care in the past and present, but also due to their increased awareness of diabetes, which previously was highly prevalent in urbanised areas. The research findings of King relating to Aboriginal diabetic patients in rural South Australia indicates a lack of knowledge about management issues, and the effects of diabetes on their lifestyle.[15]

Figure 2: Percentage of patients passing in relation to duration of the disease

Time of diagnosis
The largest number (n = 61 or 34%) of patients were diagnosed more than 10 years previously, followed by 27% (n = 49) of patients having been diagnosed between one and five years previously (Figure 2). Of the remainder of the study population, 43 (24%) had been diagnosed five to 10 years previously, while 28 patients (15%) had been diagnosed less than a year previously. There was a progressive increase in the number of patients passing the diabetes knowledge test with an increase in the number of years post diag-nosis. The pass rates of patients who were diagnosed less than a year pre-viously was 60.7%, of those diagnosed one to five years previously was 65.3%, five to 10 years previously was 67.4% and more than 10 years previ-

ously was 70.5%. These findings are not consistent with those of West and Goldberg, who found no significant increase in knowledge scores with the number of years post diagnosis in the Veterans Clinic in the United States.[16]

Age
The majority of the patient population fell into the 40 to 59 year age group (70.6%, n = 117), with the 60 to 79 year age group comprising 28.7% (n = 52) and the 20 to 39 year age group constituting 0.7% (n = 12). The best pass overall in all three clinics was achieved in the 40 to 59 year age group. The 60 to 79 year age group had the worst pass overall. West and Goldberg reported a decrease of 3% in the knowledge score of diabetic patients for every 10-year increase in age.[16] A similar trend is observed in this study if we compare patients from the age of 40 onwards.

Type of medication
The majority of patients were on oral medication (80.7%), with 9.9% of the remaining population being on insulin only and 9.4% being on both insulin and tablets. There was an increase in the number of patients passing the test as one progressed from tablets only to insulin only and to both tablets and insulin. A greater number of patients on the combination of both tablets and insulin passed the diabetes knowledge test (76.5%), compared to a pass rate of only 65.1% among patients who were on tablets only. More intensive counselling (i.e. regarding diet, medication and exercise together) was received by the insulin group than the tablet only group. This can be deduced from the observation that the insulin-treated patients had a better knowledge score than the tablet-treated patients. The more intensive counselling of the insulin-treated group is due to this group requiring closer monitoring and detailed information in order to control the state of their diabetes and to prevent insulin dose-related complications.

Response to specific questions in diabetic knowledge test
The worst performance was evident in two questions. The first was question one, which focused on the ability of the patient to identify the symptoms of hypoglycaemia. Only 31.5% (Table I) of the patient population answered this question correctly. Ironically, 31.5% (Table I) of the patient population also

understood the significance of plasma glucose levels following a finger prick analysis (question two in the patient questionnaire). Kapur et al., who assessed diabetic patients in urban India, reported only 60% of patients having knowledge and understanding of fasting blood glucose levels, with only 34% appreciating the significance of the post-prandial glucose value.[17] The results of Kapur et al. are better than those found in this study, where a mere 31.5% of the patients understood the significance of blood glucose levels. This is significant, as the key to optimal diabetes self-management is being able to measure and interpret plasma glucose levels. A lack of understanding of plasma glucose levels leads to a poor prognosis in terms of complications.

Another area of poor performance was questions designed to establish whether patients were able to identify the associated co-morbidities of diabetes. In these questions, patients failed to point out that there was no association between diabetes and asthma or diabetes and cancer. Patients need to realise that diabetes mellitus is not related to other prevalent diseases like asthma or cancer. They need to understand that poor management of the disease could definitely lead to major co-morbidities, such as blindness, renal failure, etc. These results indicating misconceptions about the disease coincide with the study of Badruddin et al., who assessed the knowledge, attitudes and practices of patients attending a diabetes care unit in Pakistan. Of these patients, 7% thought that diabetes is caused by a diabetic virus, 43% believed a bad shock could cause diabetes and 14% replied that diabetes was an epidemic disease.[18] Thus patient education as to the aetiology of diabetes should be addressed and clarified, as should the associated complications of the disease.

The patients in this study performed best in identifying blindness as a complication of diabetes, with 92.3% answering correctly (Table I), and in associating fat with heart disease, with 80.7% answering correctly (Table I). Only 57.5% (Table I) of the population in this study identified maize (phuthu) as a food with a high carbohydrate content. Hawthorne and Tomlinson found that 72% of Pakistani Moslems at the Manchester Diabetes Centre had adequate knowledge of diabetic diets.[19] Maize is part of the staple diet in South Africa. This lack of knowledge by the

population, compounded by the lack of adequate nutrition, could be a predictor for later co-morbidities.

Only 53% (Table I) of the population in this study was knowledgeable on basic foot hygiene. Matwa et al. also reported poor foot hygiene amongst patients in the Transkei, leading to limb amputations.[20] Pollock et al. reported a mean knowledge score regarding foot care of 6.5 (SD = 2.1) out of a possible 11 among diabetic patients in Middlesborough, South Tees, UK.[21]

In order for patients to manage their disease properly, a minimum of 80% of the questions should have been answered correctly, since only the very basic essential questions relating to diabetes were incorporated in the questionnaire.[22]

Informed patients and knowledge results

Of the patient population in this study, 91.2% had been informed of their glucose levels after being tested by the clinic sister. The diabetic knowledge results showed a greater pass rate (67.9%) among patients who had been informed of their glucose levels than among those who had not been informed (37.5%). This reflects that patients who are more knowledgeable about their blood glucose levels are more likely to have a better general knowledge of diabetes mellitus.

A sub-analysis was performed of patients who had been or had not been informed of their blood glucose levels in relation to passing the specific question in the diabetes knowledge test regarding the understanding of blood glucose levels. Thirty-four percent (56 out of 165) of the patients who had been informed of their glucose levels answered the question correctly, compared to 6.25% (one out of 16) who had not been told of their blood glucose levels. These findings indicate the need for patients to be educated and informed of their glucose levels after the test.

Results in terms of counselling received

Studies have shown that the quality and extent of diabetes counselling has a major influence on patient self-management.[23] A greater part of the study population had been counselled on a combination of diet and exercise (32%), 29% had been counselled about exercise only, 22.1% had not been counselled at all and only 9.1% of the population re-porting counselling on all three, i.e. diet, exercise and dosage of medication. Patient pass rates increased when there was a combination of counselling rather than counselling on one topic only. The patient population that reported having had no counselling at all performed poorly in the diabetes knowledge test.

Discussion

Prior to discussing the results, it should be emphasised that a difference in knowledge scores does not infer a lack of intelligence in any of the race groups, but rather a historical deficiency in the particular group regarding knowledge about diabetes mellitus and also inequalities of the past with regard to proper education, health services and health education, as also indicated by Hawthorne and Tomlinson regarding Pakistani Moslems attending the Manchester Diabetic Centre.[19]

The overall data across the three clinics indicate a better pass by the Indian population than by the African population, with 75.9% of the Indian population passing the diabetic knowledge test compared to 52.2% of the African study population. Assal et al. found that knowledgeable patients receiving regular counselling are more likely to maintain better glycaemic control.[22] Peyrot and Rubin and Westaway et al. reported that only 8% of African South African diabetics achieve optimal metabolic control (HbA$_1$C 7%), with 25% achieving acceptable metabolic control (HbA$_1$C 8%).[9, 24] White patients had 22% optimal metabolic control and 39% acceptable metabolic control. A study by Levitt et al. showed similar findings, namely that African South African diabetic patients have a poor ability to manage their disease.[25] Optimal patient self-management of diabetes is largely dependent on patient knowledge. The poor glycaemic control reported in the above studies of African patients is thus an indicator of a poor understanding of diabetes.

With a relationship between knowledge and glycaemic control, a comparison can be made between this study and the ones above, which show that the diabetic knowledge of the African population is less than that of either the Indian or white population. This indicates that there may be a problem with regard to the understanding of diabetes by the African population. This can be attributed to the inequalities of the past, when the white population enjoyed better healthcare facilities in both the private and public health sectors. A further advantage of the white population was health education, which was gained not only at school and in the private or public healthcare systems, but also from media coverage. The African community previously was very disadvantaged in this regard, as it did not have the benefits of urbanisation and its influence on communication. This can be overcome by encouraging health education in schools and by using the appropriate language and medium of communication to educate the public on diabetes. Education should therefore not be limited to clinics and diabetic patients only.

An important point of consideration is the lack of recognition of the prevalence of diabetes in the African population. The increase in the awareness of diabetes mellitus among Indians may be due to the high prevalence of the disease and its co-morbidities in the Indian community for many years.[13] Earlier studies in South Africa (1959–1985) reflected a low prevalence of diabetes mellitus among black South Africans.[26,27] Omar et al., using the revised WHO criteria for the diagnosis of diabetes, indicated a prevalence of 5% in the urban South African African population, with an increase in prevalence among the Indian population of South Africa of 7.6% in males and 13.5% in females.[13, 28] More recent statistics show the prevalence of diabetes increasing to 8% in South African Africans, exceeding prevalence rates in African Americans.[25,29] This is evidence that diabetes mellitus is a growing burden on the South African economy. Possible explanations could be the urbanisation of the African population (sedentary lifestyles and changes in diet), or an increase in screening of African patients.

Conclusion

There is a deep need for an increase in the awareness of diabetes management and its complications in the primary healthcare sector. Continuing education on diabetes mellitus and its complications for primary healthcare providers is crucial and this should be accompanied by a regular assessment of their diabetic knowledge. Screening for diabetes is important, but equally crucial is patient education and counselling. It is evident from this study that patients are not sufficiently equipped with the knowledge to comprehensively manage their disease.

Knowledge of diabetes is therefore essential for primary healthcare and other diabetic patients in order to prevent co-morbidities, which may compromise their lifestyles as well as increase the burden on public health care.

An important area of focus in future studies should be the physical observation of nurses counselling diabetic patients. The inclusion of this parameter in a study will highlight the possible barriers to patient counselling and will also be an important tool in measuring the efficacy of counselling in terms of the use of appropriate language and techniques with the different patient groups, more aggressive counselling for elderly patients, more focus on counselling rural dwellers beyond the urban hub, and the efficacy of post-plasma glucose test counselling. The evaluation of the actual and perceived level of nursing knowledge regarding diabetes mellitus and its co-morbidities is also an area of importance and it would be interesting if a correlation is done between this and patient knowledge, and the prevalence of diabetes-related co-morbidities at the particular clinic. A study of youth awareness of diabetes mellitus in rural settings is also a viable study area, as education will be the key to prevention and disease management in later years. The key to unravelling the knots in rural diabetic patient management thus lies in empowering the patient and the healthcare provider with the essential knowledge.

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