Long-Term Complications and their Associated Risk Factors Among Diabetic Patients at the Kenyatta National Hospital, Kenya

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ABSTRACT

Background: Diabetes mellitus (DM) has become the epidemic of the 21st century. In Kenya, diabetic patients face multiple risk factors that increase vulnerability to long-term complications. This study explored the factors associated with increased risks to long-term complications among patients with Type 2 DM (T2DM) at the Kenyatta National Hospital (KNH). Methods: A descriptive cross-sectional study was conducted to estimate the distribution characteristics of the long-term complications, and collect data of participants’ medical history, physical examination findings and responses of the focused group discussion. We recruited 147 adults with T2DM and 10 nurses involved in diabetes care. Continuous data were analyzed using parametric methods while categorical data were analyzed by Chi-Square tests. Results: Participants faced multiple obstacles as they sought diabetes care at the KNH. Most obstacles resulted from long distance to the facility (43%), inadequate essential services (75.2%) and high costs (66%). Inadequate income (83.7%), psychological stress (91.8%) and obesity (47.6%) were found to be associated with increased vulnerability to complications. Conclusions: At the KNH, diabetes control is inadequate due to limited access to essential health services and the individual participants’ report of facing challenges in self-management. Decentralized comprehensive DM clinics and increased insurance cover would improve access to health services. It is important to implement structured diabetic health education early in the course of the disease taking into account patients’ cultural and socioeconomic variations. These measures would adequately address the modifiable risk factors and decrease the risks of long-term diabetic complications in Kenya.

Keywords: Diabetes mellitus, long-term complications, risk factors

1. INTRODUCTION

Diabetes mellitus (DM) is among the most common non-communicable disease in the 21st century causing significant morbidity and mortality(1). Globally, diabetic population continues to increase stimulating interest among the clinicians and public health experts. The increase in DM and other noncommunicable diseases has resulted in double burden in low income countries that are already facing a burden of communicable diseases(2). This double burden now poses a real threat to individual country and regional developments. In low income countries DM often goes unnoticed for long period due to slow progression, varied clinical presentation and inadequate primary health care services. Late
diagnosis and subsequent complications contribute significantly to the health burden. There appears to be an epidemic in diabetic cases in low income countries related to nutritional-activity transition and adoption of western lifestyle\(^3\). Africa will have the highest number of patients with diabetes in the coming decade if no workable solutions are found. Diagnosed as well as undiagnosed DM present a challenge to the person as a result of its myriad complications notably; cardiovascular, renal, retinal and neural among others\(^4\,5\). The main culprit in the aforementioned is chronic hyperglycemia as a result of poorly-controlled DM leading to long-term damage and/or dysfunction of small and/or large blood vessels aka microvascular and macrovascular diseases\(^6\,7\). Protection from these complications, require a multidisciplinary-multifaceted approach because of financial, administrative and behavioral components of the problem.

The high prevalence of DM in Kenya depicts a diabetic population in urgent need of appropriate health interventions directed to preventable long term complications\(^8\,9\,10\). Studies have shown that early diagnosis and mitigation of multiple risk factors in chronic disease management improves health outcomes\(^11\,12\,13\,14\). We sought to identify the factors associated with increased risks to long-term complications among patients with T2DM attending the national referral hospital in Kenya.

2. METHODS

A descriptive cross-sectional study was done involving 147 participants with T2DM. Eligible participants were defined as those who consented and had been diagnosed with T2DM at least one year prior to the study. Nurses who consented and directly managed type 2 diabetic patients at least one year prior to the study participated in the focused group discussion. A total of 147 T2DM participants aged 21-90 years (61 male and 86 female) were randomly sampled from the clinic and the wards. Ten nurses were sampled from the DM clinic and the wards. Upon consent, participants with T2DM who met the inclusion criteria were randomly selected and interviewed. Randomization was stratified based on age, gender and variations of diabetes-related morbidity, as these factors were expected to influence patients’ self-management and overall risk factor control. The participants’ questionnaire was self-administered, written in simple English and contained both open-ended and close-ended questions. Trained research assistants interviewed them and filled in the data for the participants who were unable to read and write. The questionnaire addressed the following – socio-demographic data, duration of illness, reason for attending clinic, diabetes medication history, health-seeking behaviour, diet history, social support, sleep, lifestyle behaviour, healthcare financing and stress management. The questionnaire also captured basic routine diabetic investigation reports (AIC, lipid and renal profiles) and the findings of the physical examination (BP, pulse rate, and anthropometric measurements – height, weight, hip and waste circumferences). Basic diabetic routine investigation reports of the previous 6 months were captured from the participants’ medical records. The data on lifestyle behavior included individual social habits (cigarette smoking, use of alcohol), diet and physical activity. The focused group discussion investigated factors that increased risks to long-term complications among patients with T2DM from the nurses’ perspectives. The discussion focused on the specific factors that could have been attributed to the healthcare system, those outside the healthcare system and the suggestions of addressing them.

Data was coded and tallied manually into the statistical analysis program SPSS for running of the results. Socio-demographic characteristics, duration of illness, reason for attending clinic, diabetes medication history, health-seeking behaviour, diet history, social support, sleep; lifestyle behaviour, healthcare financing and stress management were summarized using descriptive statistics. Categorical data were analyzed by Chi- Square tests. A multivariate analysis using logistic models was conducted to identify independent variables for risks of hypertension, foot, eye and renal complications. The risks encountered in preventing long term complications were determined by analyzing open ended responses by participants and the focused group discussion with nurses. This study was approved by the Kenyatta National Hospital -University of Nairobi Ethics Committee, and authorized by the Kenya National Council for Science and Technology. Informed consent was obtained from all participants.

3. RESULTS

There were eighty-six (58.5%) and sixty-one (41.5%) female and male participants respectively with a mean age of 57.4 (SD 13.2) years. The prevalence of long-term DM complications increased gradually from the time of diagnosis, peaking between the ages of 60-69.

years, where it was proportionately higher among women. Majority of the participants (89.4%) had attained primary education. The main economic activities were small-scale business (31.3%) and subsistence farming (23.1%) with only twenty-four participants (16.3%) having full-time formal employment. The mean duration of T2DM illness was 9.7 years (SD = 6.9, range 1-35 years). A significant number of participants (n = 65, 44.1%) had lived with DM for more than 10 years. The prevalence of co-morbidity was high (n = 135, 91.8%), with hypertension being the commonest (n = 93, 63.3%).

Hypertensive participants were older than their normotensive counterparts (mean age = 60.3 versus 52.3 years, t = -3.74, p = 0.0003). Participants with hypertension had lived with T2DM for an average period of 10.8 years compared to an average duration of 7.72 years for normotensive ones (t = -2.66, p = 0.0087). Diabetic neuropathy (n = 60, 41.1%) was the most common long-term complication found. The mean BMI for our study group was 27.1 (SD = 4.5). Majority of the participants who were overweight and obese were women.

Table (1): BMI distribution among the study group: (Adapted from WHO, 1995, 2000 and 2004)

<table>
<thead>
<tr>
<th>Classification</th>
<th>BMI (Kg/M²)</th>
<th>Men</th>
<th>Women</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td>&lt; 18.50</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Normal Weight</td>
<td>18.50 - 24.99</td>
<td>22 (45%)</td>
<td>27 (55%)</td>
<td>49</td>
</tr>
<tr>
<td>Overweight</td>
<td>≥ 25.00</td>
<td>38 (39%)</td>
<td>59 (61%)</td>
<td>97</td>
</tr>
<tr>
<td>Pre-obese</td>
<td>≥ 25 – 29.9</td>
<td>26 (42%)</td>
<td>36 (58%)</td>
<td>62</td>
</tr>
<tr>
<td>Obese</td>
<td>≥ 30</td>
<td>12 (34%)</td>
<td>23 (66%)</td>
<td>35</td>
</tr>
<tr>
<td>Obese Class I</td>
<td>30.00 - 34.99</td>
<td>10 (37%)</td>
<td>17 (63%)</td>
<td>27</td>
</tr>
<tr>
<td>Obese Class II</td>
<td>35.00 - 39.99</td>
<td>2 (25%)</td>
<td>6 (75%)</td>
<td>8</td>
</tr>
<tr>
<td>Obese Class III (Severe/Morbid Obesity)</td>
<td>≥ 40.00</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Nearly all participants (n = 145, 98.6%) sought day-to-day DM care services in public health facilities. Majority (n = 63, 43%) of the participants travelled a distance of more than 20 km to the hospital with only 3.4% of them living within 5 km radius. In addition, a significant number (n = 109, 75.2%) reported not getting all the sought services. The services commonly identified as missing included; proper information (13.6%), timely attention (34.6%), essential drugs (56.5%), affordable drugs (30%), and personal attention (10.9%). On regular checkups, participants with no dental problem (46.3%) had never had routine dental checkup. The reasons given for failure to have dental checkup were lack of finances (55%) and “feeling okay” (38.7%). Majority of the participants (83%) thought they had increased risks of eye disease secondary to diabetes. However, 19.6% of the participants did not attend routine eye checkups. Participants with eye disease were more likely to see an eye specialist compared to those without (89% and 70% respectively). Eye problems were significantly associated with obstacles in seeking eye treatment (p = 0.0001) and the attendance of regular eye checkups (p = 0.035). Participants with problems accessing eye treatment had higher odds of getting eye disease compared to those without [5.36 times] (95%, CI 2.11-13.52).

Foot ulcers was associated with concurrent diagnosis of hypertension and reported problems in financing healthcare (OR [95% CI] = 2.18 [1.07 – 4.41] and OR [95% CI] = 2.06 [1.002 – 4.22]) respectively. Foot ulcers were also significantly associated with duration of DM (t = 2.62, p = 0.0098) and the age of the participants (t = 3.43, p = 0.0008). Despite majority of the participants reporting compliance with treatment, nineteen (12.9%) of them had problems with injecting insulin.
The main forms of physical activity among our group included regular walking and performance of household tasks. The commonly stated reasons for not engaging in brisk or aerobic exercises included lower limb pains, diabetes-related illnesses, individual commitments and advanced age. Our participants (81%) were unable to identify common foods with high calorie, protein or fat contents. Few participants reported taking alcohol (8%) and smoking cigarettes (5%). The average hours of night sleep were 7.97 with a range of 4-12. Participants with inadequate sleep (40.8%) reported significant stress levels (\( p = 0.028 \)). The common sources of stressors for our group included DM morbidity and domestic-related issues. Almost all the participants (n = 142, 96.6%) incurred out-of-pocket expenses and strained to finance their health care. The most common reasons that contributed to the financial strain included paying other medical bills (34%) and lack of personal income (31.3%).

4. DISCUSSION

Our study population comprised individuals with less formal education, relatively old and overweight with multiple comorbidities. In addition, they faced challenges financing their healthcare. Prevalence of long term complications was related to less formal education, advancing age and inadequate financial resources. Our participants faced challenges accessing the health services due to long distance and multiple appointments in the facility (e.g., surgical, renal, eye clinics). High costs incurred in transport and paying for the multiple services contributed to increased financial strain for the participants. Treating elderly DM population is complicated by multiple comorbidity, inadequate income and presence of multiple treatment adherence barriers, as detailed by earlier studies\(^ {15} \).

There was no evidence that diabetes education motivated our group to engage in secondary preventive practices. For example; majority of the participants were aware of the increased risks to eye complications but only 19.6% of them reported ever having had a routine eye checkup. Decisions to visit eye clinics were often made when problems with eye sight developed. Noncompliance to health instructions often results in poor health outcomes as outlined in previous studies\(^ {16} \). The health workers at the DM clinic routinely referred patients to the eye clinic for checkup but there was no evidence of follow up. In addition, the eye clinic was situated in a different unit where new patients faced challenges locating it and complained of being delayed while in the clinic. Multiple studies have shown that health systems that do not respond appropriately to the overall patients’ need results in poor health outcomes\(^ {17} \).

Diabetes education needs to be structured in a step-wise manner to meet individual patient needs. Initial basic health education should be followed by regular appraisals of patients’ knowledge level and adherence to health instructions. This will enable potential or actual management adherence barriers to be identified and addressed in time to prevent or delay long-term complications due diabetes. It would be better if diabetic patients get most or all their health services within one physical location where appointment dates can be reconciled. Multiple appointments can be scheduled in one day where possible. This would greatly reduce expenses in terms of transport costs and time to the majority of patients who live far.

Foot care services were inadequate in the DM clinic. Few participants had their feet examined by health workers. On the other hand, participants who were referred for wound dressing due to foot ulcers waited long due to nurses’ shortage. The nurses in the examination room were still the ones assigned to work in the dressing room. This seemed to compromise delivery of quality services especially in cases where patients had come for routine checkup. Inadequate staffing levels compromised diabetes care at the clinic as outlined in previous studies\(^ {18} \). Participants with foot ulcers were older, hypertensive, and had lived with DM for relatively longer period. In addition, diagnoses of foot ulcers showed a significant association with reported problems in paying for health care. Physical illness, financial strain, fear of diabetic complications and domestic-related stressors negatively interfered with self-care practices among our participants as reported in other studies\(^ {19} \).

Majority of our participants did not have health insurance cover. In Kenya, the National Hospital Insurance Fund (NHIF) is a statutory cover for the formally employed where payments are deducted by the employers and transferred to the NHIF. However, the proportion of the informal sector employees covered by NHIF is minimal and those covered often times fail to meet their monthly or quarterly payments due to financial constraints. This results in the failure of the NHIF to settle their medical bills when they are due. The affected patients have to find alternative ways to settle their medical bills including selling property and requesting for donations. Participants who had problems financing their diabetes treatment

had poor health outcomes including higher chances of developing foot ulcers. Moreover, financial constraints brought challenges in prioritizing diabetes care in the elderly comorbid patient with competing needs. Overall, financial constraints interfered with priority setting in the context of DM management as the aspects which did not seem urgent to the patient were overlooked, resulting to early complication and/or disability as evidenced in other studies (20).

5. CONCLUSION

There were multiple factors that negatively affected the practice of comprehensive care for diabetic patients at the facility increasing their risks to long term complications. Access to diabetic care services was limited by long distance to the facility, inadequate essential services and financial constraints. Most participants were elderly, stressed, overweight or obese with high comorbidity. High comorbidity resulted in multiple prescriptions and appointments worsening the existing financial burden that brought problems in priority setting. There were inadequate primary prevention practices for long-term complications as decisions to seek healthcare services were usually made after the onset of diabetic complications.

As a developing country, Kenya needs to take into consideration the emerging threat that NCDs pose to her population. Resources directed towards treating illnesses and complications resulting from diabetes mellitus and other NCDs impose huge financial burden to the already resource-constrained society. Like other countries in Africa, Kenya has prioritized primary prevention model as the key to address the HIV&AIDS pandemic. This model should be replicated to address the emerging threat from NCDs. We need to build capacity among healthcare providers on comprehensive care for diabetic population. The national and county governments through the Ministry of Health (MOH) should decentralize comprehensive DM care centers across the country and subsidize DM care commodities. On the other hand, diabetic patients require formal structured education on self-management with timely health seeking behaviour being emphasized and continuously appraised. Further, the national government should increase budgetary allocation to health sector and enact and implement policies to increase the national health insurance coverage that includes outpatient cover.

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