P-0882: Patterns of Glycated Hemoglobin and Microalbuminuria in Patients with Diabetes Mellitus at a Diabetes Clinic in Ethiopia

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Background:

- Glycated hemoglobin (HbA1c) and microalbuminuria measurements are routinely used in the management of diabetes and its complications in the developed world.
- In contrast, in most of sub-Saharan Africa (SSA), management of diabetes is performed using limited laboratory data.
- A lot of times, management decisions are made based on a single fasting blood glucose value performed at the day of the visit in the clinic.
- Screening for nephropathy is performed by doing routine urinalysis which only detects gross proteinuria and misses a lot of patients with microalbuminuria.
- Tests such as HbA1c and urine microalbumin are not routinely available.
- Therefore, there is scant data from Africa regarding the HbA1c and microalbuminuria pattern in patients with diabetes.
- As the prevalence of diabetes and its complications is growing at an alarming rate in SSA, it important that we try to better understand diabetes and its complications urine tests such as HbA1c and urine microalbumin.

Aim

- The aim of this study is to look at and describe the pattern of HbA1c and microalbumin in patients with diabetes at a specialized diabetes clinic at an academic institution in Ethiopia.
- By doing so, the study will determine the proportion of patients who are well controlled and poorly controlled based on internationally accepted HbA1c criteria.
- It will also determine the prevalence of microalbuminuria and gross proteinuria.

Method

- This is a retrospective study of 230 patients from the diabetes clinic of Tikur Anbessa Specialized Hospital at Addis Ababa University in Ethiopia.
- The HbA1c determination was performed using the A1C Now + Professional kit.
- The microalbumin level was determined using Microalbumin 2-1 Combo Strip.
- In addition, a Urinalysis Strip was used to check for proteinuria, among other things.
- During a period of several weeks in 2016, the test kits were made available through an international collaboration.
- All consecutive patients seen at that time were tested as part of their clinical evaluation.
- At a later time point, the results were retrieved from medical charts for analysis.
- Additionally, data is collected on demographics, clinical characteristics, and other laboratory investigation results.
- An approval from the Institutional Ethics review board was obtained for this retrospective study.

Figure 1: Distribution of HbA1c Values by Type of Diabetes

	Type 1 DM	Type 2 DM
HbA1c Mean (SD)	9.2% (1.4)	8.2% (1.6)
HbA1c Range	5.5- 13%	5.1-13%

Figure 2: Distribution of Fasting Blood Glucose Values by Type of Diabetes

	Type 1 DM	Type 2 DM
FBG Mean (SD)	208 mg/dL (92)	172 mg/dL (66)
FBG Range	80-422 mg/dL	57-369 mg/dL

Results

- Of the 230 patients who had the tests performed, 125 (54.1%) were female while 106 (45.9%) were male.
- The age range was 18 to 80 years with an average age of 47.1 yrs.
- The mean HbA1c value was 8.37%, while the minimum value was 5.1% and the maximum was 13%.
- A total of 54 patients (23.3%) had HbA1c values ≤ 7%, 102 (44.2%) had values ≤ 8%, while 38 (16.5%) had values ≥ 10%.
- On the urinalysis strip test, 125 patients (54.1%) were negative for gross proteinuria, 57 patients (24.7%) had trace proteinuria, and 48 patients (20.8%) had +1 to +4 proteinuria.
- On the microalbumin strip test, in 64 patients (27.8%), the albumin to creatinine ratio (ACR) results could not be determined due to very low or undetectable urine creatinine.
- Of the 166 patients with valid results, 45 (27%) had ACR of <30 mg/g (normal), 108 patients (65%) had ACR of 30-300 mg/g (microalbuminuria), and 13 patients (8%) had ACR of > 300 mg/g (macroalbuminuria).

Discussion & Conclusions

Only 23% of patients with diabetes at the diabetes clinic that we studied are at goal HbA1c of ≤ 7% (^ in T1DM and 26% in Type 2 DM). In regard to urine tests, 21% of the diabetes patients have gross proteinuria as measured by urinalysis strip and 8% as measured by the microalbuminuria strip. An additional 65% have microalbuminuria most of whom were missed by the urinalysis strip. Those results indicate a significant majority of patients having poor glycemic control and evidence of early nephropathy. We believe that expanding access to HbA1c and urine microalbumin testing in Ethiopia will provide health care providers and patients the necessary tools for early detection of poor control and complications. Such a measure will translate into improved glycemic control as well as timely management of early nephropathy. That will go a long way in helping control the emerging epidemic of diabetes and its complications in Ethiopia and SSA. Policy makers and public health experts in SSA should look into how best to introduce such tests in a cost effective manner to most diabetes clinics in Africa.

Table 1: Demographic & Clinical Characteristics of Subjects

	Type 1 DM	Type 2 DM
Gender (M/F)	24/28	57/53
Age Mean (±SD)	33.67 (±10.7) Range: 18-68	53.77 (±10.6) Range: 30-60
BMI Mean (±SD)	22.5 (±3.8) Range: 16-30	25.9 (±4.9) Range: 17-44
BMI < 25	72%	45%
BMI 25-30	26%	34%
BMI > 30	2%	20%

Figure 3: Distribution of Proteinuria Dipstick Measurement In Patients with Diabetes (Both Type 1 and Type 2)

Figure 4: Distribution of Urine Albumin to Creatinine Ratio in Patients with Diabetes (Both Type 1 and Type 2)