

Assessments of Urine Parameters in Diabetes Mellitus Patients in Jimma University Specialized Hospital, South West, Ethiopia, 2018

Aklilu Getachew*

Department of Clinical Chemistry, Institute of Health, Jimma University, P.O.Box -378, Ethiopia

Introduction

Diabetes mellitus is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both. The chronic hyperglycemia of diabetes is associated with long-term damage, dysfunction, and failure of different organs, especially the eyes, kidneys, nerves, heart, and blood vessels [1].

The type of diabetes is based on the presumed etiology. There are two most common types of diabetes: type 1 and type 2 diabetes. In type 1 diabetes, the body does not produce insulin, and daily insulin injections are required. Type 2 diabetes is the result of failure to produce sufficient insulin and insulin resistance [2].

Several pathogenic processes are involved in the development of diabetes. These range from autoimmune destruction of the β -cells of the pancreas with consequent insulin deficiency to abnormalities that result in resistance to insulin action. The basis of the abnormalities in carbohydrate, fat, and protein metabolism in diabetes is deficient action of insulin on target tissues.

Deficient insulin action results from inadequate insulin secretion and/or diminished tissue responses to insulin at one or more points in the complex pathways of hormone action. Impairment of insulin secretion and defects in insulin action frequently coexist in the same patient, and it is often unclear which abnormality, if either alone, is the primary cause of the hyperglycemia [1].

***Corresponding author:** Aklilu Getachew, Department of Clinical Chemistry, School of Medical Laboratory Science, Faculty of Health Sciences, Institute of Health, Jimma University, Jimma, P.O.Box -378, Ethiopia, Tel: +251911743331; E-mail: akeachew.2@gmail.com

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the color chart on the reagent strip container. The instructions that came with the strips indicating how to wait to correctly for the color change was diagnostic, and was strictly followed. For the microscopic examination we first open the urine cap and well-mixed the sample of urine (12ml) in test tube was centrifuged at 1000 rpm for 3minutes and the supernatant was poured off then a well-mixed sediment of urine was used for microscopic examination under High and low power field.

Data analysis

Data was cleaned, edited, checked for completeness and entered to EPI info version 3.5.3 and then transferred to SPSS version 20 statistical package for analysis. Bivariate and multivariate logistic regression was used to see the association between dependent variables and independent variables. A p-value < 0.05 was considered as statistically significant.

Data quality management

To ensure the reliability and validity of the study, the following activity was done just before and during performing the procedures.

For the interview we translated the questionnaire the local language and we also used data collectors who are able to speak the local language.

Prior to the use of the questionnaire, it was checked for its completeness and we also undertook for checking the completeness and consistency.

We also gave two days training for data collectors on how to collect using both the questionnaire and checklist.

To assure the quality of the data from laboratory analysis standard operating procedures (SOPs) was strictly followed during specimen collection and other laboratory procedures.

All reagents strip kits were checked for their expiry date and used according to the manufacturer's instructions.

Training/orientation was given for specimen collector to apply standard operational diagnostic procedures to ensure the quality of each test.

The data collection, application of standard procedure, accuracy of test results was supervised by principal investigator.

Result

Socio-demographic characteristics of the study participants

From the total of 275 DM patients who attend JUS Hospital during

for epithelial cells/ LPF followed by 116 (42.2%) WBC/HPF, 98(35.7%) few RBC/HPF (Table 4).

Association of Urine parameters with factors

It was found that DBP and SBP were significantly associated with a positive urine protein. Moreover, sex, HT and type of DM were found to be statistically with high significance association with a positive urine

DM. Management of DM is dynamic. With better understanding of the pathogenesis of DM, there have been many changes in the treatment of the disease.

The expanding field of inquiry into DM is likely to be the source of future break-through in treatment. Urine physical and chemical parameter will also play an enormous part in this regard. In this study alteration of urine parameters in DM patients have been evaluated. In this study, 40(14.54%) participants had urine proteinuria which was somehow consistent with a study conducted in India (9.4%), (25) Denmark (13.8%)(23).

On the other hand, the current study was much lower than a study conducted in Bahrain, UAE, and Oman (42.5%, 34.5%, and 29%), respectively(22) and in Shakiso, Ethiopia (30.8%)(27) among type 2 DM patients. The difference might be the difference in study design, lifestyle, socioeconomic status or environmental/genetic factors.

The prevalence of proteinuria was higher in type 2 DM 30 (10.9%) than in type1 DM 10(3.6%)patients in the current study. This might be due to type 2 DM patients are more likely do have hypertensive, obesity, and advanced age which commonly associated with proteinuria.

Moreover, our result demonstrated proteinuria has a significant association with hypertensive DBP (12%) (P-value=0.002). The presence of proteinuria suggests kidney disease which is a common complication of DM and requires further evaluation.

Another finding of the current study showed, 188(68.3%) had urine positive for glucose among the participants. the current study was higher than a study conducted in Japan for Urine Glucose Screening Program at Schools in Japan to detect Children with Diabetes and Its Outcome-Incidence and Clinical Characteristics of Childhood Type 2 Diabetes was Approximately 30– 60% of children who show positive test for urine glucose.

The result demonstrated that urine glucose was significantly associated with hypertension, alcoholic consumption, age and sex .for further cooperation I can't get research done to compare with prevalence of glycosuria.

And also Another finding of the current study showed, 100(36.35%) had urine positive for ketone among the participants which was somehow consistent with a study conducted in selected hospitals in Addis Ababa for Clinical Characteristics of Diabetic Ketoacidosis in Children with Newly Diagnosed Type 1 Diabetes was (35.8%) presented with DKA at first diagnosis of diabetes.

The prevalence of ketone was higher in type 1 DM 69(25.1%) than in type2 DM 18(6.54%) patients in the current study. this is due to type 1 diabetes have lost the ability to produce any insulin, so ketone can occur when insulin doses are missed, or when the body's insulin requirements rise due to stress or illness, Moreover, sex, HT and type of DM were significantly associated with a positive urine ketone. Another point in this study was that when I compare the urine physical parameter with the chemical parameters of DM patients, Turbidity or cloudiness of DM patient's urine be caused by excessive cellular material or protein in the urine of DM Patients. the presence of bacteria, red or white blood cells in DM patients urine is caused by Cloudy urine of the DM patients.

Conclusion and Recommendation

In this study, a higher proportion of DM subjects had altered urine parameters those Altered urine chemical test among the participant

was protein 14(14.54%), ketone 100 (36.35%), leukocyte esterase 155(56.36%), and glucose 188(68.4%). It was found that DBP and SBP were significantly associated with a positive urine protein. Sex, HT and type of DM were significantly associated with a positive urine ketone. Moreover; age, hypertensive and blood glucose were significantly associated with urine glucose. WBC, epithelial cell, casts, and crystals were major microscopic findings. By recognizing the above the following recommendation was given:-

There should be periodic assessment of urine parameters in the routine follow-up of DM patients

Kidney function tests should be performed to assess DM related complication

Further longitudinal studies should be done to identify determinant factors

Early diagnosis, the improvement of care and constant monitoring of patients should be the focus of primary prevention.

Availability of Data and Materials

All the data and the materials we used in this research will be available up on request any legal concerned body at any time.

Declaration

Ethical consideration

