INTRODUCTION

Diabetes mellitus is a metabolic disorder resulting from insufficient insulin secretion, inefficient insulin action or both which lead to increased blood glucose. Diabetes is the most common cause of End Stage Renal Disease (ESRD). Approximately 40% of patients with type 1 and 15% of patients with type 2 Diabetes eventually develop ESRD. The aim of this study was to assess the level of serum Cystatin-C and Creatinine among Sudanese patients with diabetes mellitus. A cross-sectional study was conducted during the period from May to Jun 2017, sixty samples from diagnosed patients with diabetes mellitus (admitted to Eltayeb said make in Khartoum state) as cases, the level of serum Cystatin-C and Creatinine were measured by I-chroma device and Mindray BS 120 method, Data analysis was carried out by SPSS version 16. The level of serum Cystatin-C and serum Creatinine showed significantly increased in patients with type2 diabetes mellitus when compared to patients with type1 DM with (P.value =0.014 and 0.000) respectively, (the Mean±SD of serum Cystatin-C was 1.03±0.11mg/l, 1.28±0.38mg/l in type1 and type2 DM respectively), (the Mean±SD of serum Creatinine was 0.69±0.10mg/dl, 0.91±0.14 in type1 and type 2 DM respectively), also The level of serum Creatinine showed significant increased in male patients with diabetes mellitus when compared to female patients with diabetes mellitus with (P.value = 0.033), (the Mean±SD = 0.96±0.12mg/dl, 0.87±0.15mg/dl in male and female respectively), and also The level of serum Cystatin-C showed insignificant variation in patients with diabetes mellitus when compared according to gender with (p-value =0.411), Also there was positive correlation between level of Cystatin-C, Creatinine and duration time of diabetes mellitus with (R= 0.810, p-value= 0.000, R= 0.423 and P-value=0.004) respectively. The level of Cystatin-C and Creatinine increased in type2 diabetic patients and also there was a positive correlation between the level of Cystatin-C, Creatinine and duration time of diabetes mellitus and age.

Keywords: Diabetes mellitus, Cystatin-C, Creatinine, and Sudan.

Abstract: Diabetes mellitus is a metabolic disorder resulting from insufficient insulin secretion, inefficient insulin action or both which lead to increased blood glucose. Diabetes is the most common cause of End Stage Renal Disease (ESRD). Approximately 40% of patients with type 1 and 15% of patients with type 2 Diabetes eventually develop ESRD. The aim of this study was to assess the level of serum Cystatin-C and Creatinine among Sudanese patients with diabetes mellitus. A cross-sectional study was conducted during the period from May to Jun 2017, sixty samples from diagnosed patients with diabetes mellitus (admitted to Eltayeb said make in Khartoum state) as cases, the level of serum Cystatin-C and Creatinine were measured by I-chroma device and Mindray BS 120 method, Data analysis was carried out by SPSS version 16. The level of serum Cystatin-C and serum Creatinine showed significantly increased in patients with type2 diabetes mellitus when compared to patients with type1 DM with (P.value =0.014 and 0.000) respectively, (the Mean±SD of serum Cystatin-C was 1.03±0.11mg/l, 1.28±0.38mg/l in type1 and type2 DM respectively), (the Mean±SD of serum Creatinine was 0.69±0.10mg/dl, 0.91±0.14 in type1 and type 2 DM respectively), also The level of serum Creatinine showed significant increased in male patients with diabetes mellitus when compared to female patients with diabetes mellitus with (P.value = 0.033), (the Mean±SD = 0.96±0.12mg/dl, 0.87±0.15mg/dl in male and female respectively), and also The level of serum Cystatin-C showed insignificant variation in patients with diabetes mellitus when compared according to gender with (p-value =0.411), Also there was positive correlation between level of Cystatin-C, Creatinine and duration time of diabetes mellitus with (R= 0.810, p-value= 0.000, R= 0.423 and P-value=0.004) respectively. The level of Cystatin-C and Creatinine increased in type2 diabetic patients and also there was a positive correlation between the level of Cystatin-C, Creatinine and duration time of diabetes mellitus and age.

Keywords: Diabetes mellitus, Cystatin-C, Creatinine, and Sudan.

Measurement of serum creatinine is simple but the general view is that up to 50% of GFR can be lost before the significant elevation of serum creatinine occurs [5]. It also has significant limitations due to inter-individual variation in muscle mass and tubular secretion of creatinine. As a result serum creatinine has a poor sensitivity for mild renal dysfunction and in elderly patients, with subsequent under-recognition of renal impairment [6].

Cystatin C, a Cysteine protease inhibitor is freely filtered by the renal glomeruli, metabolized by proximal tubule and identified as a promising marker of renal failure. Cystatin C is produced at a constant rate by nucleated cells and released into the bloodstream with a half-life of 2 hours. Its concentration is almost...
totally dependent on GFR [6]. The independence from the height, gender, age, and muscle mass is advantageous [7]. Screening for diabetic nephropathy is recommended as early intervention delays the progression of kidney disease [8]. So far annual screening for microalbuminuria is the modality used for detecting diabetic nephropathy [9]. Recently, interest has grown in the use of another surrogate marker, cystatin C, in the detection of renal disease in type 2 diabetes mellitus. It has been noted that patients with type 2 diabetes and microangiopathy have statistically significant higher levels of cystatin C than healthy individuals [10]. In 52 Caucasian patients with type 2 diabetes, cystatin C was found to be a better marker of kidney disease measured by serum creatinine or Cockcroft and Gault GFR estimation. The study clearly demonstrated that serum concentration progressively increased as the glomerular filtration rate decreased [11], however, the present study was undertaken to assess the level of serum cystatin-c and serum creatinine in diabetes mellitus.

MATERIALS AND METHODS

This is a cross-sectional study conducted in Khartoum state, during the period from May to Jun 2017. Sixty patients with diabetes mellitus (type1 and type2 DM) were selected. All patients diagnosed with diabetes mellitus and duration of disease more than four years were included in this study. Patients with hypertension, thyroid disorders, congestive cardiac failure, liver disease, rheumatoid disease, malignancy, fever, dehydration, and patients on glucocorticoids, nephrotoxic drugs, pregnancy, smoking and alcohol users were excluded from the study.

The study was approved by the scientific committee of medical laboratory science –Alneelain University. Subjects involved in this study were informed by this study and its importance. The data was collected using a structured questionnaire.

- **Samples collection:** 5.0 ml of venous blood sample was collected from the patient in a plain container. Serum was separated directly by centrifugation.
- **Method for estimation:** The levels of serum Cystatin-C was measured by using (i-chroma device), and serum creatinine was measured by using Mindray BS120. Pathological and Normal control sera were measured, to assure the accuracy and precision of results.
- **Data analysis:** statistical package for the social science computer program (SPSS) was used for analysis, t, test was used to compare between means, for correlation, person correlation test was used, a p.value of ≤0.05 was considered significant.

RESULTS

Statistical analysis showed a significant increased in levels of Cystatin-C and Creatinine among patients with type2 diabetes mellitus when compared to patients with type1 DM (Table-1), also statistical analysis showed a significant increased in levels of serum creatinine in male with diabetes mellitus when compared to female with diabetes mellitus (Table-2), and also statistical analysis showed insignificant variation in the level of serum cystatin-c among diabetic patients when compared according to gender (Table-2), also statistical analysis showed positive correlation between cystatin-c, creatinine levels and duration of disease (Figure 1 & 2) respectively, and also statistical analysis showed a positive correlation between the levels of (cystatin-c, creatinine) and age (Figure 3 & 4) respectively.

<table>
<thead>
<tr>
<th>Table-1: The level of Cystatin-C and Creatinine in patients with (type1) DM versus patients with (type2) DM</th>
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</thead>
<tbody>
<tr>
<td>Parameters</td>
</tr>
<tr>
<td>Cystatin C (mg/L)</td>
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<tr>
<td>Creatinine (mg/L)</td>
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A p-value less than 0.05 considered as significant:

<table>
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<th>Table-2: Compare the level of serum cystatin-c and creatinine in diabetic patients according to gender</th>
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A p-value less than 0.05 considered as significant:
Fig-1: Correlation between the level of serum cystatin-c and duration of DM

Fig-2: Correlation between the level of serum creatinine and duration time of DM
DISCUSSION

In these study sixty patients diagnosed with diabetes mellitus used as a case, the level of serum Cystatin-C and Creatinine were measured. The level of serum Cystatin-C and serum Creatinine showed significantly increased in patients with type2 diabetes mellitus when compared to patients with type1 DM with (P.value =0.014 and 0.000) respectively, this finding was agreement with the previous study done by Ashwin Kumar AS et al., which reported, Serum creatinine as well as serum cystatin- C levels were significantly elevated in type2 diabetes mellitus, and There was a strong positive correlation of serum cystatin C with serum creatinine [12]. Also The level of
serum Creatinine showed significant increased in male patients with diabetes mellitus when compared to female patients with diabetes mellitus with (P.value = 0.033), that mean creatinine has significant limitations due to inter individual variation in muscle mass and tubular secretion of keratinize. As a result serum creatinine has a poor sensitivity for mild renal dysfunction and in secretion of keratinize, The level of serum Cystatin-C showed insignificant variation in patients with diabetes mellitus when compared according to gender with (p-value =0.411), due to Cystatin-c concentration is almost totally dependent on GFR [6], the independence from height, gender, age, and muscle mass is advantageous, that mean, cystatin-c is better than Creatinine to evaluate renal problems [7]. Also there was positive correlation between level of Cystatin-C, Creatinine and duration time of diabetes mellitus with (R= 0.810, p-value= 0.000, R= 0.423 and P-value=0.004) respectively. And also the present study found positive correlation between level of serum Cystatin-C, Creatinine and ages.

CONCLUSIONS

The present study conclude that, the levels of serum Cystatin-C and serum Creatinine increased in type2 diabetic patients and also there was positive correlation between level of Cystatin-C, Creatinine and duration time of diabetes mellitus and age.

REFERENCES