

## Original Research

### Lower serum Creatinine is a new risk factor of Type 2 Diabetes

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#### ABSTRACT:

**Background:** To analyse lower serum creatinine is a new risk factor of type 2 diabetes. **Materials & methods:** A total of 200 subjects were enrolled. The subjects were divided into two groups as non- diabetic and diabetic. The age of patients was 45- 55 years included. The data was collected. The results were analysed using SPSS software. **Results:** The mean age of patients was 49 years. The lowest category of serum creatinine levels (0.40–0.60 mg/dl) was associated with an increased risk of type 2 diabetes. No significant first-order interaction between serum creatinine and the other variables was observed.

**Conclusion:** Lower serum creatinine increased the risk of type 2 diabetes.

**Keywords:** creatinine, type 2 diabetes, insulin.

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#### INTRODUCTION

The prevalence of diabetes in the U.S (2007) was estimated to be 10.7% (23.5 million) among adults aged 20 years or older and 23.1% (12.2 million) among those aged 60 years and older.<sup>1</sup>Hyperuricemia, the precursor of gout, is strongly associated with insulin resistance syndrome, an established risk factor for type 2 diabetes.<sup>2,3</sup>This link may be translated into an independent association between hyperuricemia and the future risk of type 2 diabetes, but little prospective data on the topic are available, particularly in the general population. Indeed, studies of individuals with impaired glucose levels have suggested that hyperuricemia is an independent risk factor for diabetes.<sup>4, 5</sup> Furthermore, the Rotterdam study of individuals 55 years and older reported similar results.<sup>6</sup>

Low serum creatinine levels were associated with a higher risk of T2DM in a recent study of non-obese middle-aged Japanese men<sup>6</sup>, leading the authors to speculate that low creatinine might reflect low muscle mass volume. In addition, glomerular hyperfiltration, which is associated with lower serum creatinine levels, may be associated with increased metabolic risk and future diabetes.<sup>7,8</sup> Notably, obesity may be considered as a state of relative hyperfiltration, and several lines of evidence indicate that the absolute

glomerular filtration rate (GFR) is higher in severely obese subjects than in their lean counterpart.<sup>9,10</sup> Although skeletal muscle is one of the major target organs of insulin, to our knowledge, no prospective study has investigated the association between total skeletal muscle mass and type 2 diabetes.<sup>11,12</sup> Serum creatinine is primarily a metabolite of creatine, almost all of which is located in skeletal muscle. Because the amount of creatine per unit of skeletal muscle mass is consistent and the breakdown rate of creatine is also consistent, plasma creatinine concentration is very stable and a direct reflection of skeletal muscle mass.<sup>13</sup> Hence, this study was conducted to analyse lower serum creatinine is a new risk factor of type 2 diabetes.

#### MATERIALS & METHODS

A total of 200 subjects were enrolled. the subjects were divided into two groups as non- diabetic and diabetic. The participants in control group were 175 and in diabetic group were 25. The age of patients was 45- 55 years included. Type 2diabetes was diagnosed if fasting plasma glucose was  $\geq 126$  mg/dl or if participants were taking oral hypoglycemic medication or insulin. The data was collected. The results were analysed using SPSS software.

## RESULTS

A total of 200 subjects were enrolled. The mean age of patients was 49 years. The lowest category of serum creatinine levels (0.40–0.60 mg/dl) was associated with an increased risk of type 2 diabetes.

The association between the low serum creatinine and the risk of type 2 diabetes, assessment was done according to the median BMI. No significant first-order interaction between serum creatinine and the other variables was observed.

**Table 1: Baseline characteristics according to serum creatinine levels and incidence of type 2 diabetes**

Parameters Total		Serum creatinine (mg/dl)				
		0.40-0.60	0.61-0.70	0.71-0.80	0.81-0.90	0.91-1.50
n	200	20	50	80	30	20
Age (years)		50.2	49.5	49.6	49.4	50
BMI (kg/m <sup>2</sup> )		23.5	24	23.6	24	24.3
Fasting plasma glucose (mg/dl)		95.8	95.2	95.4	95.6	96.3
Family history of diabetes		12.6	12.4	13.1	13.5	12.2
Incidence of type 2 diabetes	25 (12.5%)	4	7	9	3	2

## DISCUSSION

Obesity and insulin resistance are well established risk factors for type 2 diabetes mellitus (T2DM).<sup>14,15</sup> Skeletal muscle is the most important site of insulin resistance and accounts for approximately 90% of overall glucose disposal after glucose infusion.<sup>16</sup> Muscle mass has been shown to be inversely associated with insulin resistance and the metabolic syndrome.<sup>17,18</sup> Conversely, Kuk et al. found that whole-body skeletal muscle mass was not associated with either glucose tolerance or insulin sensitivity in overweight and obese men and women.<sup>19</sup> Hence, this study was conducted to analyse lower serum creatinine is a new risk factor of type 2 diabetes.

In the present study, a total of 200 subjects were enrolled. The mean age of patients was 49 years. The lowest category of serum creatinine levels (0.40–0.60 mg/dl) was associated with an increased risk of type 2 diabetes. A study by Harita N et al, studied participants were nondiabetic Japanese men (n = 8,570) aged 40–55 years at entry. Type 2 diabetes was diagnosed if fasting plasma glucose was  $\geq 126$  mg/dl or if participants were taking oral hypoglycemic medication or insulin. During the 4-year follow-up period, 877 men developed type 2 diabetes. Lower serum creatinine was associated with an increased risk of type 2 diabetes. The multiple-adjusted odds ratio for those who had serum creatinine levels between 0.40 and 0.60 mg/dl was 1.91 (95% CI 1.44–2.54) compared with those who had levels between 0.71 and 0.80 mg/dl.<sup>7</sup>

In the present study, the association between the low serum creatinine and the risk of type 2 diabetes, assessment was done according to the median BMI. No significant first-order interaction between serum creatinine and the other variables was observed. Another study by Hjelmessaeth J et al, studied the unadjusted GAM analysis suggested a piecewise linear relationship between serum creatinine and diabetes. Each 1  $\mu\text{mol/l}$  increase in serum creatinine was associated with 6% (95% CI; 3%-8%) and 7% (95% CI; 2%-13%) lower odds of diabetes below serum creatinine levels of 69 and 72  $\mu\text{mol/l}$  in women and men, respectively. Patients with creatinine levels

below median had approximately 50% (women) and 75% (men) increased odds of diabetes. Low serum creatinine is a predictor of type 2 diabetes in Caucasian morbidly obese patients, independent of age, gender, family history of diabetes, anthropometric measures, hypertension, and current smoking. Longitudinal studies of both obese and non-obese populations are needed to investigate whether serum creatinine may be causally linked with type 2 diabetes, and if so, precisely how they are linked.<sup>20</sup> Hyperuricemia may lead to endothelial dysfunction and nitric oxide inhibition, which in turn contribute to insulin resistance and thus diabetes.<sup>21</sup> This is supported by findings that fructose-induced hyperuricemia in rats leads to insulin resistance along with other components of metabolic syndrome, and these conditions are improved by decreasing uric acid levels.<sup>22</sup>

## CONCLUSION

Lower serum creatinine increased the risk of type 2 diabetes.

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