An Evaluation of Creatinine and Random Blood Sugar in Patients with Renal Failure Undergoing Hemodialysis

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ABSTRACT

Introduction: Promoting healthy behavior is cost-effective approach and is essential for healthy kidneys. In reality, kidney problem has increased as a public health problem in current situation and it has associated with unhealthy lifestyle of people. **Objective:** to evaluate Creatinine and Random Blood Sugar in Patients with Renal Failure Undergoing Hemodialysis. **Materials and Method**: Two hundred ninety-nine (n=299) patients presenting to the Medicine OPD of Siddhartha City Hospital, Bhairahawa, Nepal were involved in the study. Data were collected from June 2018 to October 2018. Microsoft-Excel and Statistical Package for the Social Sciences software (SPSS version 20) were used to entry and analysis data. Mean ± standard deviation, and median and Chi-square test were used to elucidate. **Results:** Creatinine level among the patients found to be 9. 10±2. 27 mg/dl. Mean values of random blood sugar among the patients was 103. 16±28. 67368. **Conclusion:** Creatinine levels before dialysis in male was higher than in female patients. Creatinine and Random blood sugar of the patients could be strongly associated with age of the patients.

Key words: Creatinine, Hemodialysis, Random Blood Sugar and Siddhartha City Hospital

INTRODUCTION

Kidneys are essential to have a healthy body. They are mainly responsible for regulating of extracellular fluid volume, ensuring an adequate quantity of plasma to keep blood flowing to vital organs, Regulation of osmolarity, ion concentrations, pH, excreting of wastes, toxins and other impurities from the blood and production of hormones. Healthy behavior such as: limit rich cholesterol foods, salt, alcohol consumption, stop smoking, eating fresh fruits, vegetables , whole grains, and low-fat dairy products, increase physical activity, maintaining optimum weight and drink plenty of water play vital role to keep healthy kidney and it can help to prevent many of the underlying causes of kidney disease.

Recently, chronic kidney disease (CKD) has increased as a global public health problem with estimated overall prevalence of 8%–16% in world at 2013. [1] This corresponds to nearly 500million affected individuals, of whom 78% (387. 5 million) reside in low-income to middle-income countries (LMICs). [2] A study on Global Burden of Disease (2015) estimated that 1. 2 million people died from kidney failure, an increase of 32% since 2005. [3] Additionally, each year, around 1. 7 million people are thought to die from acute kidney injury. [4] Between 1990 and 2010, deaths attributable to CKD nearly doubled, and was ranked the 18th leading cause of death in 2012. [5]

Creatinine is a waste product that comes from the normal wear and tear on muscles of the body. Creatinine levels in the blood can vary depending on age, race and body size. A creatinine level of greater than 1. 2 for women and greater than 1. 4 for men may be an early sign that the kidneys are not working properly. During dialysis treatment, hyperglycemia can also lead to hyponatremia: this happens when the serum contains an excessive amount of additional osmoles (such as glucose), which increases the effective osmolality and reduces the serum sodium concentration by attracting water from the intracellular compartment. The serum becomes hypotonic, with the final result that both sodium concentration and effective osmolality become low. Hyponatremia can then lead to a wide spectrum of clinical symptoms, from slight to severe or even life threatening, and it is associated with increased mortality, morbidity, and duration of hospitalization. [6]

Diabetes mellitus is the leading cause of end-stage renal disease (ESRD) in many countries globally. Chronic kidney disease (CKD) and type 2 diabetes are long term conditions that are recognised as major public health concerns. The prevalence of CKD has increased in parallel with that of obesity and type 2 diabetes. [7]

Life expectancy on dialysis can vary depending on medical conditions of patient and treatment plan. An increase in the average life expectancy and greater access to general healthcare, simultaneously lead to an increase in the diagnosis of kidney disease (Parsi, Kanni, & Malhotra, 2015. [8]Wild, Roglic, Greene, Sicree, & King, 2004). [9]

The present study was planned to evaluate Creatinine and Random Blood Sugar in Patients with Renal Failure Undergoing Hemodialysis.

MATERIALS AND METHOD

The hospital based descriptive study was conducted in the Siddhartha City Hospital, Bhairahawa, Nepal, from June 2018 to October 2018. Two hundred ninety-nine (n=299) patients presenting to the Medicine OPD were selected. Ethical consideration was maintained to conduct the research and an informed consent was taken from all selected respondents. Data were collected based on variables as: age, gender, creatinine and random blood glucose, from the central lab of Siddhartha City Hospital. Data entry and Statistical analysis were performed using Microsoft-Excel and Statistical Package for the Social Sciences software (SPSS version 20). Data were expressed mean ± standard deviation and median . The Chi-square test was used for comparison of categorical variables. P value of less than 0. 05 (P≤0. 05) was considered as statistically significant.

RESULTS

Table1. Demographic Variables

Variables		Percent (%)
Age	Up to 40 years	42. 3%
	41 years and above	57. 7%
Mean=39. 84/ year / Std. Deviation=17. 20 years		
sex	Male	54. 6%
	Female	45. 4%

Table 2. Values of Random Blood Sugar and Creatinine in patients

Variables	Mean	Std. Dev
RBS	103. 16	28. 67
Creatinine	9. 10	2. 27

Table 3. Cross analysis of Creatinine and Random Blood Sugar (RBS)with Sex Group

Variables	Sex Group			
	Male		Female	
	Mean	Std. D.	Mean	Std. D.
Creatinine	9. 514	2. 50	8. 58	1. 80
Pearson Chi-Squarevalue=15. 547/ df=1/ p=0. 000				
RBS	106. 5	32. 03	97. 10	20. 29
Pearson Chi-Square value=. 137/df=1/ p=0. 712				

Table 4. Cross Analysis Of Creatinine and Random Blood Sugar with Age Group

Variables	Category of age group					
	Up to 40 years			41 years and above		
	Mean	Median	Std. D.	Mean	Median	Std. D.
S. Creatinine	9. 53	9. 1800	2. 40	8. 8137	8. 5700	2. 12536
Pearson Chi-Square value=11. 297/df=1/p=0. 001						
RBS	95. 90	89. 15	20. 27	112. 24	110. 00	34. 49
Pearson Chi-Square value=9. 334/df=1/p=0. 002						

DISCUSSION

Information was taken from laboratory report of two hundred ninety-nine patients with renal failure undergoing hemodialysis in medicine department of Siddhartha City Hospital Bhairahawa Nepal for evaluation of creatinine and random blood sugar.

Mean age of patient was 39. 84 ± 17. 20 years, most of them (57. 3%) were above 40 years and 54. 3**%** were male. Creatinine level among the patients found to be 9. 10±2. 27 mg/dl in the study. Creatinine level among the male and female patients was 9. 51±2. 50 mg/dl, 8. 58±1. 80 mg/dl respectively and was significantly higher in mail than in female patients. Creatinine level of the patients could be strongly associated with sex group where we observed Pearson Chi-Square value=15. 547/ df=1/ p=0. 000.

Based on age group , the study clearly explained that age up to 40 years had 9. 53 ± 2. 40 mg/dl creatinine level and it was 8. 81 ± 2. 12 mg/dl in the age above 40 years. In another study creatinine levels 10. 48 ± 3. 06 mg/dl in the age between 21 and 40 years, 10. 35 ± 3. 23 mg/dl in the age group between 41 and 60 years and 8. 27 ± 2. 60 mg/dl in the age group between 61 and 80 before dialysis was found at Dr. Jayasekaran Center for Kidney Diseases, Nagercoil, Tamilnaduin. [10] Analysis of retrospective data of patients who had undergone at least one hemodialysis session in the Hemodialysis Unit at Charak Hospital and Research Center found average creatinine (8. 35 ± 4. 85 mg/dl) among the patient. [11]

A study conducted by Shiv Kapoor et al on chronic kidney disease found the mean values of serum creatinine in patients suffering from chronic kidney disease was 3. 5 ± 2.6 mg/dl,[12] Another similar study showed Serum Creatinine among patients with chronic kidney disease (CKD) as mean (7. 19 mg/dl) median (5.56 mg/dl) and standard deviation (4. 77 mg/ dl). [13] Categorical analysis of the variables in the study explained creatinine level among the patients with age below 40 years was higher than age group above 40 years and both variables were statistically significant (*Pearson Chi-Square value=11. 297/df=1/p=0. 001*).

In patients with diabetes receiving chronic haemodialysis, both very high and low glucose levels are associated with poor outcomes, including mortality. Conditions that are associated with an increased risk of hypoglycaemia in these patients include decreased gluconeogenesis in the remnant kidneys, deranged metabolic pathways, inadequate nutrition, decreased insulin clearance, glucose loss to the dialysate and diffusion of glucose into erythrocytes during haemodialysis[14]

Determination of glucose levels during dialysis treatment is clinically important. [15] High blood sugar levels damage millions of nephrons resulting in inability of kidneys to maintain fluid and electrolyte homeostasis. Hyperglycemia is one of the major causes of progressive renal damage. [16, 17] Average pre-dialysis glycemia was lower in those who presented intra-dialytic hypoglycemia than in those who did not, both in glucose-free (140. 4 ± 50. 7 vs. 277. 7 ± 91. 0 mg/dL; p = 0. 005; 95%CI: 46. 4 to 228. 1) [18]

The study done by Joel Neugartan, et al found the effect of gender on progression of non-diabetic renal disease that men with chronic renal disease of various etiologies show more rapid decline in renal function with time than do women. [19] CKD is a significant risk factor for the development of hypoglycemia with or without the presence of diabetes, but the risk is greatest in patients with CKD and diabetes. The risk for hypoglycemia, regardless of severity, is increased in the presence of either diabetes or CKD, with the risk most pronounced in the presence of both conditions (P 0. 0001 for the interaction of diabetes and CKD). The risk for the most severe hypoglycemic events was highest in the group with both diabetes and CKD. [20] Hypoglycemia is not uncommon during dialysis, and it can even lead to coma and death. In fact, hypoglycemic events increase with intensive treatment, and in the presence of cardiovascular diseases it can cause fatal dysrhythmia [21, 22].

In this study mean values of random blood sugar (RBS) among the patients was 103. 16±28. 67368. Random blood sugar in male and female patients was 106. 5± 32. 03 and 97. 10± 20. 29 respectively. Patients beyond 40 years of age, the mean RBS was 95. 90±20. 27 similarly below 40 years of age had mean RBS=112. 24±34. 47. Random blood sugar level was significantly associated with age group (Pearson Chi-Square value=9. 334/df=1/ p=0. 002) but it did not keep similar relation with sex group (Pearson Chi-Square value=. 137/df=1/ p=0. 712).

CONCLUSION

Creatinine level found to be high in both male and female patients but random blood sugar was indicated in lower range as compare to standard. Creatinine and random blood sugar was strongly associated with sex group of the patients.

CONFLICT OF INTEREST: None.

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