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Influence of Interdialytic Weight Gain on Urea Reduction Ratio in CKD Patients.

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ABSTRACT

To compare the Urea reduction rate of renal failure patients undergoing hemodialysis twice a week versus hemodialysis done thrice a week and to analyse the influence of inter dialytic weight gain on Urea Reduction Ratio in chronic kidney disease patients for the same group. 50 Renal failure patients on hemodialysis in Nephrology unit in Sree Balaji Medical College and Hospital were included with age ranging from 15 to 75 years. The patients were divided into two groups depending on the number of dialysis session per week as twice weekly or thrice weekly. Urea, creatinine is estimated and urea reduction rate is calculated. Interdialytic weight gain was measured. There is significant reduction in URR in twice weekly dialysis group and more decrease in urea after dialysis in thrice weekly group with statistical significance. (p value = 0.000). URR is less in patients with interdialytic weight gain more than 4Kg. In renal failure patients on hemodialysis, it is mandatory to do thrice weekly dialysis for all patients so as to get good control and decrease morbidity and mortality.

Keywords: interdialytic, weight gain, urea, CKD.

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INTRODUCTION

Excretory function of kidney is affected in chronic kidney disease causing accumulation of most waste products produced in the body especially urea. These waste products can be removed from blood in kidney failure patients through dialysis. The adequacy of dialysis is measured periodically- usually once a month, by collecting blood at the beginning and at the end of dialysis. The levels of urea in both samples are compared. It is assessed by Urea Reduction Ratio. Direct measurement of URR has been proposed as a simpler substitute for more complex equations to calculate dialysis dose [1-3].

There is weight gain in between two dialysis sessions. The weight gain may be due to improved nutrition or due to water retention. In hemodialysis patients, greater weight gain has increased risk for cardiovascular morbidity & mortality [4,5]. Excessive interdialytic weight gain (IDWG) is usually related to an overload of sodium and water, and is the most important factor for arterial hypertension in dialysis [6].

MATERIALS AND METHODS

50 Renal failure patients undergoing hemodialysis in Nephrology unit in Sree Balaji Medical College and Hospital were included in the study with age ranging from 15 to 75 years. The patients were divided into two groups depending on the number of dialysis session per week as twice weekly or thrice weekly.

Urea, Creatinine was taken in the Pre dialysis blood sample. Half an hour after dialysis was completed, blood was taken and urea was repeated in the patients. Urea is estimated by modified berthlot method, creatinine is estimated by jaffe's method. Inter dialytic weight gain was taken in all the patients. (The weight is taken after a dialysis session. Weight is again taken before the next dialysis and difference between the two is interdialytic weight gain). It was divided into three groups. (Weight gain less than 2Kg, 2-4Kg and more than 4Kg.)

Written informed consent was obtained from all patients.

Inclusion Criteria

Associated Diabetes Mellitus, Hypertension, Cardiac Failure patients, Hepatitis C Virus infection

Exclusion Criteria

Chronic Kidney Disease patients with acute complications, Patients who had started dialysis recently (less than three months).

Urea Reduction Ratio was calculated & compared between the twice weekly dialysis & thrice weekly dialysis groups.

RESULTS

Results were analysed by using SPSS 15 software. Total number of patients were 50 of which there was 30 males and 20 females. Twice weekly dialysis group comprised of 28 patients. Thrice weekly dialysis group comprised of 22 patients. Overall 70% of patients had URR less than 65%. When Urea Reduction Ratio was compared between twice weekly & thrice weekly group, it was statistically significant as shown in table 1. (student t-test P-value 0.000).

Table 1: URR between twice weekly and thrice weekly dialysis groups

URR Percentage	N	Mean	Std. Error Mean	T-Value	P-Value
Twice weekly 2	28	53.3036	1.14631	7.607	0.000 (S)
Thrice weekly 3	22	67.8000	1.58052		

N = 50. (S) = Significant .

There is significant reduction in URR in twice weekly dialysis group and more decrease in urea after dialysis in thrice weekly group.

Inter dialytic weight gain <2Kg, 2-4Kg, >4Kg groups as in table 2 & 3

Table 2: Interdialytic weight gain in thrice weekly dialysis

URR percentage	Mean	N	Std. Deviation	Std. Error of Mean	F value	Sig.
Less than 2Kg	67.4800	5	4.59750	2.05606	.025	.975 (NS)
2-4Kg	68.2100	10	8.91945	2.82058		
More than 4Kg	67.4429	7	7.64261	2.88864		
Total	67.8000	22	7.41331	1.58052		

Tables 3: URR percentage and interdialytic weight gain with in twice weekly dialysis

URR percentage	Mean	N	Std. Deviation	Std. Error of Mean	F value	Sig.
<2 Kg	52.0750	8	7.09039	2.50683	2.358	.115 (NS)
2-4Kg	55.3267	15	4.28610	1.10667		
>4Kg	49.2000	5	7.52728	3.36630		
Total	53.3036	28	6.065572	1.14631		

URR is less in patients with interdialytic weight gain more than 4Kg.

DISCUSSION

Dialysis adequacy is related to mortality and morbidity in renal failure patients on hemodialysis. Improvement in mortality have been associated with improvement in Urea Reduction Ratio.

$$\text{Urea reduction ratio} = \frac{\text{Urea Predialysis level} - \text{Urea Post dialysis}}{\text{Urea predialysis level}} \times 100$$

Hence assessment of adequacy [7-9] of dialysis by monthly URR is simple test to control morbidity and mortality. URR is shown to be comparatively less in males than in females. This may be due to the lower body mass in females [10].

Interdialytic weight gain as a marker of blood pressure, nutrition and survival in hemodialysis patient was done in study by Juan-M Lopez et al, Spain [11]. They found greater Interdialytic weight gain is directly associated to better nutrition status. Beneficial effects were greater than negative aspects that depend on blood pressure. Weight gain may be due to increased water retention in hypertensive patients or because of insufficient removal of fluid during dialysis. In the present study weight gain of 2Kg & 2-4 Kg had good URR compared to weight gain of >4 Kg.

Within twice weekly group, URR is less in all the categories. Hence dialysis is not adequate for these patients. Within thrice weekly group, URR is good in majority of the patients.

CONCLUSION

- Urea Reduction Ratio is adequate in thrice weekly hemodialysis patients when compared to twice weekly group.
- In patients with interdialytic weight gain more than 4 Kg, URR was less than 65% in both groups. Hence only adequate weight gain to be maintained with good nutrition.
- In conclusion we can say that in renal failure patients on hemodialysis, it is mandatory to do thrice weekly dialysis for all patients so as to get good control and decrease morbidity and mortality.



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