ISSN: 0975-8585

Research Journal of Pharmaceutical, Biological and Chemical Sciences

# The Efficacy and Outcome of Slow Extended Daily Dialysis in Acute Renal Failure Patients.

**Navya Jith Jacob[1], Jojo K Pullockara[2]*, Kumar Sai Sailesh[3], and Mukkadan JK[4].**

[1]PG student, Department of Physiology, LIMSAR, Angamaly, Kerala, India.
[2]Consultant Nephrologist, Little Flower Hospital And Research Center, Kerala, India.
[3]Research Scholar, LFMRC, Angamaly, Kerala, India.
[4]Research Director, LFMRC, Angamaly, Kerala, India.

**ABSTRACT**

The incidence of Acute renal failure complicates 30%of the ICU admissions and 5 -10 % requires dialysis .Various traditional dialysis modalities like Continuous Renal Replacement Therapy , Intermittent Hemodialysis are often accompanied by many complications like hypotension. Slow Extended Daily Dialysis is a hybrid dialysis therapy introduced recently for renal failure patients. The present study is a prospective interventional study conducted in Medical ICU of Little Flower Hospital And Research Center ,Kerala in the period of 2013 -2014.74 Acute Renal Failure patients undergoing Slow Extended Daily Dialysis were included in the study .Serum electrolytes ,Arterial Blood Gas values ,Blood Urea Nitrogen ,use of anticoagulants and blood pressure changes were monitored before Slow Extended Daily Dialysis, after Slow Extended Daily Dialysis and at the time of discharge .The results indicated that blood pressure was maintained and there was significant change in the blood urea and serum creatinine levels. The performed study recommends Slow Extended Daily Dialysis as an effective dialysis modality.

**Keywords**- Acute Renal Failure, Continuous Renal Replacement Therapy, Intermittent Hemodialysis, Slow Extended Daily Dialysis .

***Corresponding author***

ISSN: 0975-8585

## INTRODUCTION

The incidence of Acute Renal Failure and the need of dialysis are increasing now days. Acute Renal Failure is associated with high mortality up to 60% [1]. Many studies were conducted to assess the superiority of various dialysis modalities among renal failure patients .Among those techniques, Continuous Renal Replacement Therapy (CRRT) and Intermittent Hemodialysis (IHD) are the dialysis modalities preferred by most of the nephrologists [2].

Intermittent Hemodialysis(IHD) is a common dialysis modality opted by most of the nephrologists as it provides a high intradialytic solute clearance .But the rapid fluid and solute removal is often accompanied by many life threatening complications like severe hypotension[3]. Continuous Renal Replacement Therapy (CRRT) offers a better tolerance among the patients due to the slower rate of fluid removal, thus preventing rapid solute disequilibrium .But compared to IHD, implementation of CRRT program is highly expensive because of the need of highly specialized machinery and other equipment's [4].

Slow Extended Daily Dialysis (SLEDD) is a hybrid technique of CRRT and IHD, combining the advantages of both and reducing the complications occurring [5,7]. SLEDD is a specialized procedure, in which solutes and fluid in a slower rate ,preventing the occurrence of rapid fluid shifts and solute disequilibrium .The features involved are better hemodynamic stability, increased treatment duration to enhance dialysis dose and cost effectiveness[6,8] .In the present study ,the effectiveness and outcome of SLEDD among the Acute Renal Failure has been assessed in terms of solute clearance ,occurrence of complications if any, mortality rate, need of anticoagulation, and hemodynamic stability.

## MATERIALS AND METHODS

The study was approved by institutional ethical committee. A written informed consent was obtained from all the participants. The study was carried out in accordance with the ethical guidelines for biomedical research on human participants, 2006 by ICMR.A total of 74 male and female patients admitted in the medical ICU of Little Flower Hospital and Research Centre, Angamaly, Kerala, India, in between 2013 -2014 were recruited for the study.

### Inclusion Criteria

- Renal failure occurring within hours to days due to factor or agent.
- SLEDD as a treatment modality.
- Oliguria (urine output less than 500ml/day)

### Exclusion Criteria

- Age less than 18 years
- Patients with chronic renal failure
- Consent denial

### METHODS

On admission, patients were submitted to complete physical examination and laboratory investigations of serum electrolytes, BUN, ABG and other routine investigations. SOFA score was also recorded at the time of admission. Relevant laboratory investigations were performed routinely to assess patient status and the data needed for the study were collected from the case sheet of the patients and the records kept by ICU nurses. The investigations include serum sodium, serum potassium, blood urea, serum creatinine, ABG values –$PCO_2$, $PO_2$, Serum bicarbonate, pH, Oxygen saturation.

ISSN: 0975-8585

**SLEDD CHARACTERISTICS**

The machine used was Fresenius Artplus and the blood flow rate was 150ml/mt at the initial period . After half an hour blood flow rate increased to 200ml/mt. The dialysate flow rate was 200 ml/mt. Saline flushes were given in between to prevent extracorporeal circuit clotting.

**DATA ANALYSIS**

Data collected were analyzed using SPSS software for windows version 20.One way ANOVA and paired t test were used for the analysis of quantitative values before the initiation of SLEDD and before discharge.5% level was chosen as level of significance.

**RESULTS**

Among the 74 cases, 72% were males and 28% females .The age group varied between 18 -75 years .Among the etiological factors leading to ARF, snake envenomation constitute the major cause (24%), followed by Congestive Cardiac Failure (14%).Blood urea level was 98.78± 49.58 at the time of admission, decreased up to 71.52±32.31 after 48 hours of initiation of SLEDD and became 61.22±41.03 at the time of discharge. Serum Creatinine level was 5.44±2.06 at the time of admission, decreased up to 1.51±2.7 after 48 hours of initiation of SLEDD therapy. Serum electrolytes also had significant changes as shown in the table 3. Urine output increased significantly to 1718.90±817.70 after the SLEDD sessions.Mean Arterial Pressure ,systolic BP diastolic BP and pulse rate is maintained as shown in figure 5 ,figure 6,figure 7 and figure 8.

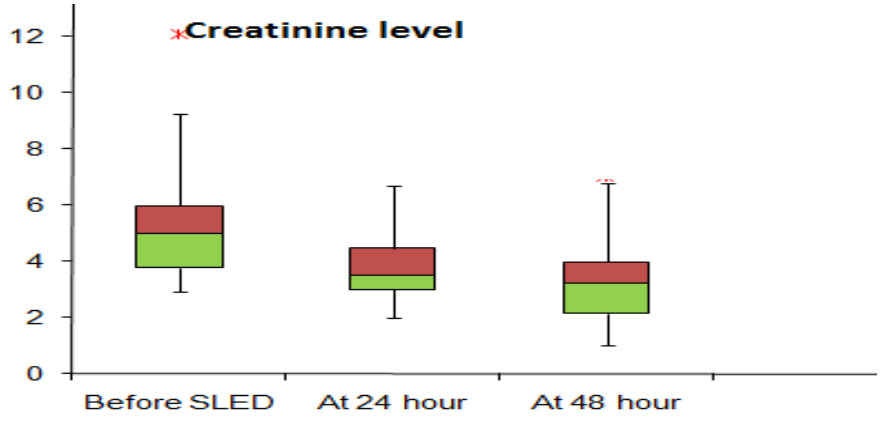



**Figure 1: Serum Creatinine level before SLEDD ,at 24 hours after initiation of SLEDD ,and 48 hours after initiation of SLEDD* The p value is significant at the 0.05 level.**

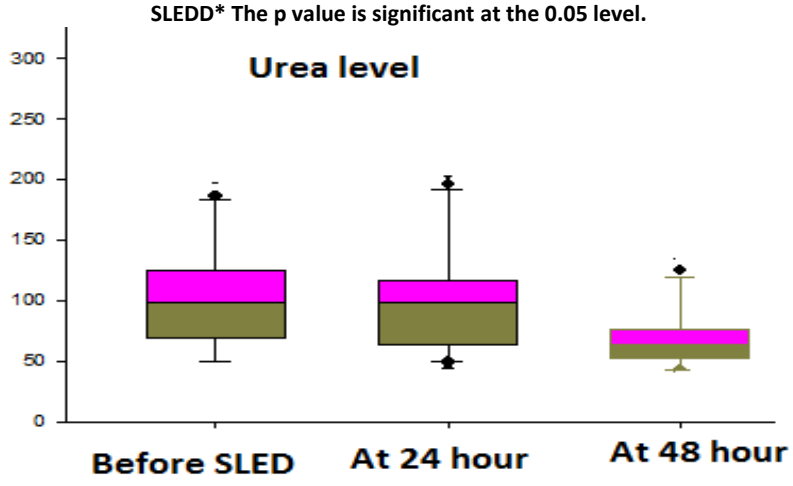



**Figure 2: Blood urea levels before SLEDD, 24 hours after initiation of SLEDD,48 hours after initiation of SLEDD .The p value is significant at the 0.05 level.**

ISSN: 0975-8585

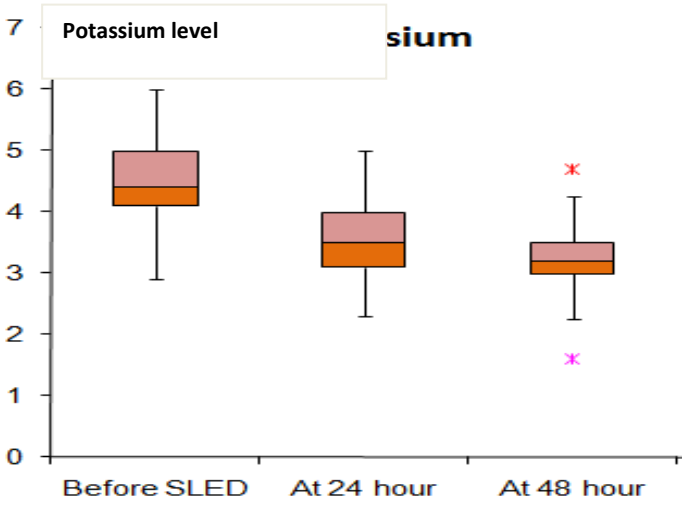



**Figure 3: Serum Potassium levels before SLEDD,24 hours after initiation of SLEDD,48 hours after initiation of SLEDD. * The p value is significant at the 0.05 level.**

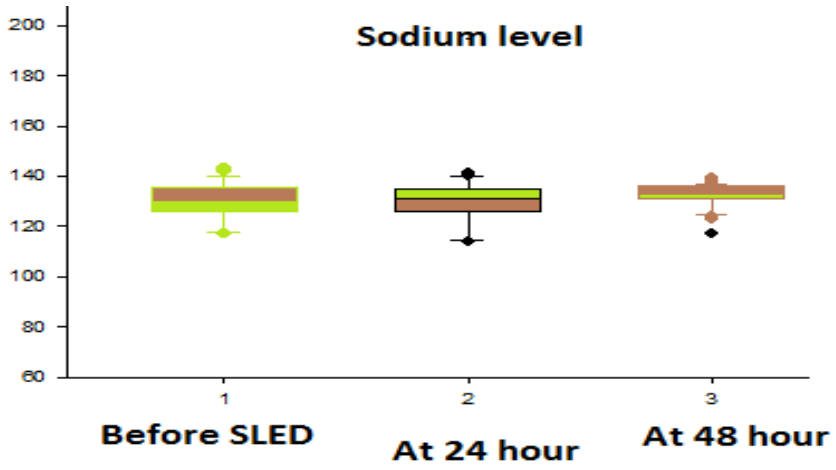
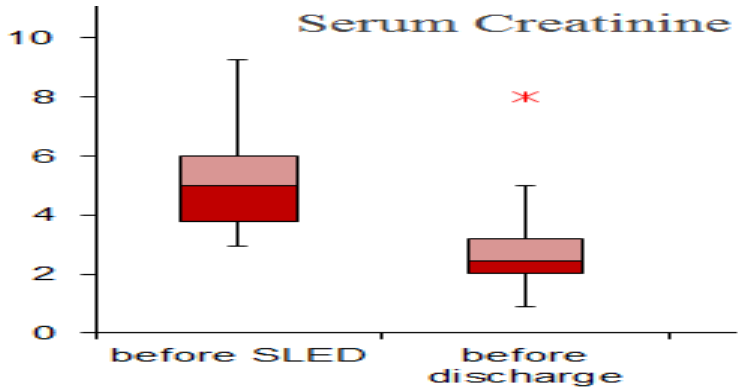



**Figure 4: Serum sodium level before SLEDD,24 hours after initiation of SLEDD,48 hours after initiation of SLEDD .The p value is significant at the 0.05 level**

**LABORATORY VALUES BEFORE SLEDD AND AFTER SLEDD SESSIONS**



ISSN: 0975-8585

**Figure 5: The serum creatinine levels before SLEDD and before discharge(after SLEDD sessions).*The p value is significant at the 0.05 level**

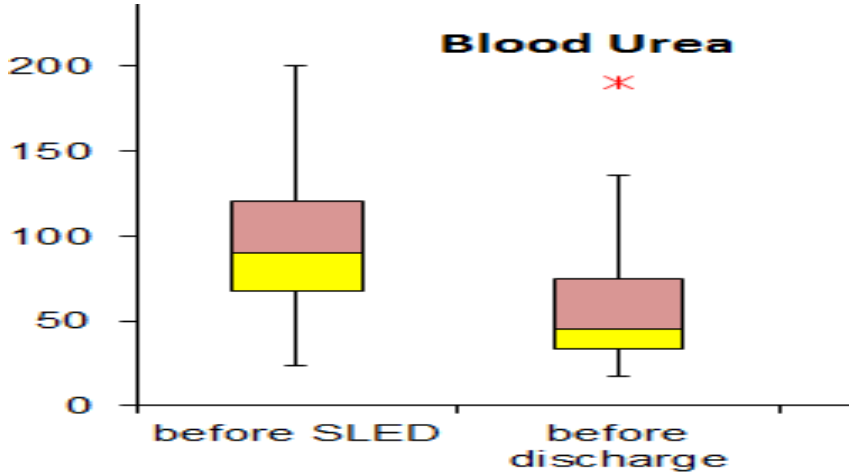



**Figure 6: The blood urea levels before SLEDD and before discharge (after SLEDD sessions). The p value is significant at 0.05 level**

**HEMATOLOGICAL VALUES**

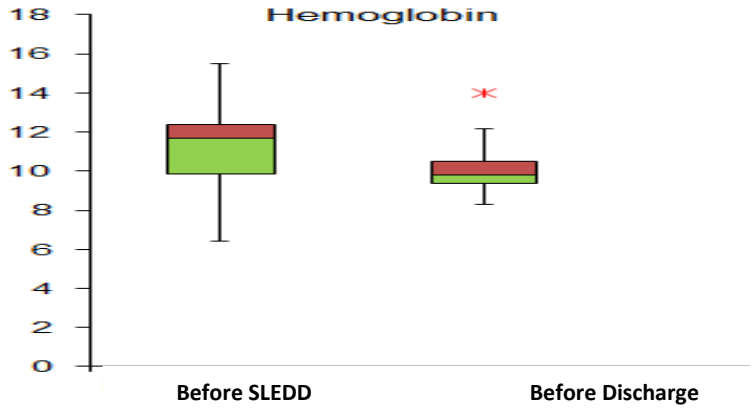
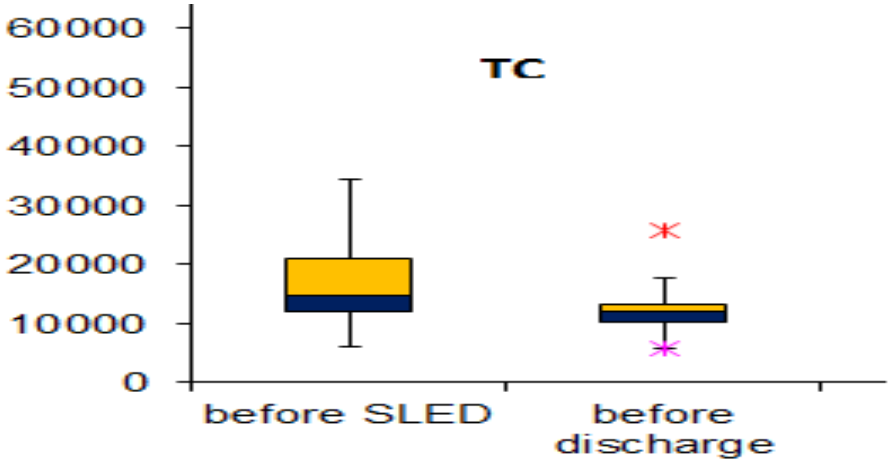



**Figure 7: Change in hemoglobin level at the time of admission(before SLEDD sessions) and at the time of discharge. The p value is significant at 0.05 level**



ISSN: 0975-8585

**Figure 8: The Total Count at the time of admission (before SLEDD) and before discharge(after SLEDD sessions). The p value is significant at 0.05 level**

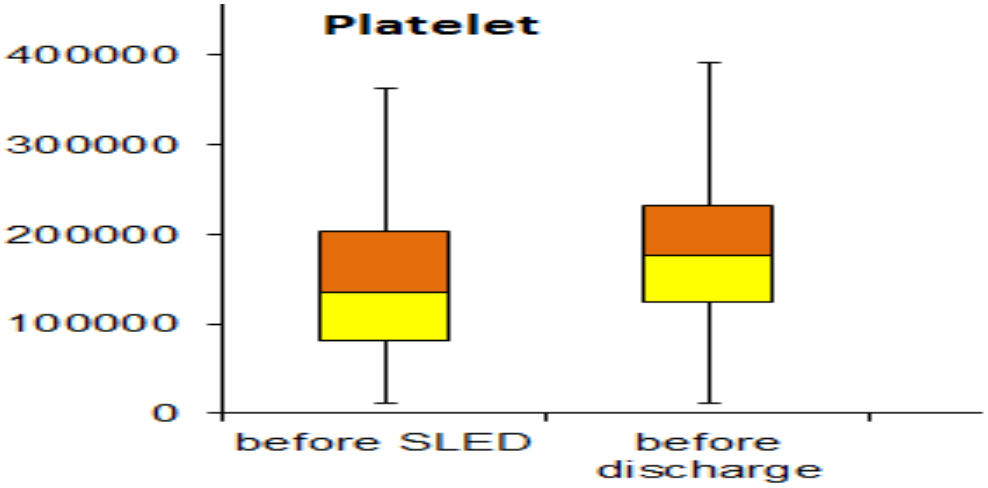



**Figure 9: Changes in the platelet level before SLEDD sessions and before discharge (after SLEDD sessions) The p value is significant at 0.05 level**

**ARTERIAL BLOOD GAS VALUES**

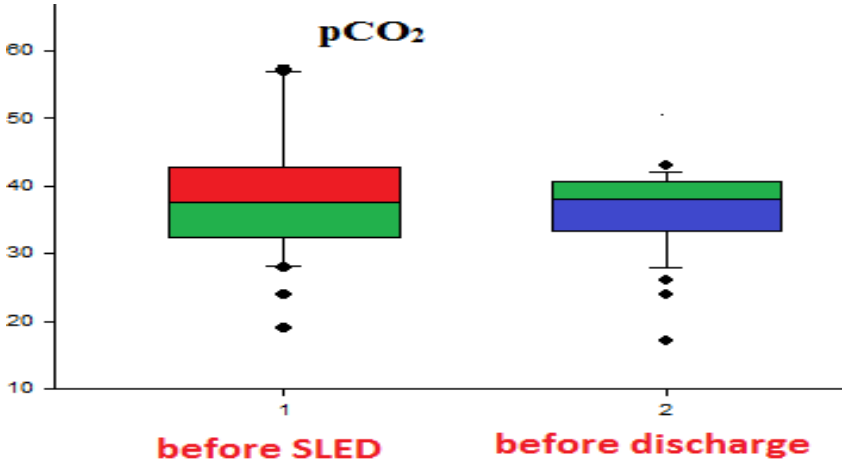
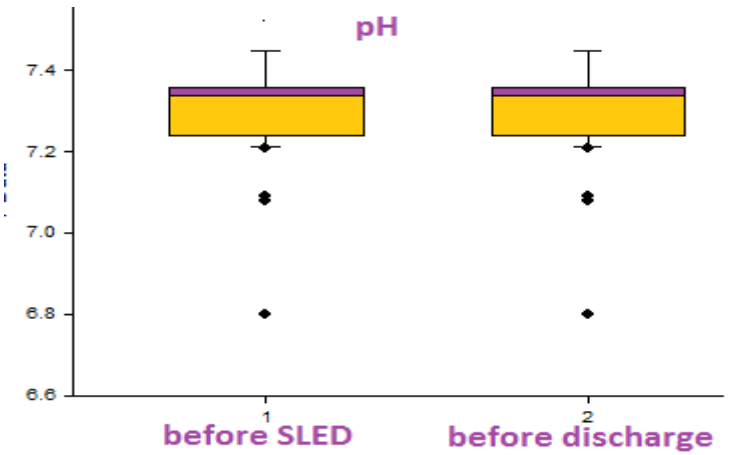



**Figure 10: Change in partial pressure of carbon dioxide($pCO_2$) Before SLEDD sessions and before discharge(after SLEDD sessions) The p value is significant at 0.05 level**



ISSN: 0975-8585

**Figure 11: Changes in blood pH before SLEDD sessions and before discharge(after SLEDD sessions) The p value is significant at 0.05 level**

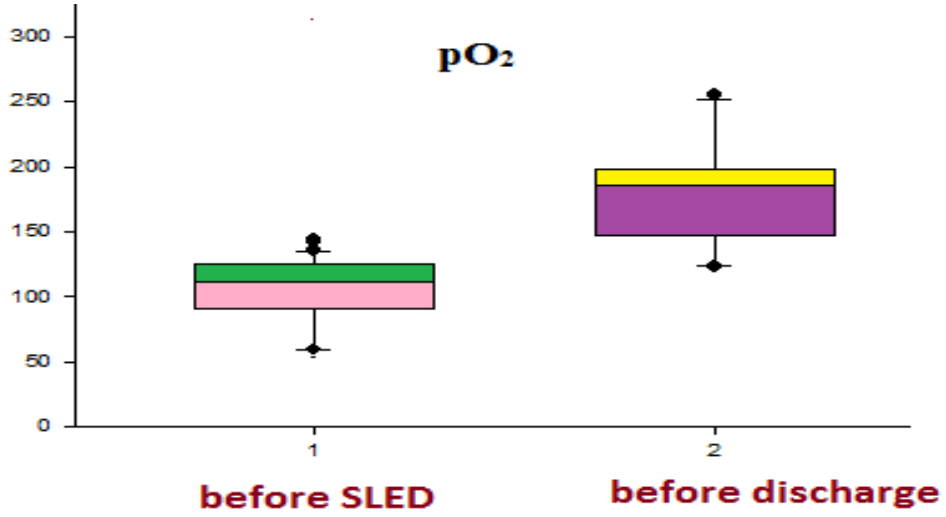



**Figure 12: Change in partial pressure of oxygen($pO_2$) before SLEDD sessions and before discharge(after SLEDD sessions) .The p value is significant at 0.05 level**

**SERUM ELECTROLYTES**

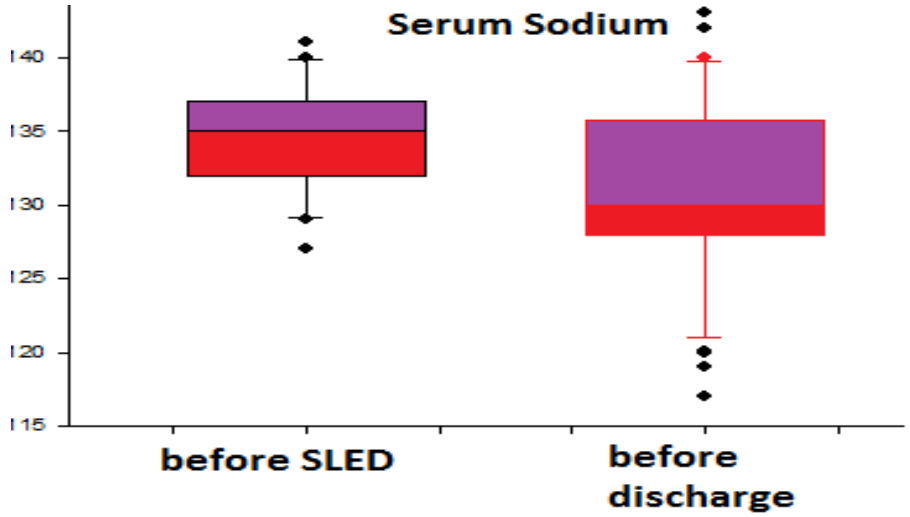
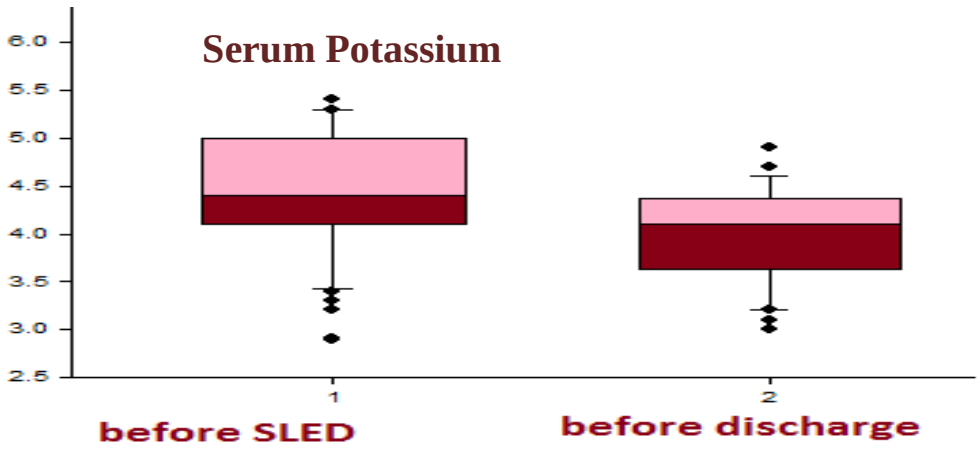



**Figure 13: Changes in serum sodium level before SLEDD and before discharge (after SLEDD sessions) The p value is significant at 0.05 level**



ISSN: 0975-8585

Figure 14: Change in serum potassium value before SLEDD (at the time of admission) and before discharge (After SLEDD sessions) The p value is significant at 0.05 level

HEMODYNAMIC STABILITY

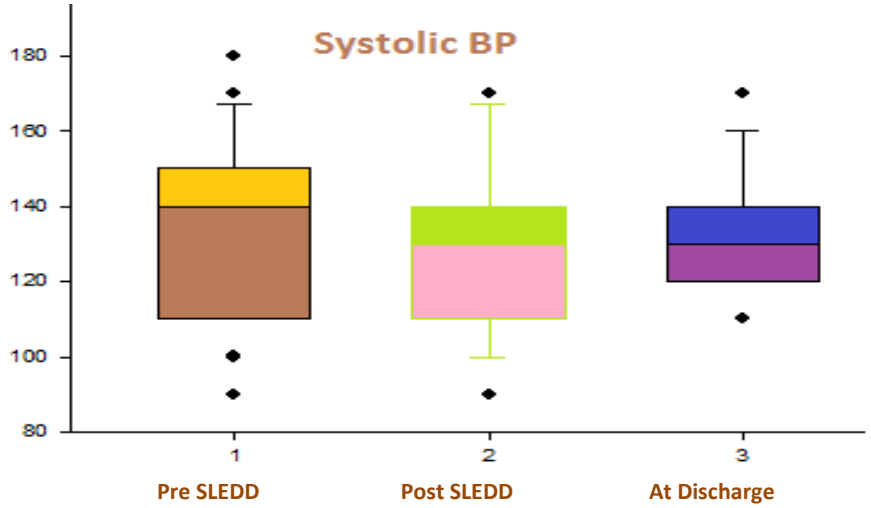



Figure15:Comparison of pre SLEDD systolic BP ,Post SLEDD systolic BP and systolic BP at the time of discharge

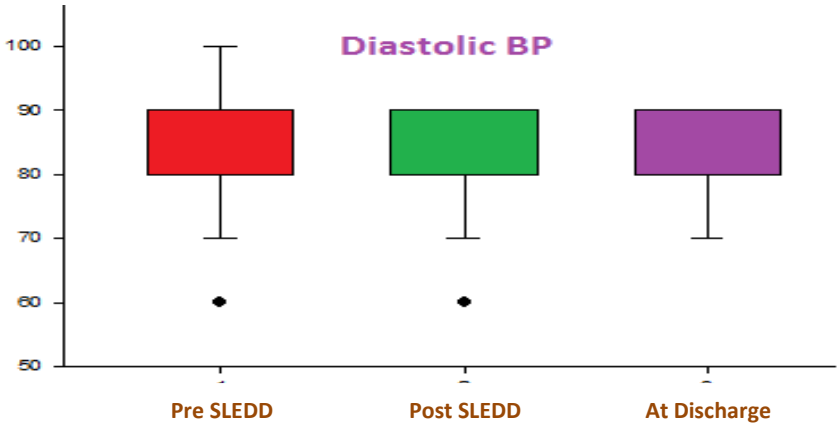
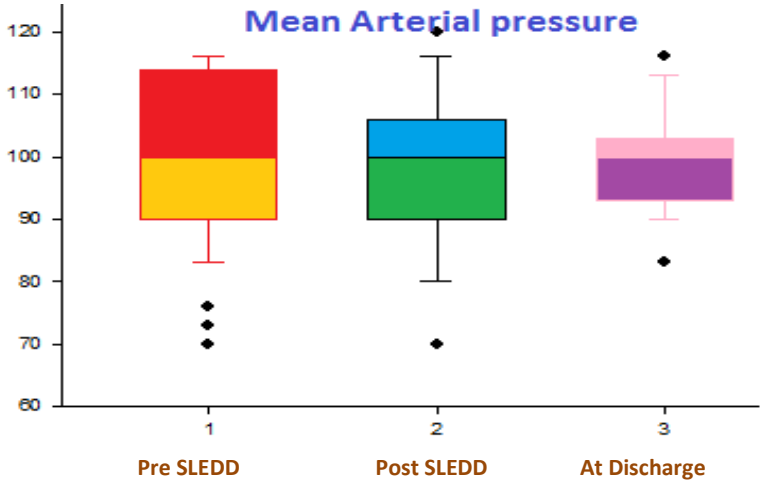



Figure 16 :Comparison between pre SLEDD diastolic BP,Post SLEDD diastolic BP,diastolic BP at the time of discharge.



ISSN: 0975-8585

Figure 17: Comparison between Pre SLEDD Mean Arterial Pressure ,Post SLEDD Mean Arterial Pressure ,Mean Arterial Pressure at the time of discharge.

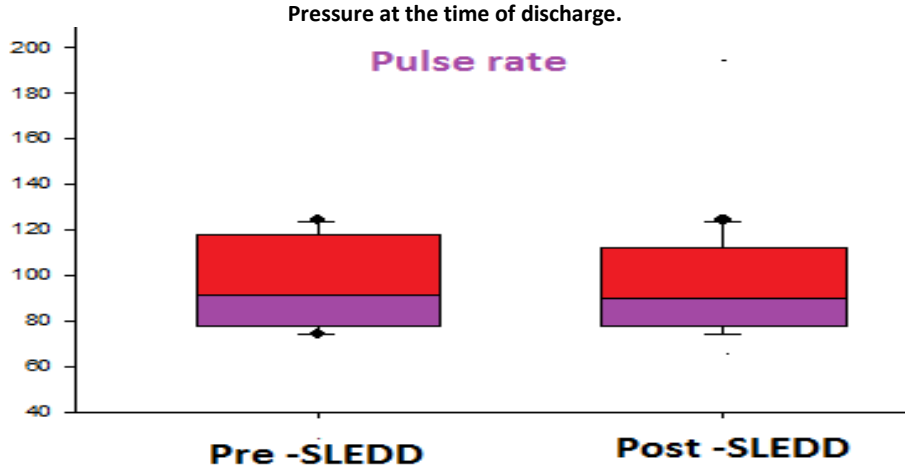



Figure 18: Comparison between Pre SLEDD pulse rate and Post SLEDD pulse rate

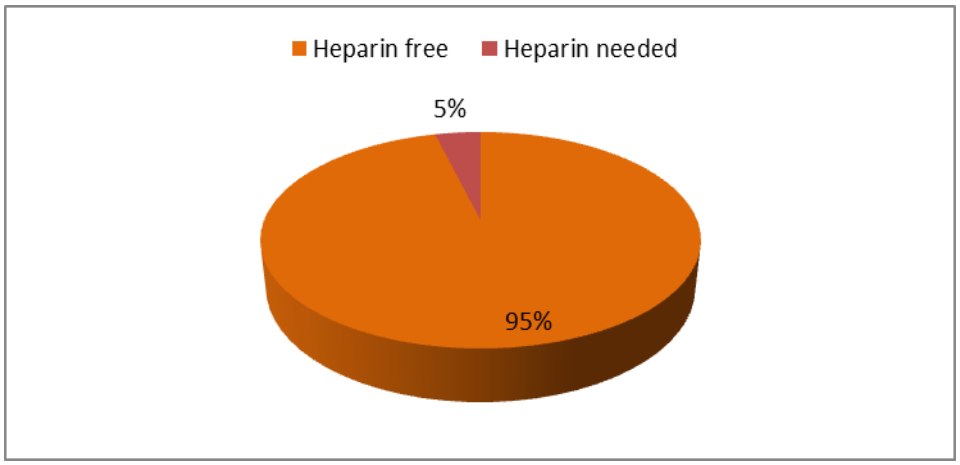



Figure 19: Need of anticoagulation among the patients.

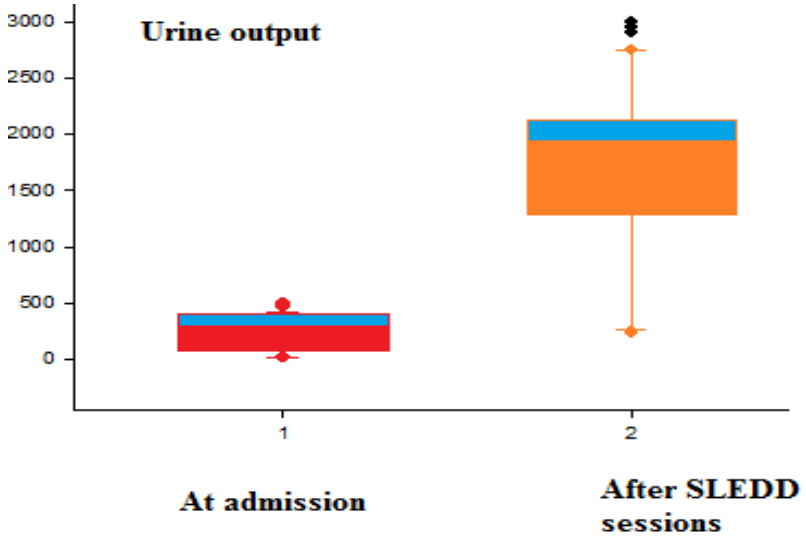



Figure 20: Comparison of urine output at admission(before SLEDD) and after SLEDD sessions.* The p value is significant at 0.05 level

ISSN: 0975-8585

**Table 1: Complications occurred during treatment**

| *Complications* | *Frequency* | *Percent* |
|---|---|---|
| CRF | 7 | 10 |
| Death | 11 | 15 |
| MODS | 3 | 4 |
| Sepsis | 3 | 4 |
| Nil | 50 | 67 |
| Total | 74 | 100 |

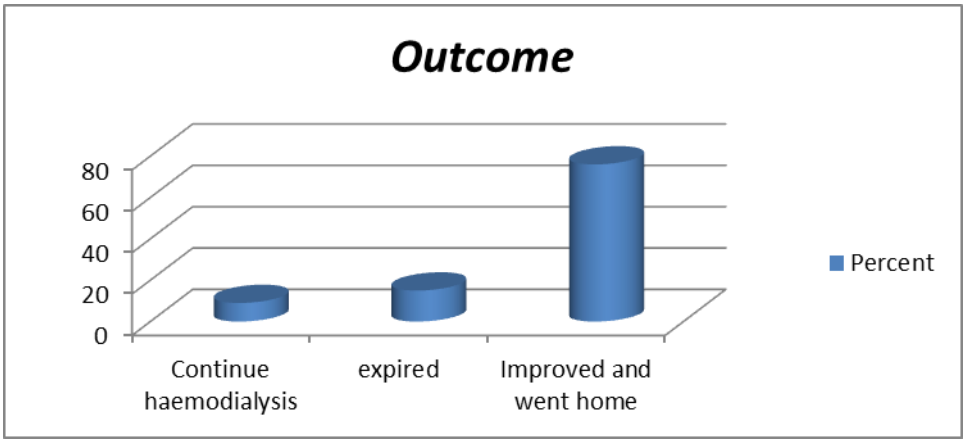



**Figure 21: Outcome**

## DISCUSSION

In the present study, we aimed at identifying the efficacy and outcome of SLED Dialysis .To our knowledge there were not much studies conducted in SLED Dialysis in spite of its clinical importance. Most of the nephrologists are either polarized to CRRT or IHD.

In a study conducted in 2000, Mark R Marshall etal suggest SLED dialysis as an alternative to traditional CRRT for terminally ill patients. The study was conducted among 37 critically ill patients in whom IHD was withheld. Among 145 SLEDD treatments performed only 51 SLEDD treatments need to be prematurely discontinued due to extracorporeal circuit clotting in 40 cases and only 11 due to intractable hypotension[3]. In our study, all patients tolerated SLEDD, even patients in inotropic support.75% the patients had improvement in the renal functions and had no further complications.

A study done by Soheir A Ellakany etal (2006), among patients admitted in the Main University Hospital of Alexandria .The author concluded SLEDD therapy as a tolerable dialysis modality even in critically ill patients[1]. In our study there was not much change in Mean Arterial Pressure before SLEDD and after SLEDD .Systolic and diastolic BP was also maintained.

In the present study, it was found that SLEDD therapy was well tolerated by all 74 patients including 19 hypotensive patients on inotropic support. Blood pressure was maintained throughout the procedure and thus has an important potential advantage. Adequate solute control was achieved by the patients without rapid solute disequilibrium, thus aid in the prevention of further hemodynamic instabilities.

## CONCLUSION

Our study indicates that SLEDD can be an effective dialysis modality in terms of hemodynamic stability, solute removal and survival rate. The finding of our study strongly recommend SLEDD as an effective and highly tolerable dialysis modality, which can even applied to even in patients on inotropic support.

ISSN: 0975-8585

**REFERENCES**

[1] Soheir A, Ellakany, et al. J Med Res Instit 2006; 27 (4) : 303-13.
[2] Omran Abeen, Ravindra L. Mehta. Crit Care Clin 2002;18:227.
[3] Mark R Marshall ,Thomas A Golper, Mary J Shaver. Kidney Int 2001;60:777-785.
[4] Moreno l, Heyka R, Paganini E. Semin Dial 1996;9:209-214.
[5] Hall FS,Shaver MJ ,Marshall MR. Blood Purif 1999;17:36A.
[6] Berbece AN, Richardson RM. Kidney Int 2006;70:963-968.
[7] Marshall MR, Golper TA, Shaver MJ, Chatoth DK. Contrib Nephrol 2001:252-257.
[8] Golper TA. Contrib Nephrol 2004 ; 144 :278 -283.