

Dialysis dose can also be assessed measuring the urea reduction ratio (URR)<sup>(11)</sup>. The (URR) can be assessed by measuring the blood urea level before and after dialysis<sup>(12)</sup>.

The results of many surveys show that achieving a (kt/v) of (1.2-1.3) or more and (URR) of (65%) or more is effective in improving prognosis of patients on (HD)<sup>(13)</sup>. Therefore achieving this goal remain are the aims of dialysis. Many factors can increase (kt/v) and (URR) including use of high quality filter, increase blood flow rate (BFR), increase flow of dialysate and dialysis time<sup>(14,15)</sup>.

Increasing duration of dialysis is a useful method for increasing (kt/v), but it is not always possible because of economic factors and intolerance of patient<sup>(16)</sup>. Also, increasing the flow rate of dialysis leads to increase diffusion of urea from blood to the dialysate, but the affect cannot be prolonged<sup>(17)</sup>.

According to united state Renal Data system (USRDS), increasing (kt/v) by 0.1 can result in reducing partial risk of cardiovascular system and infections<sup>(18)</sup>, and each (0.1) reduction of (Kt/v) can increase mortality by (5-7) years in dialysis patients<sup>(19)</sup>, available literature suggest that usage of more effective dialyzer and increase BFR and Increase dialysis duration can all increase efficiency of Hemodialysis<sup>(20)</sup>.

It should be remembered that increase of BFR not always lead to highest clearance of blood urea, thus increasing BFR by (100%) from 200 ml/min to 400 ml/min can increase blood urea clearance by 33%<sup>(21)</sup>.

The study intended to assess the effect of blood flow rate on adequacy of hemodialysis in patients with (ESRD) under going regular (HD).

## Methods

The study was carried out on samples of patients (cross sectional study) in dialysis unit at Al-Kadhimiya Teaching Hospital, assessment of adequacy of HD in patients with ESRD underwent different range of BFR during HD, which are (150-200), (201-250) and (251-300) ml/min.

## Patients' selection

70 patients were selected randomly, 46 males and 24 females, with age range between (28-70) years ( $48 \pm 13$  mean and SD) on regular on hemodialysis sessions a bout (2-3) sessions per week ( $2.6 \pm 0.4$ , mean and SD), and each session lasting (2-4) hours ( $3.3 \pm 0.4$  mean and SD) the vascular access used was an arterio-venous fistula in (55) patients, and dual lumen catheter in subclavian vein in (15) patients, ethically there were acceptances from the patients

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BFR was grouped in three readings which are (150-200), (201-250) and (251-300) ml/min and the patients were classified patient according to these groups.

Dialysis machine used is GAMBRO AK95S and all patients used hollow fiber dialyzer (GAMBRO) with synthetic membrane; surface area (1.5-1.7) m<sup>2</sup>. The dialysate fluid consisted of flowing constituents sodium 140 mmol/l, potassium 2.0 mmol/l, calcium 1.5 mmol/l, magnesium 0.5 mmol/l, chloride 111.0 mmol/l, bicarbonate 32.0 mmol/l, acetate 3 mmol/l, osmolality 290 mmol/l and dialysate flow rate 500 ml.

In dialysis sessions patient body weight (pre and post dialysis) were recorded and ultrafiltration pressure, trans- membrane pressure and BFR recorded from machines.

During HD, the Clinical vital signs (pulse rate, blood pressure and temperature of patients) were recorded and controlled appropriately.

Dialysis efficacy was measured by using two types of formula which are (URR) and (kt/v) and this formula as follow<sup>(14)</sup>

$$\text{URR} = (\text{urea pre} - \text{urea post} / \text{urea pre}) * 100\%$$

Where URR is ratio of the relationship between two different numbers or quantities, Urea that uses is BUN, BUN = blood urea / 2.141

Another formula is  $kt/v = -\ln(1 - \text{URR})$

Where K refer to dialyzer clearance, T = time of dialysis, V refer to pt. body water volume.

*Statistical analysis*