

**Research Article****Vital Signs Variation in Pre and Post Haemodialysis Session among Chronic Renal Failure Patients****Aravind Kumar. R<sup>1\*</sup>, Anbuselvan. V<sup>2</sup>, Ramaprabha. P<sup>3</sup>**<sup>1</sup>Assistant Professor, Department of Physiology, Melmaruvathur Adhiparasakthi Institute of Medical Sciences & Research, Melmaruvathur, Tamilnadu, India<sup>2</sup>Associate Professor, Department of Physiology, Sri Ramachandra University, Chennai, Tamilnadu, India<sup>3</sup>Associate Professor, Department of Physiology, Melmaruvathur Adhiparasakthi Institute of Medical Sciences & Research, Melmaruvathur, Tamilnadu, India**\*Corresponding author**

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**Abstract:** Renal failure is a situation in which the kidney fails to function adequately. There are two forms of renal failure acute and chronic renal failure. End-Stage Renal Disease is the final stage of chronic renal failure where there is a progressive, irreversible deterioration in renal function and the function is substituted by continuous renal replacement therapy (CRRT), haemodialysis (HD), peritoneal dialysis (PD), or renal transplantation. During haemodialysis (HD) patient's blood comes in direct contact with the dialysis membrane which is a non-physiological environment which may elicit a series of changes in the metabolic haemostasis. The aim of this present study was to assess the changes in various vital signs parameters in pre and post haemodialysis (HD). Totally 50 subjects were participated in our study. Among them 30 were male subjects and 20 were female subjects. The age group of whole 50 patients was  $40 \pm 13$ . All the patients were in regular haemodialysis for the period of more than 15 months and the course of dialysis were 3 times a week. The vital signs parameters showed significant variations in pre and post dialysis session. 1. Body weight were increased than ideal weight in Pre haemodialysis and in Post haemodialysis there was a decrease in body weight than Pre dialysis. 2. Blood Pressure was increased than normal level in Pre haemodialysis and it was decreased in Post haemodialysis when compared to Pre haemodialysis. 3. Heart rate was increased than normal level in Pre haemodialysis and it was decreased in Post haemodialysis when compared to Pre haemodialysis. 4. Body Temperature was found to be in Normal level in Pre haemodialysis and in post dialysis there was no specific changes observed. From our study we concluded that haemodialysis has specific variations in vital signs. Regular dialysis constantly maintains the specifications of the vital signs parameters among the patients.

**Keywords:** Chronic Renal Failure, Body Temperature, Blood Pressure, Heart Rate

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**INTRODUCTION**

The kidneys are essential organs responsible for a multiple bodily functions. The function of the kidney includes the excretion of the waste products, including the nitrogenous wastes urea and uric acid, regulation of the blood volume, production of the hormones like erythropoietin, prostaglandins, rennin, also the regulation of vitamin D metabolism. Renal failure is defined as a deterioration of normal renal function resulting in the retention of nitrogenous waste products in the blood and the body (azotemia) and decrease in the Glomerular filtration rate (GFR) [1].

Renal failure is of two types Acute and Chronic renal failure.

Acute Renal Failure (ARF) is a complex disorder with clinical manifestations ranging from a minimal

elevation in serum creatinine to anuric renal failure. ARF occurs suddenly and is usually initiated by underlying causes like example infection, dehydration, serious injury to the kidney or the chronic use of over the counter pain medications. ARF is often reversible with no lasting damage [2].

CKD is progressive destruction of renal mass with irreversible sclerosis and loss of nephrons over a period of months to years, depending on the underlying aetiology [3]. It is characterized by an exceptionally high mortality rate, primarily due to Cardiovascular disease [4]. The most common cause of chronic renal failure (CRF) is Diabetes mellitus (DM), present in 40-60% of all patients with CRF progressing to End-Stage Renal failure (ESRF) [2].

End-Stage Renal Disease (ESRD) end stage of CRF. In ESRD body's ability to maintain fluid and electrolyte balance fails resulting in uremia or azotemia (retention of urea and other nitrogenous wastes in the blood) [5]. For maintaining life ESRD patients require a regular course of dialysis or kidney transplantation. Dialysis is only temporary that does not replace all of the renal functions[1].

Haemodialysis (HD) is a process of solute clearance based on diffusion across the membrane driven by a concentration gradient between the blood and dialysate [2]. It involves the movement of solutes and solvent across a semi permeable membrane (the dialyzer) [6]. Three major mechanisms govern the movement of molecules in this procedure are diffusion, ultra filtration, and convection [7]. During HD, the blood passes through an extra-corporeal circuit where metabolites are eliminated, the acid-base equilibrium is re-established and excess salt and water is removed. Water is removed from the body using a negative pressure gradient in a process called ultra-filtration. After transit through the dialyzer, the clean, filtered blood is returned to the body[8].

**MATERIALS AND METHODS**

The study was conducted in Melmaruvathur Adhiparasakthi Institute of Medical Sciences and research. The study period was between 2013-2014 from the month of November to December. Institutional ethical committee clearance was obtained. Informed written consent was obtained from the patients in corresponding languages. The confidentiality of the reports were maintained throughout the study. The procedure and the purpose of the study were explained. Totally 50 subjects were participated in our study .Among them 30 were male subjects and 20 were female subjects. The age group of whole 50 patients was  $40 \pm 13$ . All the patients were in regular haemodialysis under permanent dialysis access for the period of more than 15 months and the course of dialysis were 3 times a week.

**Dialysis procedure**

The whole 50 subjects were in haemodialysis, under Fresenius medical care dialysis equipment. The duration of dialysis was around 4 hours a day totally three times a week. The blood flow rate was maintained

around 200-250 during the whole procedure. The dialyzer and blood line was f6 type which is reusable up to 6-8 times.

**Parameter analysed**

- Body weight
- Blood Pressure
- Heart rate
- Temperature.

**Methods of recording the parameters**

Body weight was measured using nova machine weight analyser. The patient was instructed to stand straight in erect manner and weight was measured in kgs. Blood pressure was measured by auscultatory method by using medigaurd sphygmomanometer in lying down position two trails were recorded. The least trail value is taken for consideration. Heart rate was measured by using palpating the radial artery as heart rate correlates with the radial pulse. It was recorded in lying down position two trails were recorded. The least trail value is taken for consideration. Oral body temperature was measured by hicks Medicare thermometer by standard method. All the parameters were subjected for pre and post dialysis assessment. Pre dialysis parameter assessment was done before starting the haemodialysis procedure. Post dialysis assessment was done 20 minutes after the termination of haemodialysis.

**Statistical analysis**

Student paired" t "test was used to analysis between the variables. Interpretations of data were done by SPSS software 16.0 version. The values are analysed accordingly for the study.

**RESULTS**

The results of our study showed that the pre and post dialysis has an significant variations in vital signs parameters. In pre and post dialysis the body weight was around  $65 \pm 4.25$ ,  $61 \pm 2.34$  off p value  $<0.01^*$ . In pre and post dialysis the blood pressure was around Systolic- $160 \pm 20.33$ ,  $140 \pm 10.45$ , Diasystolic- $110 \pm 22.19$ ,  $90 \pm 0.8$  off p  $<0.01^*$ value. In pre and post dialysis the heart rate was around  $98 \pm 5.93$ ,  $85 \pm 4.66$  off  $<0.01^*$ . In pre and post dialysis the body temperature was around  $96.02 \pm 2.00$ ,  $95.05 \pm 1.22$  off 0.23.

**Table 1: Shows the vital signs parameter level in pre and post haemodialysis (n=50)**

Sl.No.	Parameters	Pre haemodialysis	Post haemodialysis	p value
1.	Body weight	$65 \pm 4.25$	$61 \pm 2.34$	$<0.01^*$
2.	Blood pressure			
	Systolic	$160 \pm 20.33$	$140 \pm 10.45$	$<0.01^*$
	Diasystolic	$110 \pm 22.19$	$90 \pm 0.8$	
3.	Heart rate	$98 \pm 5.93$	$85 \pm 4.66$	$<0.01^*$
4.	Body Temperature	$96.02 \pm 2.00$	$95.05 \pm 1.22$	0.23

pvalue  $<0.05$  \*considered as stastically significant

## DISCUSSION

Dry weight is the weight without the excess fluid that builds up between dialysis treatments. This weight is similar to what a person with normal kidney function would weigh after urinating. It is the lowest weight you can safely reach after dialysis without developing symptoms of low blood pressure such as cramping, which can occur when too much fluid is removed. The main factor which alters the weight status among the end stage renal failure patients are sodium and fluid retention, proteinuria, malnutrition, multiorgan dysfunction [9].

A study conducted by Piccoli A *et al.* states that over filling hypothesis is the main cause of retention of sodium and water is the main causes for weight gain among chronic renal failure patients that makes the intra vascular volume to increase in the majority of patients with end stage renal disease. The role of neuro-hormonal contribution to the weight is tend to be high because of increased in atrial natriuretic peptide secretion leads to atrial wall distension, and suppressors the plasma renin activity which increases the fluid mass retention in the body. Increased aldosterone activity is also a favouring factor for weight gain in CRF patients. Blood pressure increases due to abnormal stretching of vessel wall due to improper metabolic activity and acculation of waste metabolites near the blood vessels. Blood pressure even more rises due to fluid over load in the blood vessels. Another factor which increases the blood pressure periodically is stress. When the kidneys receive low blood flow, they act as if the low flow is due to dehydration and thus releases hormones that stimulate the body to retain sodium and water [10].

A study conducted by Zager *et al.* in 1994 stated that blood pressure is the main factor for mortality among dialysis patients. Elevated lipid level and arteriosclerosis are the other causes for hypertension in dialysis patients. Gaining weight increases the blood pressure among the patients. Steroids intake for long term intake of has a role in prevalence of hypertension among CRF patients. Correction of azotaemia, correction of over hydration, regular erythropoietin therapy and proper dosage of anti-hypertensive before dialysis session reduces the blood pressure. Dialysis removes the excess amount of fatty acids, and cholesterol products which is present in blood it reduces the thickening of artery so there will be a decreased in blood pressure [11].

Safar ME *et al.* in 1990 stated that anaemia can put strain on the heart and its demand for oxygen by increasing the heart rate and output. Fluid over load, anaemia and hypertension contribute to certain hemodynamic factors; put strain on your cardiovascular system. Insufficient dialysis can also lead to

pericarditis. When dietary protein is broken down urea is formed. This condition is toxic to the body and could lead to a dangerous inflammation of the outer layers of the heart, the pericardium causes increase in heart rate. Removal of excess amount of fluid by dialysis reduces the heart rate by lowering the work load. Correction of hyperkalaemia in dialysis reduces the myocardial contraction. Erythropoietin therapy after dialysis reduces the work load caused by anaemia to the blood vessels of heart [12].

Schneditz D *et al.* in 2001 they analysed the thermoregulation variation among renal failure patients. The analysis revealed thermal balance and temperature in haemodialysis patients reveals both striking similarities and important differences to urea kinetics. During haemodialysis both urea and thermal energy are to be removed [13].

## CONCLUSION

From our study we conclude that vital signs have significant variations in pre and post dialysis session. The adoptive mechanism was very clear that duration of dialysis. Dialysate composition, access of dialysis has a role in altering the vital signs.

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