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Effect of Hemodialysis on the Hemodynamic Status for Patients with Chronic Renal Failure

Fatma Makee Mahmmod
Nursing, University of Karbala, College of Nursing, Ault Nursing Department.

Abstract:
Objectives: *To assess the effect of Hemodialysis on the Hemodynamic (systolic, diastolic of blood pressure, and heart rate before , during and after Hemodialysis)*
Methodology*: Descriptive study was carried out at the Hemodialysis word in Baghdad teaching hospital during the period from 20 July 2015 to 20 April 2016. A purposive (non-probability) sample of (30) patients with end stage of renal failure who were systematically admitted to the hospitals were selected one by one. A questionnaire was constructed for the purpose of the study, which comprise of four parts that included*
Part I: Sociodemographic characteristics which included age ,gender, and occupational status.
Part II: Clinical characteristics Which included past medical history
Part III: Measurement forma of blood pressure, and heart rate before during and after hemodialysis.
Part IV: Complication forma of hemodialysis.
The data was collected by the application of the questionnaire, the interview technique, observation and the patients' sheets
Results: *The findings of the study indicated that there is no significant difference between before , during and after hemodialysis related to heart rate , systolic , diastolic blood pressure , and respiratory rate .*
Conclusion*: Reduced heart rate value and a sudden reduction in systolic blood pressure of 20 mmHg or more in the first 2 h of dialysis in during hemodialysis patients.*
Recommendation*: The study recommended that development and implementation of educational program for nurses (theory and practices) for care of patients with end stage renal failure during hemodialysis.*
Key words: *Hemodialysis, Hemodynamic, systolic, diastolic of blood pressure*

I. Introduction

Hemodialysis works by circulating the blood through special filters (semi- permeable membrane) outside the body . The blood flows across a filter, along with solutions that help remove toxions [1]. Hemodialysis is a therapeutic procedure that clean , filtrate and balanced the body from the harmful waste products, chemical substance and electrolyte disturbances [2]. The usual manifestation of hemodynamic instability during ultrafiltration dialysis (in which excess fluid removal from the blood is the primary goal) is hypotension .The incidence of a symptomatic reduction in blood pressure during (or immediately following) dialysis ranges from 15 to 50 percent of dialysis sessions [3] .

In some patients, the development of orthostatic hypotension necessitates fluid replacement befor they are able to leave the dialysis unit. This proplem contributes to the excessive morbidity that is associated with the dialysis procedure [4].

Dialysis uses special ways of accessing the blood in the blood vessels. The access can be internal connections between viens and arteries (arteriovenous fistula) or external connection (arteriovenous shunt orcannula) [4,5] . Blood is diverted from the access point in the body to a dialysis machine .Here,the blood flows counter-current to a special solution called the dialysate.Thechemical imbalances and impuities of the blood are corrected and the blood is then returned to the body .Typically ,most patients undergo hemodialysis for three sessions every week .Each session lasts 3-4 hours [6] .

The objectives of the study is to To assess the effect of Hemodialysis on the Hemodynamic (systolic, diastolic of blood pressure, heart rate and respiratory rate before, during and after Hemodialysis)

II. Methods

A purposive sample of (30) patients with end stage of renal failure was conducted at the hemodialysis word in Baghdad teaching hospital during the period from 20 July 2015 to 20 April 2016. The diagnosis of chronic renal failure depends on symptomatology, complete history and physical examination was carried for all patients were done by specialist physician. Patients were chosen according to the following criteria.

1. Patients with chronic renal failure who were receiving 3 hours maintenance hemodialysis twice time weekly.
2. They were all adults.

3. All patients were given heparin at a bolus dose of 2000 U at the initiation of dialysis follwed by 1000 U.
4. None of them received antihypertensive drugs or any other agents known to influence the blood pressure.
5. Validity of the instrument was determined through the use of panel (10)experts, the reliability of the tool was determined (r=0.95) which was adequately reliable.

The study instruments consist of 4 parts:
Part I: Sociodemographic characteristics which included age , gender and occupational status.
Part II: Clinical characteristics which included past medical history.
Part III: Measurement forma of blood pressure, heart rate and respiratory rate before during and after hemodialysis.
Part IV: Measurement forma of complication which included hypotension episodes, muscles cramps, nausea and vomiting, dizziness, diaphoresis and weakness and persistent hypotension which are scored yes and no , the rating of scale 0 indicates no ,1 indicates yes. The time average required to complete the interview 3 hours for each patient.

Statistical analysis
Percentage was used to describe of the sample mean,standard deviation and T-test value were computed to estimate the differences between

III. Results

Table (1) Socio Demographic and Clinical Characteristics of Patients with chronic renal failure

Characteristic		NO	%
Gender	Male	18	60
	Female	12	40
	Total	30	100
Age	30 -39 Years	7	23.33
	40 -49 Years	9	30
	50 -59 Years	12	40
	60 -69 Years	2	6.66
	Mean of age SD: Standard Deviation	46.26 8.27	
Occupation	Wife house	8	26.66
	Self-employee	4	13.33
	Retired	3	10
	Government employee	15	50

The results indicated that the sample of chronic renal failure patients consisted of (30) ones The majority of the study sample were females (40 %) while the remaining (60%) were males and this table also shows that (40%) of the patients were (50- 59) years old, the mean age was (46.26).

Table (2): Distribution of the Study Sample by their Clinical Data with a Comparison Significant

Clinical Data	**Groups**	**Freq**	**Percent**
Past medical history	Primary Hypertension	11	36.66
	Diabetes mellitus (DM)	6	20
	Nepherosclerosis	7	23.33
	Obstructive uropathy	4	13.33
	Chronic glomerulonephrities	3	10

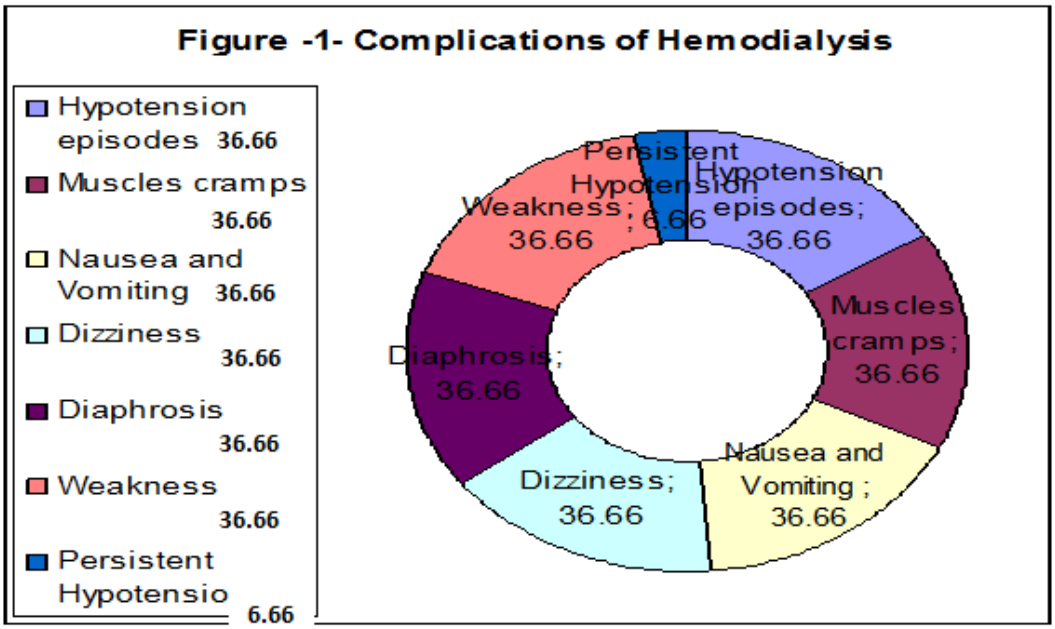
Our study revealed that (36.66%) of patients have primary hypertension ,(20%) of patients have diabetic mellitus, (23.33%) of patients have Nepherosclerosis,(13.33%) of patients have Obstructive uropathy (10%) of patients have Chronic glomerulonephrities

Table (3) Comparison of homodynamic status characteristics (Blood pressure, Heart rate , and respiratory rate) between before, during and after hem dialysis .

Variable	Before		During		After		Comparative significant by t-test		
	X	SD	X	SD	X	SD	Before and during	Before and after	After and during
Systolic blood pressure (SBP)	139	13.80	128.33	8.97	139.16	13.42	N.S	N.S	N.S
Diastolic blood pressure(DBP)	92.66	6.42	86.83	6.12	90.83	7.53	N.S	N.S	N.S
Heart rate (HR)	88.53	5.22	84.43	4.74	78.8	4.66	N.S	N.S	N.S
Respiratory rate (RR)	22.13	4.11	20.96	3.96	22.13	4.11	N.S	N.S	N.S

X: mean, SD : Standard Deviation , N.S: Non Signified
Table -3- shows that there is no significant difference between before after hemodialysis related to SBP,DBP,HR, and RR. When analyzed by t-test

Figure -1- explains the differences of the observed of percentage of complications which occurs during hemodialysis



IV. Discussion

Throughout the course of the present study as shown in table one ,it has been noticed That (60%) of the study sample and the remaining are female. Our findings were similar to those of other studies [7, 8] who reported that fourteen uremia patients (8 male and 6 females, aged 50=15 years) on maintenance hemodialysis and 14 sex-and age- matched healthy controls were studied. Both groups underwent ambulatory electrocardiogram monitoring to evaluate the heart rate value time and frequency domain indices. The hemodialysis session was performed by 1h of high –rate isolated ultra filtration followed by 3 h of bicarbonate.

Another study [9] stated that twenty nine patients (aged 29-69 years) with end stage renal failure on maintenance hemodialysis participated in the study .

Koji, et al., 1995 [11] reported that 13 patients with end- stage renal failure who were receiving hemodialysis:Six patients had hypertensive episodes during dialysis and7 did not .

In the present study, we evaluated heart rate values in a group of hemodialysis. Our data shows no significant differences between before, during and after hemodialysis although reduced in a mean heart rate, respiratory rate variability during hemodialysis (table 2).

Studied stated that the decreased heart rate value, an indicator of suppressed autonomic activity that is associated with adverse clinical events and increased mortality in patients with stable ischemic heart disease and preserved left ventricular [11, 12, 13], as well as in those with myocardial infarction has also been associated with sudden death in patients undergoing hemodialysis, especially in those with coronary stenos is and nocturnal myocardial ischemia.

Another studies reported that heart rate control is initiated and coordinated by pacemaker cells; sympathetic stimulation is associated with release of nor adrenaline , which binds to be adrenergic receptors, whereas parasympathetic stimulation is mediated by acetylcholine release, which binds to M2 muscarinergic receptors [14]. In uremia patients, increased plasma and tissue levels of catecholamine and resistance to their physiologic effect were reported by several authors [15, 16, 17].Clinical and laboratory evidence suggests that both B- adrenoreceptor and muscarinergic receptor – mediated responses are attenuated in the uremia state [18, 19]. Furthermore, other endocrine and procaine systems that might affect sympathetic activity such as insulin release or the L-arginine-nitric oxide pathway are also impaired by renal insufficiency [20, 21].

Decreased HRV, an indicator of suppressed autonomic activity that is associated with adverse clinical events and increased mortality in patients with stable ischemic heart disease and preserved left ventricular function [17], as well as in those with myocardial infarction [18, 19], has also been associated with sudden death

in patients undergoing hemodialysis, especially in those with coronary stenos is and nocturnal myocardial ischemia [20, 21].

Our study revealed that there is (36.66%) of patients with chronic renal failure had hypotension episodes during the hemodialysis (table 3).

Supported of the study other study [17] who reported that dialysis hypotension remains one of the most frequent intradialytic complications, although important improvements have been made in the dialysis techniques. The incidence of symptomatic hypertensive episodes during the hemodialysis sessions is high in the patients who have low or normal blood pressure and in those with large intradialytic weight gain [1, 2]. The

Fluid removal during dialysis with its homodynamic consequences (hypovolaemia, fall in circulating filling pressure and in cardiac output) is considered to be an important cause of these symptomatic hypotensive episodes [3]. However, in many patients without hypovolaemia , moderate or severe hypotensive episodes occur during HD and are reasonably explained by high venous capacity for the normal blood volume and/or an inappropriately low peripheral arterial resistance(4).

A dialysis hypotension episode was defined as a sudden reduction in systolic blood pressure of 20 mmHg or more in the first 2 h of dialysis.

We chose this definition in order to minimize the effect of the fluid removal on the blood pressure, known to be more prominent in the second half of dialysis [23].

Our study shows that there is (36.66%) of patients had complained form muscles cramps and the same percentage of patients had nausea and vomiting, dizziness, diaphoresis and weakness while (6.66%) of patients had chronic persistent hypotension (figure -1-). Supported of this study [24,25] who reported that a method of treating a patient experiencing or at risk of experiencing, certain signs or symptoms, episodes of hypotension ,nausea or vomiting, cramping , faintness, dizziness, weakness, fatigue, or diaphoresis, by administering an effective amount or an anti-hypotensive agent, preferably a vasoconstrictive agent or compound, e.g., an alpha-adrenergic agonist such as midirons, or a pharmacologically effective metabolite thereof, to the patient.

Conclusion from the study, it was noted that Hemodialysis often involves fluid removal (through ultrafiltration), because most patients with renal failure pass little or no urine. Side effects caused by removing too much fluid and/or removing fluid too rapidly include low blood pressure , fatigue, chest pains, leg-cramps, nausea and headaches. These symptoms can occur during the treatment and can persist post treatment; they are sometimes collectively referred to as the dialysis hangover or dialysis washout the researcher recommends that the development and implementation of educational program for nurses (theory and practices) for care of patients with chronic renal failure during hemodialysis.

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