

Effectiveness of Nurse Led Clinical Interventions, on Physiological Outcomes among Patients Undergoing Hemodialysis

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ABSTRACT

Introduction and Aim: Hemodialysis is the most widely used treatment for severe and irreversible renal failure. Even in the best of circumstances, adjusting to the effects of renal failure and the dialysis period can be challenging. The patient may experience a decrease in energy in addition to the "lost time." The purpose of this study is to evaluate the effectiveness of video-assisted instruction on specific nurse-led therapeutic interventions to enhance the physiological outcomes of hemodialysis patients.

Materials and Methods: 120 hemodialysis patients were recruited and allocated to intervention (n = 60) and control groups (n = 60) using an evaluative pre-test and post-test repeated measure study design with the control group. Patients in the intervention group received intervention in terms of watching a video clip (40 minutes) - the video consist of disease condition, hemodialysis, dietary habits, fluid restriction, sleep hygiene, meditation, and yoga techniques, for two weeks after pre-test, later practice session, and group discussion along with individualised teaching and counselling session, finally a regular weekly follow up at dialysis unit, while the control group received only routine care.

Results: In the intervention group there was a gradual improvement, in selected physiological outcomes and most of them remain the same without much change including, blood pressure, sodium, potassium, calcium, phosphorus and Hemoglobin level. In the control group, they did not change the physiological outcomes, in most of the patients.

Conclusion: Nurse-led clinical treatments are beneficial, safe, necessary, natural therapies that can be administered under supervision at home or during hemodialysis to improve physiological outcomes. Patients' lives will improve when nurse-led clinical interventions are incorporated into standard treatment.

Keywords: physiological outcome; hemodialysis; Nurse led clinical interventions.

1. INTRODUCTION

Chronic kidney disease (CKD) is indicated by kidney damage or an estimated glomerular filtration rate (eGFR) of less than 60 mL/min/1.73 m² that persists for three months or more. A steady decline in kidney function is the hallmark of chronic kidney disease (CKD), which frequently calls for renal replacement therapy, such as dialysis or transplantation. Chronic kidney disease (CKD) affects blood pressure, anemia, bone metabolism, cardiovascular health, cognitive function, and many other health indicators. It is caused by a variety of disease processes. There have been reports of several eGFR testing methods, and early detection is the primary line of treatment for CKD. Both modifiable and unmodifiable risk factors impact the progression of chronic kidney disease. Managing chronic kidney disease (CKD) involves adjusting medication dosages according to the patient's eGFR, preparing to halt the illness's progression by treating reversible causes, and employing renal replacement therapy¹.

The process of hemodialysis is utilized to eliminate waste and water from blood, precisely as the kidneys would in a healthy condition. Blood pressure control and the appropriate balance of essential minerals such as calcium, sodium, and potassium are facilitated by hemodialysis².

Need for the study

Hemodialysis (HD) patients experience a great deal of biopsychosocial stress on all levels. Surveying HD patients regarding physiological and psychosocial stressors at two educational hospitals in Northern Iran was the aim of this study. This cross-sectional study involved eighty HD. Data was collected using a demographic information record sheet and Baldree Hemodialysis Stressors. The following physiological stressors were found: weariness (51.25%), restricted time and places for enjoyment (46.25%), and physical activation limitation (32.5%). Treatment costs (41.5%), poor quality of life (47.5%), transportation difficulties to the dialysis facility (45%), drinking water restriction (47.5%), and fistula (58.75%) were psychosocial stressors. Stress levels were higher among women who were younger, married, had less dialysis experience, and were less educated. The study comes to the conclusion that because HD patients have serious physical and psychological problems, they need social, familial, and educational support.

In order to ascertain if the physiological comfort measures—pain, edema, and vital signs—were associated with the sociodemographic and clinical data of hemodialysis patients, the study set out to assess these parameters. Utilizing a quantitative study approach and an exploratory research design, the physiological comfort levels of hemodialysis patients were assessed. A non-probability convenience selection method was used to pick 84 patients in total for the investigation. A vital signs chart, an edema evaluation scale, a pain assessment scale, a structured questionnaire of clinical and sociodemographic information, and additional instruments to measure physiological parameters were used to assess the physiological measures of comfort. Both descriptive and inferential statistics were employed to examine the data using SPSS (version 25). The physiological markers of comfort among hemodialysis patients are greatly influenced by clinical and sociodemographic factors. As a result, when it comes to carrying out appropriate nursing interventions during the dialysis treatment, the function of the nephrology nurse needs to be given additional thought.

There aren't many similar research from India, and many studies have been done on an individual basis. The researcher felt compelled to choose this particular study in order to evaluate the impact of a nurse-led clinical intervention program on hemodialysis patients with a focus on physiological parameters.

The sample of the study hemodialysis patients with moderate fatigue (Piper fatigue scale was used). The sample size was calculated by a pilot study, keeping the estimated power 82 and 5% significance. It was done using the formula;

with control group design, the formula used for estimating the sample size was as follows.

Formula to calculate sample size (based on Cohen's $d = \delta/\sigma$)¹¹⁶

$$N = (z_{\alpha} + z_{\beta})^2 / (\delta/\sigma)^2 = 55.59$$

N=Estimated Sample Size

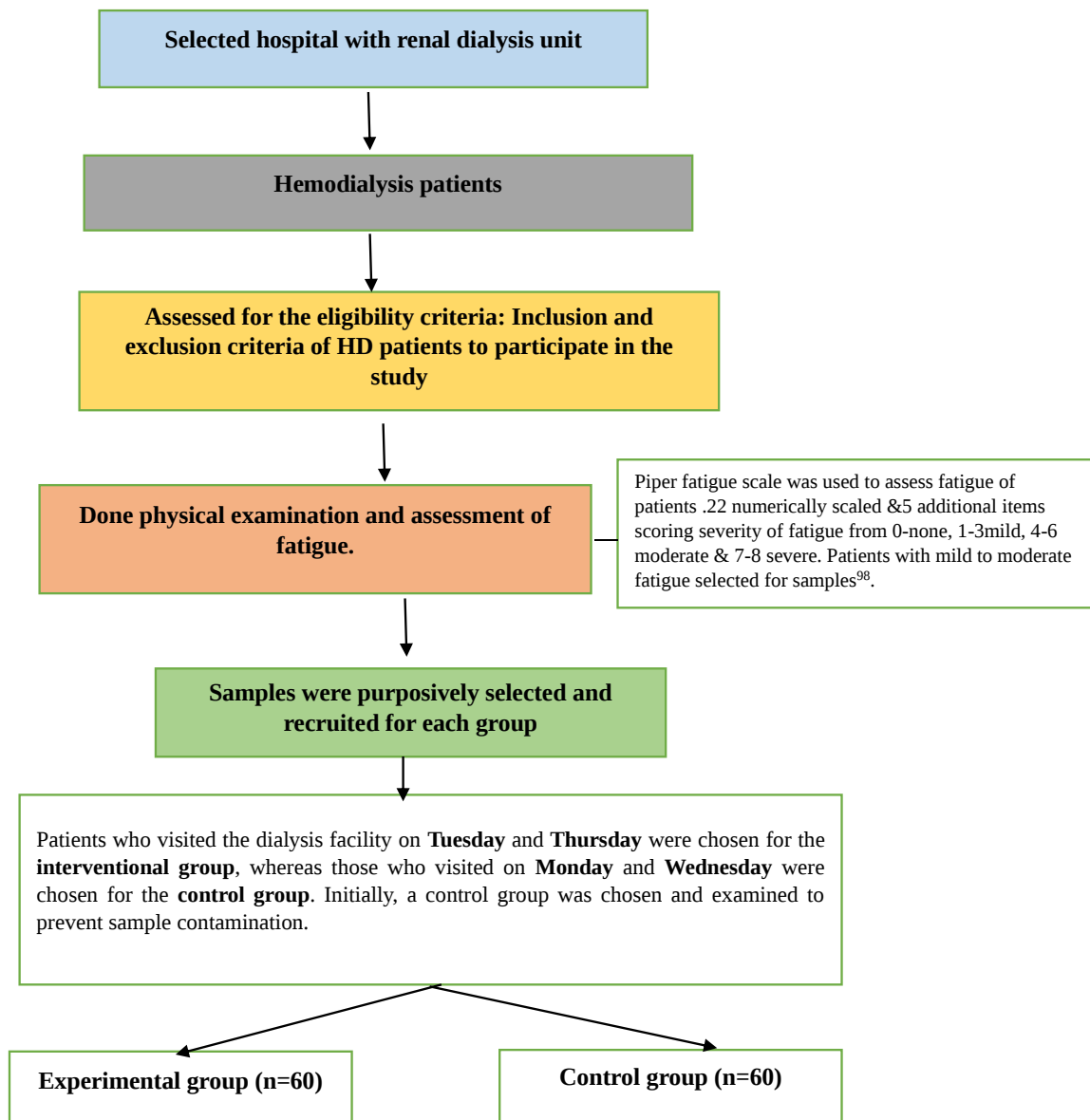
For $\alpha = .05$, $z_{\alpha} = 1.96$; for $\beta = .20$, $z_{\beta} = 0.84$.

δ =mean difference=3.17

σ =standard deviation =8.43

As the estimated sample size was 55. 60 study participants each would be included both in the experimental and control groups.

Flow diagram for selection of samples for the study



2. METHODS

The study used an evaluative pre- and post-test repeated measure research design with a control group to assess the effect of nurse-led therapeutic interventions on the physiological outcomes of hemodialysis patients. The inclusion criteria, which comprised male and female patients aged 20–60 who had been receiving maintenance hemodialysis for at least two months, were the basis for the initial selection of hemodialysis patients. The study excluded patients with myocardial infarction problems, kidney transplant recipients, and those who had not adhered to the hemodialysis regimen (not regular). The intervention and control groups were assigned at random to these sixty patients who were chosen from Adhichunchanagiri Hospital and Research Center. For two weeks following the pretest, patients in the intervention group viewed a 40-minute film that covered topics such as the medical condition, hemodialysis, dietary practices, fluid restriction, sleep hygiene, meditation, and yoga techniques. Two group practice sessions, group discussions with dietitians, individualized dietician instruction, and a researcher-facilitated counseling session came next. For about 30 minutes each person, it is possible to comprehend the challenges the patient has when putting the lessons and directions into practice. Following the conclusion of the sessions, weekly follow-ups with dairy will be conducted to assess the practice in addition to standard care. In contrast, the control group just received standard treatment and studied prior to the intervention group. Patients who had undergone kidney transplant, shown nonadherence to hemodialysis process (Not Regular) were not included in the study.

The following physiological parameters were included in the checklist, which was created based on reviews and expert opinions: sodium Na⁺, potassium K⁺, calcium Ca⁺, phosphorus PO₄, blood urea nitrogen (post-dialysis), hemoglobin was taken from the patient's file, and the investigator tracked the following: systolic blood pressure (BP), weight, diastolic blood pressure, dialysis adequacy (Kt/V), body mass index (BMI), and urea reduction ratio (URR).

Ethical consideration

The appropriate authority has given permission for the collection of data. Every research participant provided their informed permission. The research participants were made aware that their participation was completely voluntary, that no incentives were offered, and that they might discontinue the study at any moment.

Data analysis

The data were statistically analyzed with SPSS version 20. The Kolmogorov-Smirnov test had been utilized to evaluate if the research variables were regularly distributed. Thus, for socio-demographic data, “descriptive statistical parameters such as mean, standard deviation, and percentage were computed, and a parametric test such as the independent t-test were utilized for intragroup comparison. In this analysis, the independent variable is Video assisted Nurse Led Clinical Interventions, and the dependent variables were Knowledge, physiological, psychological, and symptom burden.

3. RESULTS

DESCRIPTION OF DEMOGRAPHIC VARIABLES OF SAMPLES.

Table 1: - Distribution of demographic characteristics of patients undergoing hemodialysis in experimental and control group.

			N=60+60			
Sl No	Demographic characteristics		Experimental group N=60 f (%)	Control group N=60 f (%)	Chi square (χ ²)	p Value
01	Age (in years)	21-30	6(10.0)	8(13.3)	6.224	0.183
		31-40	13(21.7)	13(21.7)		
		41-50	14(23.3)	9(15.0)		
		51-60	21(35.0)	29(48.3)		
		Above 60	6(10.0)	1(1.7)		
02	Gender	Male	52(86.7)	52(86.7)	0.001	1.000
		Female	8(13.3)	8(13.3)		
03	Religion	Hindu	32(53.33)	33(55.0)	4.080	0.130
		Muslim	19(31.66)	21(35.0)		
		Christian	9(15.0)	6(10.0)		
04	Educational status	No formal education	16(36.7)	10(16.7)	4.2777	0.118
		Primary	21(35.0)	32(53.3)		
		High school	23(38.3)	18(30.0)		
		Under graduation & above	--	--		
05	Occupation	Employed	15(25.0)	20(33.3)	8.233	0.016
		Unemployed	36(60.0)	21(35.0)		

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		self employed	9(15)	19(31.7)		
06	Marital status	Single	17(28.3)	18(30.0)	2.518	0.284
		Married	35(58.3)	39(65.0)		
		Divorced/ Widowed	8(13.3)	3(5.0)		
07	Frequency of dialysis	once in a week	3(5.0)	6(10.0)	1.081	0.298
		Twice a week	57(95)	54(90.0)		
08	Previous awareness programme regarding dialysis/renal care	Yes	--	--		
		No	60(100)	60(100)		

(p>0.05Not Significant)

The data presented in table 1 show that, in both groups, most patients (48.3%) were in the age group of 51-60 years. The majority of the sample in both groups consisted of men (86%), with the highest percentage of Hindus in experimental (32%) and control (55%) groups. The larger number of subjects were employed in both experimental (25%) and control (33%). The highest level of education in both groups was high school. A maximum 58.3(35) and 65% (39) of the choices were married; 95% (57)⁶ and 90% (54)⁷ of the patients received dialysis twice a week; no group of patients had previously participated in programs that would have raised awareness of their conditions or required renal care.

The homogeneity of the basic sociodemographic indicators of hemodialysis patients was tested by the chi-square test, and it was found that except for the profession, the basic socio-demographic characteristics of both the groups were similar (p>0.05).

Table 2: Description of pretest scores of knowledge, physiological, psychological outcomes and symptom burden among patients undergoing hemodialysis in experimental and control groups

		N=60+60					
Sl No	Variables	Experimental group n=60		Control group n =60		t value	p value
		Range	Mean ± S D	Range	Mean ± S D		
	Systolic Pressure	Blood 20	142.40±5.28	8	144.80±5.43	1.933	0.056
	Diastolic Pressure	Blood 20	94.60±4.78	10	94.10±3.46	0.656	0.513
	Weight	35	55.55±11.48	33	55.88±9.85	0.171	0.865
	Body mass index	19	22.95±5.10	7	24.30±2.37	1.861	0.065
	Sodium Na+	5	141.90±1.59	2	140.95±0.87	1.706	0.090

Potassium PO+	1.20	4.34±0.36	1.03	4.47±0.37	1.456	0.148
Calcium Ca+	0.49	3.19±0.11	0.29	3.12±0.09	1.803	0.074
Phosphorous PO4	2.50	3.83±0.86	0.5	4.74±0.20	1.456	0.148
Blood Urea Nitrogen (Post Dialysis)	8	10.00±1.99	8	10.15±1.84	0.429	0.669
Hemoglobin	3	9.14±0.66	1.7	9.16±0.61	0.172	0.864
Urea Reduction Ratio (URR)	43.75	42.06±11.54	36.86	38.79±14.27	1.381	0.170
Dialysis Adequacy (Kt/V)	0.2	1.24±0.06	0.2	1.29±0.08	1.879	0.063

($p>0.05$ Not Significant)

Physiological results,-- systolic blood pressure 142.40±5.28 and 144.80±5.43, diastolic blood pressure 94.60±4.78 and 94.10±3.46, weight 55.55±11.48 and 55.88±9.85, body mass index 22.95±5.10 and 24.30±2.37, sodium 141.90±1.59 and 140.95±0.87, potassium(PO+) 4.34±0.36 and 3.12±0.09, phosphorous (PO4) 3.86±0.86 and 4.74±0.20, blood urea nitrogen (post dialysis) 10.00±1.99 and 10.15±1.84, hemoglobin 9.14±0.66 and 9.16±0.61, urea reduction ratio (URR) 42.06±11.54 and 38.79±14.27, dialysis adequacy (Kt/V) 1.24±0.06 and 1.29±0.08 in the experimental group and control group respectively .

Repeated Measures of ANOVA is computed to find the significance differences in physiological outcomes at different time points among patients undergoing dialysis in experimental group compared to control group

Table 10: Repeated measures of ANOVA on physiological outcomes at different time points between experimental group and control group.

(N=120)

Physiological Outcomes	Group	Within the group F and p value	Between the group F and p value
SBP mmHg	Experimental (n=60)	$F=52.79, p=0.001^*$	$F=6.36,$
	Control (n=60)	$F=112.83, p=0.001^*$	$p=0.01^*$
DBP mmHg	Experimental (n=60)	$F=34.65, p=0.001^*$	$F=191.95,$
	Control (n=60)	$F=59.15, p=0.10$	$p=0.001^{**}$
Weight (Kgs)	Experimental (n=60)	$F=0.58, p=0.62$	$F=0.19,$
	Control (n=60)	$F=22.40, p=0.001^*$	$p=0.661$

BMI (Kg/m²)	Experimental (n=60)	$F=0.003, p=0.94$	$F=5.80,$
	Control (n=60)	----	$p=0.01^*$
Sodium (mEq/L)	Experimental (n=60)	$F=27.56, p=0.001^*$	$F=0.63,$
	Control (n=60)	----	$p=0.42$
Potassium (mEq/L)	Experimental (n=60)	$F=5.13, p=0.002^*$	$F=0.37,$
	Control (n=60)	----	$p=0.54$
Calcium (mg/dL)	Experimental (n=60)	$F=3.10, p=0.02^*$	$F=3.10,$
	Control (n=60)	----	$p=0.08$
Phosphorus (PO₄)	Experimental (n=60)	$F=32.55, p=0.001^*$	$F=12.50,$
	Control (n=60)	----	$p=0.001^{**}$
BUN	Experimental (n=60)	$F=0.14, p=0.70$	$F=1.69,$
	Control (n=60)	----	$p=0.19$
Hemoglobin (g/dL)	Experimental (n=60)	$F=48.50, p=0.001^*$	$F=3.86,$
	Control (n=60)	----	$p=0.04^*$
Urea Reduction Ratio (URR)	Experimental (n=60)	$F=1.89, p=0.13$	$F=0.11,$
	Control (n=60)	---	$p=0.73$
Dialysis Adequacy (Kt/V)	Experimental (n=60)	---	$F=1.69,$
	Control (n=60)	---	$p=0.19$

($p<0.05$: Significant level)

According to data in table 10, there was a statistically significant difference between the experimental and control groups in physiological outcome scores such as SBP ($F=6.36, p=0.01$), DBP ($F=191.95, p=0.001$), BMI ($F=5.80, p=0.01$), phosphorous (Po₄) ($F=12.50, p=0.001$), and hemoglobin ($F=3.86, p=0.04$).

There were statistically significant differences in the physiological outcomes of each experimental group, including SBP ($F=52.79, p=0.001$), DBP ($F=34.65, p=0.001$), sodium ($F=27.56, p=0.001$), potassium ($F=5.13, p=0.002$), calcium ($F=3.10, p=0.02$) and phosphorus ($F=32.55, p=0.001$).

However, only SBP ($F=112.83, p=0.001$) and weight ($F=22.40, p=0.001$) within control group indicated a significant difference.

Over all there is significant difference found in experimental group among few physiological parameters including blood pressure, sodium, potassium, calcium, phosphorous and hemoglobin level. This demonstrates that nurse-led clinical interventions are successful in lowering the minimal number of physiological outcomes experienced by dialysis patients. Hence the null hypothesis H07 was rejected and research hypothesis was accepted.

4. DISCUSSION

The average hemoglobin level was below normal, at 9.14 g/dL and 9 d/dL, respectively. These results are consistent with a large body of published research showing that hemodialysis patients had hemoglobin levels below normal. 52.2% of patients had hemoglobin levels between 6 and 8.5 g/dL.^{7, 8, 9, 10.}

Hemodialysis patients frequently have physical or mental symptoms before, during, or after their procedure. The frequency of symptoms, their impact on functioning regardless of severity, and the way in which biophysiological markers such as blood pressure, pulse rate, and respiration rate are used to measure well-being are all evaluated in this study. This study used a convenience sampling technique to interview 120 hemodialysis patients one-on-one utilizing a set of framed symptoms in order to match their symptom experiences with bio-physiological features. During the AV Fistula cannulation procedure, the most common symptoms were fear, anxiety, impatience, wrath, and sadness. Pain, fatigue, headaches, palpitations, numbness, nausea, vomiting, and dyspnea were the most prevalent symptoms reported by HD patients. Heart

rate, blood pressure, and pulse rate all increased. This study suggests that in order to assist hemodialysis patients with their problems, the medical and nursing staff should consider providing training and counseling. To improve the quality of life that hemodialysis patients can attain through exercise encouragement and counseling, more research is required.

5. CONCLUSION

Yoga and meditation are still not common clinical practices in dialysis centers, even though nurse-led therapeutic treatments for hemodialysis patients were beneficial, secure, and realistic. The researcher has also gained knowledge on additional issues faced by hemodialysis patients, such as intradialytic and financial difficulties, which were not covered by the current study criteria. Further research and case studies are needed to better understand these characteristics and offer a more comprehensive interventional package for hemodialysis patients.

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