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"A Study To Evaluate The Effectiveness Of Valsalva Maneuver On Arteriovenous Fistula Puncture Related Pain Among Hemodialysis Patients In Kg Hospital, Coimbatore".

Ms. Nithiyamole P J

Department of Medical Surgical Nursing,

Sree Sudheendra College of Nursing

Ambalamedu PO, Ernakulam, Kerala

Abstract

Introduction: Chronic kidney disease is a condition that reduces the quality of human life and is considered as a crucial medical problem. Dialysis can be defined as a management for renal failure which replaces the work of the kidney. One of the established routes for hemodialysis is the internal Arteriovenous Fistula. Valsalva maneuver is a unique method to reduce the pain intensity related to peripheral venous cannulation. This study aims to evaluate the effectiveness of Valsalva maneuver on arteriovenous fistula puncture related pain among hemodialysis patients. **Research methodology:** A Quasi Experimental pretest posttest control group Design was adopted. 60 samples were selected using Purposive sampling technique from Nephroplus department of KG Hospital of which 30 constituted to experimental and 30 to control group. **Results:** The calculated value of t is greater than tabulated value of t = 2.05 at 5 % level of significance. Hence there is a significant difference between posttest level of Arteriovenous fistula puncture related pain among hemodialysis patients in experimental group after performing valsalva maneuver. **Conclusion:** Thereby the researcher concluded that Valsalva maneuver can effectively reduce the sensation of pain from venipuncture among patient with Arteriovenous fistula undergoing hemodialysis.

Keywords: Assess, effectiveness, arteriovenous fistula puncture, Valsalva maneuver, hemodialysis.

INTRODUCTION

The human body is a complex and intricate system, composed of numerous organs that function in unison to sustain life. However, when one of these vital organs, such as the kidney, fails, it can lead to severe health complications. Renal failure is a serious medical condition in which the kidneys lose their ability to perform essential functions, such as regulating fluid and electrolyte balance, filtering waste products, and maintaining overall homeostasis. This dysfunction significantly impacts an individual's quality of life, often requiring renal replacement therapies such as hemodialysis, peritoneal dialysis, or kidney transplantation. Among these, hemodialysis is one of the most commonly used treatments for patients with renal failure.

The Valsalva maneuver is a simple, inexpensive technique that involves the patient performing a controlled exhalation against a closed airway, which induces changes in intrathoracic pressure and triggers an antinociceptive response. This technique has been suggested to reduce pain perception during arteriovenous fistula puncture by stimulating the sympathetic nervous system and enhancing the body's ability to tolerate pain. Despite its potential, there is a lack of extensive research on the effectiveness of the Valsalva maneuver in reducing AVF puncture-related pain in hemodialysis patients.

NEED FOR THE STUDY

Chronic Kidney Disease (CKD) is a growing global health concern, affecting approximately 10% of the population worldwide, with diabetes and hypertension being major contributing factor. In India, the incidence of CKD ranges from <1% to 13%, with renal failure being a leading cause of mortality. As the number of patients requiring renal replacement therapies, particularly hemodialysis, continues to rise, it is essential to explore effective methods to alleviate the pain associated with these treatments.

Hemodialysis patients, who typically require 2-3 sessions per week, endure repeated needle insertions into the AVF, causing significant physical and emotional distress. Given the growing demand for hemodialysis in India, where approximately 700 dialysis centers operate, it is crucial to identify cost-effective, non-pharmacological interventions that can reduce pain and improve patient well-being. The Valsalva maneuver presents a promising alternative to pharmacological pain management, offering a simple, non-invasive technique to minimize discomfort during AVF puncture.

While studies have explored the use of the Valsalva maneuver for reducing pain during needle insertions in various clinical settings, there is a limited body of research on its application in hemodialysis patients. The findings of previous studies suggest that the Valsalva maneuver may be more effective than other non-pharmacological methods, such as ice massage, in reducing pain associated with AVF puncture. Therefore, this study aims to evaluate the effectiveness of the Valsalva maneuver in reducing AVF puncture-related pain among hemodialysis patients, providing valuable insights into a potential intervention that could improve patient comfort and quality of life

STATEMENT OF THE PROBLEM

“A Study To Evaluate The Effectiveness Of Valsalva Maneuver On Arteriovenous Fistula Puncture Related Pain Among Hemodialysis Patients In KG Hospital, Coimbatore”.

OBJECTIVES

- To assess the level of pain during Arteriovenous Fistula Puncture among hemodialysis patients in experimental and control group.
- To evaluate the effectiveness of Valsalva Maneuver on level of pain during Arteriovenous Fistula Puncture in experimental group.
- To compare the level of pain during Arteriovenous Fistula Puncture between experimental and control group.
- To compare the subjective and objective pain between experimental and control group.
- To associate the findings with selected demographic and clinical variables.

HYPOTHESIS:

H1- There will be significant reduction in Arteriovenous Fistula Puncture related pain among hemodialysis patients who perform Valsalva Maneuver than patients who do not perform Valsalva Maneuver.

H2- There will be significant association between Arteriovenous Fistula Puncture related pain with selected demographic and clinical variables in experimental and control group.

RESEARCH METHODOLOGY

The research was conducted using Quantitative Research Approach and Quasi Experimental pretest posttest control group Design was adopted. The main study was done for a four weeks period in the Nephroplus department of K.G Hospital. The patients who fulfilled the inclusion criteria had been selected for the study by purposive sampling technique. The investigator met the samples and explained the purpose of study and obtained written consent from each sample. 60 samples were selected and assigned 30 in the experimental group, 30 in the control group. Patients were evaluated at four consecutive sessions of dialysis. Pretest was done for both groups of experimental and control during Arteriovenous Fistula puncture. The pain score during Arteriovenous Fistula puncture was assessed using Modified Abbey assessment pain and immediately after fixing needle, Numerical pain rating scale was used for pain assessment. After pretest, Valsalva maneuver was performed by the samples of the experimental group for the next three sessions. Posttest 1, 2 and 3 was done for both the experimental and control group using the same tool.

RESULTS

The data was presented in the form of tables and figures.

Table 1: Distribution of demographic variables among the hemodialysis patients in experimental and control group.

n = 60

S.No	Demographic Variables	Experimental group		Control group	
		Number	%	Number	%
1.	Age				
	a) 21-30 years	4	13.33	-	-
	b) 31-40 years	9	30	10	33.33
	c) 41-50 years	17	56.67	20	66.67
2.	Gender				
	a) Male	20	66.67	19	63.33
	b) Female	10	33.33	11	36.67
3.	Occupation				
	a) Unemployed	21	70	12	40
	b) Govt. employee	-	-	1	3.33
	c) Private employee	2	6.67	10	33.33
	d) Housewife	7	23.33	7	23.33
4.	Educational Status				
	a) Illiterate	-	-	1	3.33
	b) Primary education	10	33.33	13	43.33
	c) Secondary education	8	26.67	9	30
	d) Degree & above	12	40	7	23.33
5.	Marital status				
	a) Unmarried	7	23.33	6	20
	b) Married	23	76.67	24	80

The table shows that,

With regards to the age of the hemodialysis patients in experimental group, 4 (13.33%) of them were between 21 and 30 years, 9 (30 %) were between 31 and 40 years and 17 (56.67%) were between 41 and 50 years of age. In control group, 10 (33.33 %) were between 31 and 40 years and 20 (66.67 %) were between 41 and 50 years.

Regarding gender, in experimental group, 20 (66.67 %) were males and 10 (33.33%) were

females. In the control group 19 (63.33%) were males and 11 (36.67 %) were females.

Regarding the occupation, in experimental group 21 (70 %) were unemployed, 2 (6.67 %) were private employee and 7 (23.33 %) were housewife. In control group 12 (40%) were unemployed, 1 (3.33%) was government employee, 10 (33.33 %) were private employee and 7 (23.33 %) were housewives.

Regarding the educational status, in experimental group, 10 (33.33 %) had primary education, 8 (26.67 %) had secondary education and 12 (40 %) had degree and above. In t control group 1 (3.33 %) was illiterate, 13 (43.33 %) had primary education, 9 (30 %) had secondary education and 7 (23.33 %) had degree and above.

Regarding the marital status, in experimental group, 7 (23.33 %) were unmarried and 23 (76.67 %) were married. In control group, 6 (20 %) were unmarried and 24 (80 %) were married.

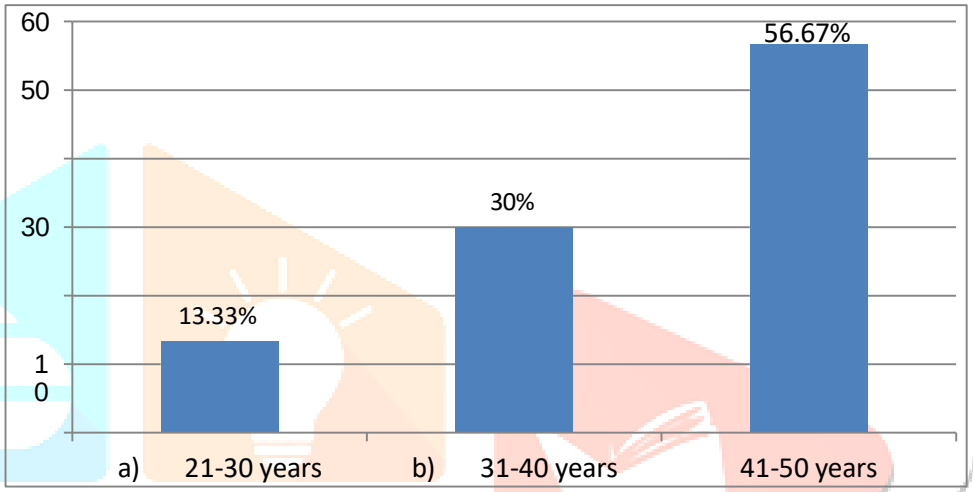

FIGURE 1: AGE OF PATIENTS UNDERGOING HEMODIALYSIS IN THE EXPERIMENTAL GROUP

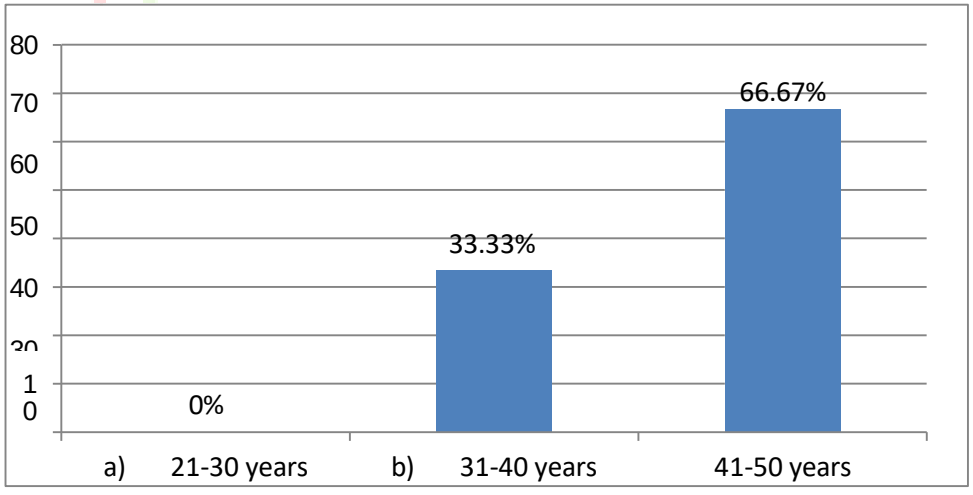

FIGURE 2: AGE OF PATIENTS UNDERGOING HEMODIALYSIS IN THE CONTROL GROUP

Table 2: Distribution of clinical variable variables among the hemodialysis patients in experimental and control group.

n = 60

S. No	Clinical Variable	Experimental Group		Control Group	
		Number	%	Number	%
1.	Presence of other chronic illness				
	a) Hypertension	22	73.33	22	73.33
	b) Diabetes mellitus	- 6	- 20	1	3.33
	c) Hypertension with DM	2	6.67	5	20
	d) Hypertension with DM and CAD			2	6.67
2.	Duration of CKD (in years)				
	a) 0-5 years	26	86.67	22	73.33
	b) 5-10 years	4	13.33	6	20
	c) 10-15 years	-	-	2	6.67
3.	Duration of hemodialysis (in years)				
	a) 0-5 years	28	93.33	27	90
	b) 5-10 years	2	6.67	2	6.67
	c) 10-15 years	-	-	1	3.33
4.	Frequency of hemodialysis				
	a) Twice	10	33.33	10	33.33
	b) Thrice	20	66.67	20	66.67
5.	Duration of functioning AV Fistula				
	a) 0-1 year	10	33.33	9	30
	b) 1-2 years	16	53.33	15	50
	c) 2-3 years	4	13.34	6	20

The table reveals that,

With regards to the presence of other chronic illness in the experimental group, 22 (73.33 %) had hypertension, 6 (20 %) had hypertension with Diabetes mellitus and 2 (6.67 %) has hypertension, diabetes mellitus and Coronary Artery Disease. In the control group, 22 (73.33 %) had hypertension, 1 (3.33 %) had diabetes, 6 (20 %) had hypertension and diabetes mellitus and 2 (6.67%) had hypertension, diabetes mellitus and coronary artery disease.

Regarding the duration of CKD, in the experimental group, 26 (86.67 %) was suffering from CKD for 0 to 5 years, 4 (13.33%) was suffering from CKD for 5 to 10 years. In the control group, 22 (73.33 %) was suffering from CKD for 0 to 5 years, 6 (20 %) was suffering for 5 to 10 years and 2 (6.67 %) was suffering for 10 to 15 years.

With respect to the duration of hemodialysis, in the experimental group, 28 (93.33 %) was undergoing hemodialysis for 0 to 5 years, 2 (6.67 %) for 5 to 10 years. In the control group, 27 (10 %) was undergoing for 0 to 5 years, 2 (6.67 %) for 5 to 10 years and 1 (3.33 %) for 10 to 15 years.

Considering the frequency of hemodialysis, in the experimental group 10 (33.33 %) was undergoing hemodialysis twice and 20 (66.67 %) for thrice. In the control group, 10 (33.33 %) was undergoing hemodialysis twice and 20 (66.67 %) for thrice per week.

While considering the duration of functioning AV Fistula, in the experimental group, 10 (33.33 %) was between 0 and 1 year, 16 (53.33 %) between 1 and 2 years and 4 (13.34 %) was between 2 and 3 years. In the control group, 9 (30 %) was between 0 and 1 year, 15 (50%) was between 1 and 2 years and 6 (20 %) was between 2 and 3 years.

Table 3 : Distribution of level of pain during Arteriovenous Fistula punctures in experimental group. n =30

Level Of pain	Pretest				Post test -1				Post test -2				Post test -3			
	MAPS		NPS		MAPS		NPS		MAPS		NPS		MAPS		NPS	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%
No pain	-	-	-	-	1	3.3	-	-	2	6.7	-	-	3	10	3	10
Mild pain	4	13.3	3	10	22	73.3	19	63.3	23	76.7	24	80	25	83.3	25	83.3
Moderate pain	21	70	19	63.3	7	23.3	10	33.3	5	16.7	6	20	2	6.7	2	6.7
Severe pain	5	16.7	8	26.7	-	-	1	3.3	-	-	-	-	-	-	-	-

The table shows that,

In experimental group, considering the level of pain during Arteriovenous Fistula puncture, in pretest, none of them had no pain in modified abbey pain scale, 4(13,3%) had mild pain, 21(70%) had moderate pain and 5(16.7%) severe pain. In numerical pain scale none of them had no pain, 3(10%) had mild pain, 19(63.3%) moderate pain and 8(26.7%) had severe pain. In posttest 1, 1(3.3%) had no pain in modified abbey pain scale, 22(73.3%) had mild pain, 7(23.3%) had moderate pain and none had severe pain. In numerical pain scale none of them had no pain, 19(63.3%) had mild pain, 10(33.3%) moderate pain and 1(3.3) had severe pain. In posttest 2, 2(6.7%) had no pain in modified abbey pain scale, 23(76.7%) had mild pain, 5(16.7%) had moderate pain and none had severe pain. In numerical pain scale none of them had no pain, 24(80%) had mild pain, 6(20%) moderate pain and none had severe pain. In posttest 3, 3(10%) had no pain in modified abbey pain scale, 25(83.3%) had mild pain, 2(6.7%) had moderate pain and none had severe pain. In numerical pain scale 3(10%) had no pain, 25(83.3%) had mild pain, 2(6.7%) moderate pain and none had severe pai

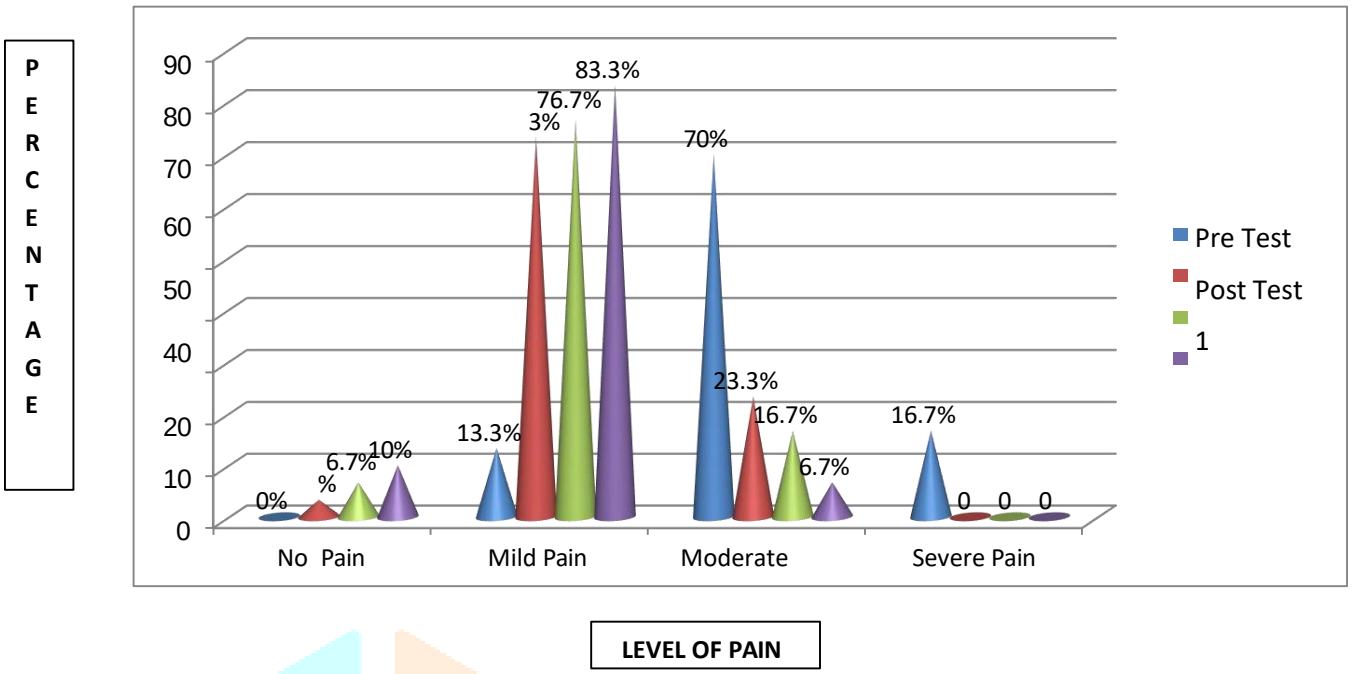

Figure 3: Distribution of level of pain in modified abbey pain scale during arteriovenous fistula puncture in experimental group

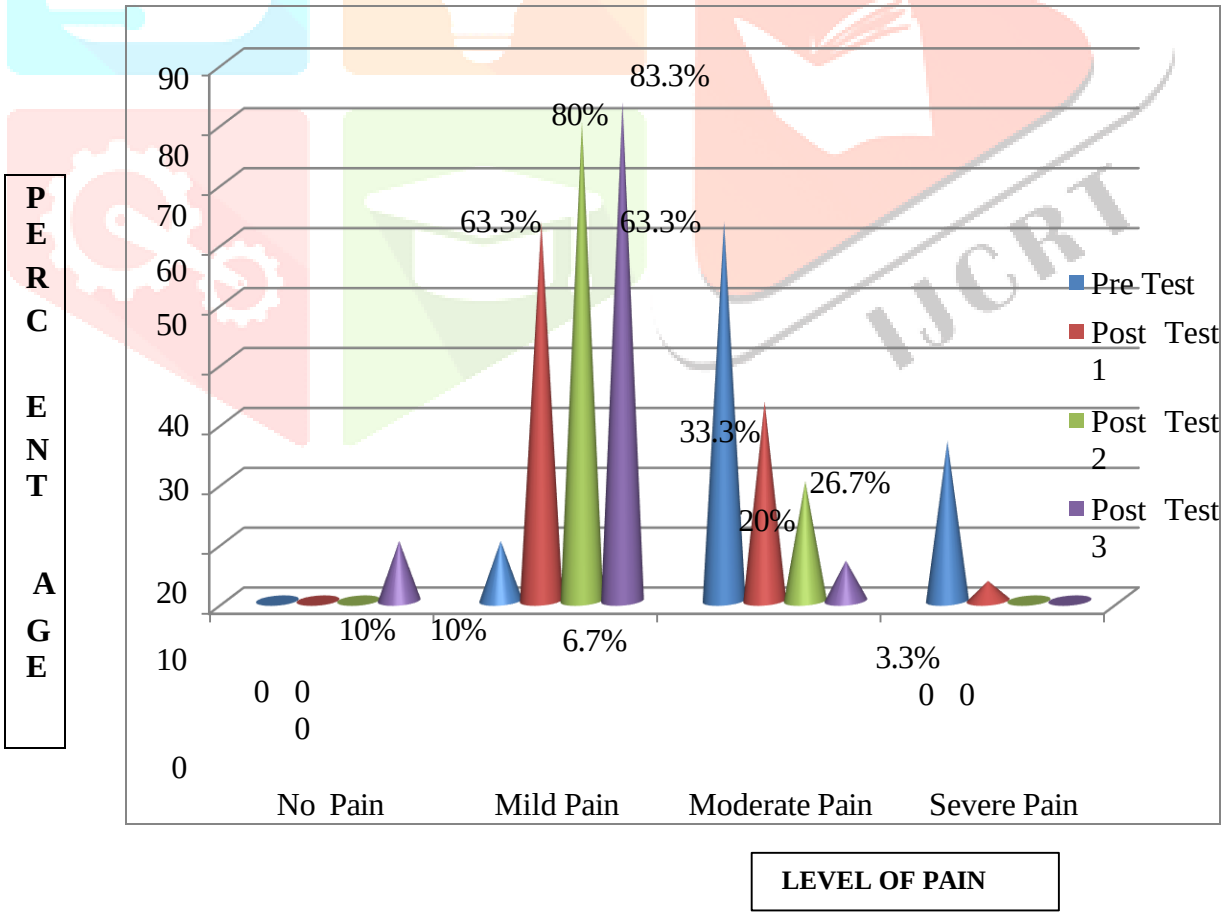

Figure 4: Distribution of level of pain in numerical pain scale during arteriovenous fistula puncture in experimental group

Table 4: Distribution of level of pain during Arteriovenous Fistula punctures in control group.

n =30

Level Of pain	Pretest				Post test -1				Post test -2				Post test -3			
	MAPS		NPS		MAPS		NPS		MAPS		NPS		MAPS		NPS	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%
No pain	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mild pain	3	10	3	10	4	13.3	3	10	3	10	4	13.3	2	6.7	3	10
Moderate pain	22	73.3	21	70	22	73.3	21	70	23	76.7	22	73.3	24	80	22	73.3
Severe pain	5	16.7	6	20	4	13.3	6	20	4	13.3	4	13.3	4	13.3	5	16.7

The above table shows that, in control group, considering the level of pain during Arteriovenous Fistula puncture, in pretest, none of them had no pain in modified abbey pain scale, 3(10%) had mild pain, 22(73.3%) had moderate pain and 5(16.7%) severe pain. In numerical pain scale none of them had no pain, 3(10%) had mild pain, 21(70%) moderate pain and 6(20%) had severe pain. In posttest 1, none of them had no pain in modified abbey pain scale, 4(13.3%) had mild pain, 22(73.3%) had moderate pain and 4(13.3%) had severe pain. In numerical pain scale none of them had no pain, 3(10%) had mild pain, 21(70%) moderate pain and 6(20%) had severe pain. In posttest 2, none of them had no pain in modified abbey pain scale, 3(10%) had mild pain, 23(76.7%) had moderate pain and 4(13.3%) had severe pain. In numerical pain scale none of them had no pain, 4(13.3%) had mild pain, 22(73.3%) moderate pain and 4(13.3%) had severe pain. In posttest 3, none of them had no pain in modified abbey pain scale, 2(6.7%) had mild pain, 24(80%) had moderate pain and 4(13.3%) had severe pain. In numerical pain scale none of them had no pain, 3(10%) had mild pain, 22(73.3%) moderate pain and 5(16.7%) had severe pain.

Table 5: Mean and Standard deviation of Modified Abbey pain scale score and numerical pain scale score. **n = 60**

Scales	Parameters	Experimental Group		Control Group	
		Mean	SD	Mean	SD
Modified Abbey pain scale	Pretest	6.57	1.75	6.6	1.37
	Post test -1	3.37	1.24	6.3	1.96
	Post test- 2	3.06	1.5	6.5	1.9
	post test -3	2.4	1.40	6.2	1.6
Numerical pain Scale	Pretest	5.83	1.5	5.2	1.4
	Post test -1	3.23	1.1	5.23	1.5
	Post test- 2	2.97	1.1	4.93	1.4
	post test -3	2.23	1.02	5.2	1.51

The above mentioned table shows that the pretest mean value of Arteriovenous Fistula puncture related pain using modified Abbey pain scale in the experimental group was 6.57 with SD 1.75, post test 1 mean was 3.37 with SD 1.24, post test 2 mean was 3.06 with SD 1.5 and post test 3 mean value was 2.4 with SD 1.40 respectively. The pretest mean value of Arteriovenous Fistula puncture related pain using numerical pain scale in the experimental group was 5.83 with SD 1.5, post test 1 mean was 3.23 with SD 1.1, post test 2 mean was 2.97 with SD 1.1 and post test 3 mean value was 2.23 with SD 1.02 respectively.

The pretest mean value of Arteriovenous Fistula puncture related pain using modified Abbey pain scale in the control group was 6.6 with SD 1.37, post test 1 mean was 6.3 with SD 1.96, post test 2 mean was 6.5 with SD 1.9 and post test 3 mean value was 6.2 with SD 1.6 respectively. The pretest mean value of Arteriovenous Fistula puncture related pain using numerical pain scale in the experimental group was 5.2 with SD 1.4, post test 1 mean was 5.23 with SD 1.5, post test 2 mean was 4.93 with SD 1.4 and post test 3 mean value was 5.2 with SD 1.51 respectively.

Table 6: Comparison of pretest and post test Arteriovenous Fistula puncture related pain using Modified Abbey pain scale among hemodialysis patient in experimental group.

n = 30

Experimental Group	Mean	Standard Deviation	Calculated t value	Tabulated t value at 5 % level of significance
Pretest	6.57	1.75	32	2.05
Post test 1	3.37	1.24		
Pre test	6.57	1.75	16	2.05
Post test 2	3.06	1.5		
Pretest	6.57	1.75	24.4	2.05
Post test 3	2.4	1.40		

The above table shows that the comparison of pre test and post test arteriovenous Fistula puncture related pain using modified Abbey pain scale among hemodialysis patients in experimental group.

The pretest mean value of arteriovenous fistula puncture related pain using modified Abbey pain was 6.57 with SD 1.75 and post test 1 mean was 3.37 with SD 1.24 and calculated t value was 32. The post test 2 mean was 3.06 with SD 1.5 and calculated t value was 16. The post test 3 mean was 2.4 with SD 1.40 and calculated t value 24.4

The calculated t value is greater than tabulated value of t =2.05 at 5% level of significance. So the null hypothesis is rejected. There is a significant difference between pre test and post test level of arteriovenous fistula puncture related pain among hemodialysis patients in experimental group.

Hence the researcher concluded that the Valsalva maneuver is effective in reducing arteriovenous fistula puncture related pain.

Table 7: Comparison of pretest and post test Arteriovenous fistula puncture related pain using Numerical pain scale among hemodialysis patient in experimental group.

n = 30

Experimental Group	Mean	Standard Deviation	Calculated t value	Tabulated t value at 5 % level of significance
Pretest	5.83	1.5	15.2	2.05
Post test 1	3.23	1.1		
Pretest	5.83	1.5	17.5	2.05
Post test 2	2.97	1.1		
Pretest	5.83	1.5	21.1	2.05
Post test 3	2.23	1.02		

The above table shows that the comparison of pre test and post test arteriovenous Fistula puncture related pain using Numerical pain scale among hemodialysis patients in experimental group.

The pretest mean value of arteriovenous fistula puncture related pain using Numerical pain was 5.83 with SD 1.5 and post test 1 mean was 3.23 with SD 1.1 and calculated t value was 15.2. The post test 2 mean was 2.97 with SD 1.1 and calculated t value was 17.5. The post test 3 mean was 2.23 with SD 1.02 and calculated t value 21.1

The calculated t value is greater than tabulated value of t =2.05 at 5% level of significance. So the null hypothesis is rejected. There is a significant difference between pre test and post test level of arteriovenous fistula puncture related pain among hemodialysis patients in experimental group.

Hence the researcher concluded that the Valsalva maneuver is effective in reducing arteriovenous fistula puncture related pain.

Table 8: Comparison of pretest and post test Modified Abbey pain score and Numerical pain scale score in experimental group.

n = 30

Experimental Group	Mean	Standard Deviation	Calculated t value	Tabulated t value at 5 % level of significance
Pretest MAPS	6.57	1.75	1.86	2.05
Pretest NPS	5.83	1.50		
Post test 1 MAPS	3.37	1.24	0.42	2.05
Post test 1 NPS	3.23	1.1		
Post test 2 MAPS	3.06	1.5	0.29	2.05
Post test 2 NPS	2.97	1.1		

Post test 3 MAPS	2.4	1.40	0.52	2.05
Post test 3 NPS	2.23	1.02		

The above table shows that the comparison of pre test and post test arteriovenous Fistula puncture related pain using modified Abbey pain scale and Numerical pain scale among hemodialysis patients in experimental group.The pretest modified Abbey pain scale mean score was 6.57 with SD 1.75 and numerical pain scale mean was 5.83 with SD 1.50 and calculated t value is 1.86. The post test 1 modified Abbey pain scale mean score was 3.37 with SD 1.24 and numerical pain scale mean was 3.23 with SD 1.1 and calculated t value is 0.42. Post test 2 modified Abbey pain scale mean score was 3.06 with SD 1.5 and numerical pain scale mean was 2.97 with SD 1.1 and calculated t value is 0.29. Post test 3 modified Abbey pain scale mean score was 2.4 with SD 1.40 and numerical pain scale mean was 2.23 with SD 1.02 and calculated t value is 0.52

The calculated t value is lesser than tabulated value of t =2.05 at 5% level of significance. So the null hypothesis is accepted. There is a no significant difference between Modified Abbey pain scale and Numerical pain scale scores.

Hence the researcher concluded that there is a no significant difference between Modified Abbey pain scale and Numerical pain scale scores.

Table 9: Comparison of post test level of Modified Abbey pain assessment score among hemodialysis patients between the experimental and control group. n = 60

Parameters	**Mean**	**Standard Deviation**	**Calculated t value**	**Tabulated t value at 5 % level of significance**
Experimental Group post test 3 MAPS Score	2.4	1.40	9.5	2.05
Control Group Post test 3 MAPS Score	6.2	1.6		

The above mentioned table shows the comparison of the post test level of Modified Abbey pain assessment scale score among hemodialysis patients between the experimental and control group.

While comparing the post test 3 Modified Abbey pain assessment scale score between the experimental and control group, mean in experimental group was 2.4 with SD 1.40 and mean in control group was 6.2 with SD 1.6 and calculated t value is 9.5. The calculated value of t is greater than tabulated value of t = 2.05 at 5 % level of significance. Hence null hypothesis is rejected. There is a significant difference between post test level of Arteriovenous fistula puncture related pain among hemodialysis patients in experimental and control group.

Table 10: Comparison of post test level of Numerical pain scale score among hemodialysis patients between the experimental and control group. n = 60

Parameters	**Mean**	**Standard Deviation**	**Calculated t value**	**Tabulated t value at 5 % level of significance**
Experimental Group post test 3 NPS Score	2.23	1.02	8.74	2.05
Control Group Post test 3 NPS Score	5.2	1.51		

The above mentioned table shows the comparison of the post test level of Numerical pain scale

score among hemodialysis patients between the experimental and control group.

While comparing the post test 3 Numerical pain scale score between the experimental and control group mean in experimental group was 2.23 with SD 1.02 and mean in control group was 5.2 with SD 1.51 and calculated t value is 8.74. The calculated value of t is greater than tabulated value of t = 2.05 at 5 % level of significance. Hence null hypothesis is rejected. There is a significant difference between post test level of Arteriovenous fistula puncture related pain among hemodialysis patients in experimental and control group.

Table 11.1: Association of post test level of Modified Abbey pain score among hemodialysis patients with selected demographic and clinical variable in experimental group.

n = 30

S.No	Demographic and Clinical Variables	Post test		Calculated value of $\chi 2$	Tabulated value of at 5% level of significance
		Above mean	Below mean		
1.	Age a) ≤ 40 years b) > 40 years	6 11	6 7	0.36 NS	3.841
2.	Gender a) Male b) Female	12 5	8 5	0.27 NS	3.841
3.	Presence of other chronic illness a) Hypertension b) Other co-morbid illness	14 4	8 4	0.06 NS	3.841
4.	Duration of CKD a) ≤ 5 years b) > 5 years	14 2	12 2	0.16 NS	3.841
5.	Duration of Hemodialysis a) ≤ 5 years b) > 5 years	16 1	12 1	0.29 NS	3.841
6.	Frequency of Hemodialysis a) Twice b) Thrice	5 12	5 8	0.27 NS	3.841
7.	Duration of functioning AV Fistula a) ≤ 2 years b) > 2 years	14 3	12 1	0.16 NS	3.841

(NS – Not Significant, S –* Significant)

The above table shows that selected demographic and clinical variable has no association between Arteriovenous Fistula puncture related pain among hemodialysis patients.

Table 11.2: Association of post test level of Numerical pain score among hemodialysis patients with selected demographic and clinical variable in experimental group. n =30

S.No	Demographic and Clinical Variables	Post test		Calculated value of $\chi 2$	Tabulated value of at 5% level of significance
		Above mean	Below mean		
1.	Age a) ≤ 40 years b) > 40 years	 6 12	 6 6	**7.72* S**	3.841
2.	Gender a) Male b) Female	 12 5	 8 5	0.27 NS	3.841
3.	Presence of other chronic illness a) Hypertension b) Other co-morbid illness	 12 4	 10 4	0.04 NS	3.841
4.	Duration of CKD a) ≤ 5 years b) > 5 years	 15 2	 11 2	0.06 NS	3.841
5.	Duration of Hemodialysis a) ≤ 5 years b) > 5 years	 16 1	 12 1	0.29 NS	3.841
6.	Frequency of Hemodialysis a) Twice b) Thrice	 5 12	 5 8	0.27 NS	3.841
7.	Duration of functioning AV Fistula a) ≤ 2 years b) > 2 years	 13 4	 12 1	0.43 NS	3.841

(NS – Not Significant, S –* Significant)

The above table shows that age has a significant association between Arteriovenous Fistula puncture related pain among hemodialysis patients.

Table 11.3: Association of post test level of Modified Abbey pain score among hemodialysis patients with selected demographic and clinical variable in control group. n=30

S.No	Demographic and Clinical Variables	Post test		Calculated value of $\chi 2$	Tabulated value of at 5% level of significance
		Above mean	Below mean		
1.	Age a) ≤ 40 years b) > 40 years	 5 11	 5 9	 0.07 NS	3.841
2.	Gender a) Male b) Female	 13 7	 6 4	 0.08 NS	3.841
3.	Presence of other chronic illness a) Hypertension b) Other co-morbid illness	 13 6	 9 2	 0.13 NS	3.841
4.	Duration of CKD a) ≤ 5 years b) > 5 years	 13 6	 9 2	 0.14 NS	3.841
5.	Duration of Hemodialysis a) ≤ 5 years b) > 5 years	 18 1	 9 2	 0.26 NS	3.841
6.	Frequency of Hemodialysis a) Twice c) Thrice	 5 14	 5 6	 1.17 NS	3.841
7.	Duration of functioning AV Fistula a) ≤ 2 years b) > 2 years	 11 8	 10 1	 2.21 NS	3.841

(NS – Not Significant, S –* Significant)

The above table shows that selected demographic and clinical variable has no association between Arteriovenous Fistula puncture related pain among hemodialysis patients.

Table 11.4: Association of post test level of Numerical pain score among hemodialysis patients with selected demographic and clinical variable in control group. n =30

S.No	Demographic and Clinical Variables	Post test		Calculated value of $\chi 2$	Tabulated value of at 5% level of significance
		Above mean	Below mean		
1.	Age a) ≤ 40 years b) > 40 years	 7 12	 2 9	 0.44 NS	3.841
2.	Gender a) Male b) Female	 13 8	 6 3	 0.44 NS	3.841
3.	Presence of other chronic illness a) Hypertension b) Other co-morbid illness	 16 5	 6 3	 **8.12*** **S**	3.841
4.	Duration of CKD a) ≤ 5 years b) > 5 years	 16 5	 6 3	 0.008 NS	3.841
5.	Duration of Hemodialysis a) ≤ 5 years b) > 5 years	 20 1	 7 2	 0.63 NS	3.841
6.	Frequency of Hemodialysis a) Twice b) Thrice	 6 15	 4 5	 0.18 NS	3.841
7.	Duration of functioning AV Fistula a) ≤ 2 years b) > 2 years	 16 5	 8 1	 0.09 NS	3.841

(NS – Not Significant, S –* Significant)

The above table shows that presence of other chronic illness only has significant association between Arteriovenous Fistula puncture related pain among hemodialysis patients.

DISCUSSIONS

The first objective was to assess the level of pain during Arteriovenous Fistula puncture among hemodialysis patients in experimental group and control group. The result revealed that the distribution of level of pain during Arteriovenous Fistula puncture, in experimental group, in pretest, none of them had no pain in modified abbey pain scale, 4(13,3%) had mild pain, 21(70%) had moderate pain and 5(16.7%) severe pain. In numerical pain scale none of them had no pain, 3(10%) had mild pain, 19(63.3%) moderate pain and 8(26.7%) had severe pain. In posttest 1, 1(3.3%) had no pain in modified abbey pain scale, 22(73.3%) had mild pain, 7(23.3%) had moderate pain and none had severe pain. In numerical pain scale none of them had no pain, 19(63.3%) had mild pain, 10(33.3%) moderate pain and 1(3.3) had severe pain. In posttest 2, 2(6.7%) had no pain in modified abbey pain scale, 23(76.7%) had mild pain, 5(16.7%) had moderate pain and none had severe pain. In numerical pain scale none of them had no pain, 24(80%) had mild pain, 6(20%) moderate pain and none had severe pain. In posttest 3, 3(10%) had no pain in modified abbey pain scale, 25(83.3%) had mild pain, 2(6.7%) had moderate pain and none had severe pain. In numerical pain scale 3(10%) had no pain, 25(83.3%) had mild pain, 2(6.7%) moderate pain and none had severe pain.

The distribution of level of pain during Arteriovenous Fistula puncture, in control group in pretest, none of them had no pain in modified abbey pain scale, 3(10%) had mild pain, 22(73.3%) had moderate pain and 5(16.7%) severe pain. In numerical pain scale none of them had no pain, 3(10%) had mild pain, 21(70%) moderate pain and 6(20%) had severe pain. In posttest 1, none of them had no pain in modified abbey pain scale, 4(13.3%) had mild pain, 22(73.3%) had moderate pain and 4(13.3%) had severe pain. In numerical pain scale none of them had no pain, 3(10%) had mild pain, 21(70%) moderate pain and 6(20%) had severe pain. In posttest 2, none of them had no pain in modified abbey pain scale, 3(10%) had mild pain, 23(76.7%) had moderate pain and 4(13.3%) had severe pain. In numerical pain scale none of them had no pain, 4(13.3%) had mild pain, 22(73.3%) moderate pain and 4(13.3%) had severe pain. In posttest 3, none of them had no pain in modified abbey pain scale, 2(6.7%) had mild pain, 24(80%) had moderate pain and 4(13.3%) had severe pain. In numerical pain scale none of them had no pain, 3(10%) had mild pain, 22(73.3%) moderate pain and 5(16.7%) had severe pain.

The mean and standard deviation of Modified Abbey pain scale score and numerical pain scale score. The table reveals that the pretest mean value of Arteriovenous Fistula puncture related pain using modified Abbey pain scale in the experimental group was 6.57 with SD 1.75, posttest 1 mean was 3.37 with SD 1.24, post test 2 mean was 3.06 with SD 1.5 and post test 3 mean value was 2.4 with SD 1.40 respectively. The pretest mean value of Arteriovenous Fistula puncture related pain using numerical pain scale in the experimental group was 5.83 with SD 1.5, post test 1 mean was 3.23 with SD 1.1, post test 2 mean was 2.97 with SD 1.1 and post test 3 mean value was 2.23 with SD 1.02 respectively. The pretest mean value of Arteriovenous Fistula puncture related pain using modified Abbey pain scale in the control group was 6.6 with SD 1.37, post test 1 mean was 6.3 with SD 1.96, post test 2 mean was 6.5 with SD 1.9 and post test 3 mean value was 6.2 with SD 1.6 respectively. The pretest mean value of Arteriovenous Fistula puncture related pain using numerical pain scale in the experimental group was 5.2 with SD 1.4, post test 1 mean was 5.23 with SD 1.5, post test 2 mean was 4.93 with SD 1.4 and post test 3 mean value was 5.2 with SD 1.51 respectively

The second objective was to evaluate the effectiveness of Valsalva maneuver on level of pain during Arteriovenous Fistula Puncture in experimental group. The comparison of pre test and post test Arteriovenous Fistula puncture related pain using Numerical pain scale among hemodialysis patients in experimental group. The pretest mean value of Arteriovenous fistula puncture related pain using Numerical pain was 5.83 with SD 1.5 and post test 1 mean was 3.23 with SD 1.1 and calculated t value was 15.2. The post test 2 mean was 2.97 with SD 1.1 and calculated t value was 17.5. The post test 3 mean was 2.23 with SD 1.02 and calculated t value 21.1. The calculated t value is greater than tabulated value of t =2.05 at 5% level of significance. So the null hypothesis is rejected. There is a significant difference between pretest and post test level of Arteriovenous Fistula puncture related pain among

hemodialysis patients in experimental group. Hence the researcher concluded that the Valsalva maneuver is effective in reducing Arteriovenous Fistula puncture related pain.

The third objective was to compare the level of pain during Arteriovenous Fistula Puncture between experimental and control group. The comparison of the post test level of Modified Abbey pain assessment scale score among hemodialysis patients between the experimental and control group. While comparing the post test 3 Modified Abbey pain assessment scale score between the experimental and control group, mean in experimental group was 2.4 with SD 1.40 and mean in control group was 6.2 with SD 1.6 and calculated t value is 9.5. The calculated value of t is greater than tabulated value of t = 2.05 at 5 % level of significance. Hence null hypothesis is rejected. There is a significant difference between post test level of Arteriovenous fistula puncture related pain among hemodialysis patients in experimental and control group. the comparison of the post test level of Numerical pain scale score among hemodialysis patients between the experimental and control group. While comparing the post test 3 Numerical pain scale score between the experimental and control group mean in experimental group was 2.23 with SD 1.02 and mean in control group was 5.2 with SD 1.51 and calculated t value is 8.74. The calculated value of t is greater than tabulated value of t = 2.05 at 5 % level of significance. Hence null hypothesis is rejected. There is a significant difference between post test level of Arteriovenous fistula puncture related pain among hemodialysis patients in experimental and control group.

The fourth objective is to compare subjective and objective pain between experimental and control group the comparison of pre test and the post test Arteriovenous Fistula puncture related pain using modified Abbey pain assessment scale and Numerical pain scale among hemodialysis patients in the experimental group. The pretest modified Abbey pain scale mean score was 6.57 with SD 1.75 and numerical pain scale mean was 5.83 with SD 1.50 and calculated t value is 1.86. The post test 1 modified Abbey pain assessment scale mean score was 3.37 with SD 1.24 and numerical pain scale mean was 3.23 with SD 1.1 and calculated t value is 0.42. Post test 2 modified Abbey pain assessment scale mean score was 3.06 with SD 1.5 and numerical pain scale mean was 2.97 with SD 1.1 and calculated t value is 0.29. Post test 3 modified Abbey pain assessment scale mean score was 2.4 with SD 1.40 and numerical pain scale mean was 2.23 with SD 1.02 and calculated t value is 0.52. The calculated t value is lesser than tabulated value of t =2.05 at 5% level of significance. So the null hypothesis was accepted. There is a no significant difference between Modified Abbey pain assessment scale and Numerical pain scale scores. Hence the researcher came to a conclusion that there is a no significant difference between Modified Abbey pain assessment scale and Numerical pain scale scores.

The fifth objective was to associate the findings with selected demographic and clinical variables. The association of level of pain with demographic variables such as age, gender, occupation, educational status and marital status and clinical variables such as presence of other chronic diseases, duration of Chronic Kidney Disease, duration of hemodialysis, frequency of hemodialysis per week and duration of functioning AV Fistula. Association was found by using chi square test. The result shows that there is an association between the age and presence of other chronic illness with the level of Arteriovenous Fistula puncture related pain.

CONCLUSION

Pain is a recurring event in dialysis patients which is considered to be the primary factor contributing to reductions in quality of life among renal failure patients. The pain felt by patients on hemodialysis makes the patient extremely inactive. Their functional aspects and quality of life are reduced compared to healthy individuals.

Arteriovenous fistula is an inevitable element in the care of hemodialysis patients. Valsalva maneuver on reducing the pain at the Arteriovenous fistula puncture site among patients undergoing hemodialysis. Valsalva maneuver was associated with significant decreases in both the subjective and objective parameters of pain measurements. Valsalva maneuver can effectively reduce the sensation of pain from venipuncture among patient with Arteriovenous fistula and patients undergoing hemodialysis. Valsalva maneuver was a safe, simple and non pharmacological management and it helps to improve the quality of life of hemodialysis patients.

LIMITATIONS

- Sample size of this study was too small which limits the generalization of the study findings.
- The long term outcome of the effectiveness of Valsalva maneuver could not be evaluated in this study because of time constraints.

RECOMMENDATIONS

This study recommends the following for further research.

- The study can be replicated by using a large sample thereby findings can be generalized.
- Studies can be conducted to assess the factors that cause pain caused by Arteriovenous Fistula puncture among hemodialysis patients.
- Comparative study could be conducted between the Valsalva maneuver with other therapies.
- The study could be conducted on patients with pain due to other types of cannulation.
- A cross over study could be conducted between the pharmacological intervention and Valsalva maneuver.
- Similar research study could be conducted to reduce pain among post operative patients.

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