Heart Failure Versus Renal Failure Patients in Relation to Outcomes of Alternate Nostril Breathing: Comparative Study

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Abstract

Background: Heart failure and renal failure patients have limited physical activity and decreased quality of life. Alternate-nostril breathing is a breathing that reduces bad progression to their disease by regular practicing. **Aim:** Was to evaluate the effect of alternate nostril breathing exercise on heart failure and renal failure patients' outcomes. **Design**: Quasi-experimental comparative design was utilized to achieve the aim of this study. **Setting**: The study was conducted in cardiac care unit and hemodialysis unit at Benha University Hospital. **Sample**: Purposive sample (70 heart failure patients &70 renal failure patients) was included in this study. **Tools**: Four tools were used, tool I: Patients' interview questionnaire, tool II: Physiologic parameters assessment, tool III: Sleep quality scale and tool IV: Fatigue assessment scale. **Results**: There were highly statistical significant differences in patients' outcomes between pre ANB intervention as compared to after 1 month and 3 months intervention among heart failure and renal failure patients as ($p \leq 0.001$) which were presented by physiologic parameters, sleep quality and fatigue level. **Conclusion:** Alternate nostril breathing exercise has been shown significantly improvement of outcomes among heart failure & renal failure patients while renal failure patients' outcomes have been shown higher improvement. **Recommendations:** Hospitals are recommended to implement the alternate-nostril breathing exercise alongside other treatments to improve heart failure & renal failure patients' outcomes as well as, for other patients with chronic illness.

Keywords: Heart failure patients, Renal failure patients, Patients' outcomes, Alternate nostril breathing.

Introduction

Chronic heart failure (CHF) is a chronic, progressive disease that develops when the heart doesn't pump enough blood for body's needs, it commonly caused by coronary heart disease, heart inflammation, high blood pressure and cardiomyopathy, its symptoms include dyspnea, fatigue, insomnia, edema, pain, exercise intolerance, these symptoms significantly has multiple consequences on a patient's quality of life and decrease energy levels. Pharmacological and nonpharmacological treatments for heart failure with proven beneficial effects on clinical outcomes **(Salzano, et al., 2021)**.

Chronic kidney disease (CKD) is a condition characterized by a gradual loss of kidney function over time, it commonly caused by glomerulonephritis, inherited diseases as polycystic kidney disease, urinary tract infection and obstructions caused by kidney stones or tumors can cause kidney damage. Symptoms like high blood pressure, anemia, fatigue, insomnia, swollen feet and pain. Treatment of renal disease include pharmacological with non-pharmacological

treatment, dialysis and kidney transplantation **(Li, Wang & Sun, 2021)**.

Alternate nostril breathing (ANB) is easy to learn, it produces consistent positive physiological changes. Patient take on the comfortable position where the back can be kept straight, then take breath in through the left nostril and having retained it according to his capacity, should exhale through the right nostril. Then again fill in the thoracic cavity by taking in breath through the right nostril and breathe out through the left nostril after holding it according to his capacity. This is one round of ANB. Patient should follow the exercise four times a day and gradually increase the rounds **(Kanorewala & Suryawanshi, 2022)**.

Patients' outcomes are the results for the patients receiving care as vital signs and other important tests. This provides nurses with a new perspective by helping them to understand all the components within the concept of patient outcomes. Use of patient-reported outcomes is an essential aspect for improving clinical care, because will lead to an understanding of the effects of treatments on outcomes and quality of life (QOL) of patients. **(Hopper, et al., 2019)**.

Significance of the study

Heart Failure is a growing national and global health problem impacting over 5.5 million Americans and 26 million people worldwide with a projected increase in prevalence of 46% in the next 10 years **(Koshy, et al., 2020)**. Chronic kidney disease is a progressive disease that affects more than10% of the general population worldwide, reaching to 800 million individuals; it has appeared as one of the leading causes of mortality worldwide. The great number of affected persons and the major adverse effect of chronic kidney disease should execute enhanced efforts for better prevention and treatment **(Kovesdy, 2022)**.

From the clinical experience observation situation, the researcher noticed that there is many health problems accompanied with heart and renal failure patients at Benha University Hospital as fatigue, pain, decrease cardiorespiratory function, sleep disturbance and the total number of patients admitted at both cardiac and hemodialysis units at the last three years (2020, 2021, 2022) were approximately (566, 480, 458) and (1271, 623, 487) patients respectively **(Statistical office in Benha University Hospital, 2022)**.

Research aim:

The aim of this study was to evaluate the effect of alternate nostril breathing exercise on heart failure and renal failure patients' outcomes.

Research hypotheses:

H_1: Patients' physiological parameters could be significantly improved after application of the alternate nostril breathing exercise than before.

H_2: Patients' quality of sleep could be significantly improved after application of the alternate nostril breathing exercise than before.

H_3: Patients' fatigue pattern could be significantly decreased after application of the alternate nostril breathing exercise than before.

Operational definition:

- **Patients' outcomes:** In this study, patients' outcomes refer to physiological parameters, quality of sleep and fatigue level.

Subjects and Method

Design: Quasi-experimental comparative design was utilized to achieve the aim of this study.

Research setting:

This study was conducted in cardiac care unit (CCU) and hemodialysis unit at Benha University Hospital, Qalyubia Governorate, Egypt. The CCU locates in the third floor of the medical building. Hemodialysis Unit locates in second floor of the medical building.

Subjects:

Purposive sample of 70 HF conscious adult patients & 70 RF conscious adult patients, their age ranged from 20- 60 years old from both sexes during the time of data collection who are able to communicate and agree to participate in this study, using the following equation $n=\frac{n\times p(1-p)}{[N-1\times(d^2\div z^2)]+p(1-p)}$ **(Sharma, et al., 2020)**.

The inclusion criteria:

Patients that able to implement the alternate nostril breathing exercise.

-Free from mental illness

-Free from neuromuscular diseases

-Free from serious lung problems as pulmonary fibrosis

-Free from severe asthma attack

The exclusion criteria:

-Patients with severe systemic disorders

-Patients with communication disorders

-Patients with nasal pathology

-Chronic smokers

-Patients with malignant hypertension

-Patients with vertebral deformities.

Tools for data collection

Tool I: Patients' interview questionnaire: It aimed to assess personal and medical data, adapted from **(Pretto, et al., 2020, Karadag & Baglama, 2019**, **& Suhardjono, et al., 2019)**. It included two parts as the following:

Part one: Concerning personal data for patient including age, sex, marital status, level of education, occupation and residence. It contained 6 questions.

Part two: Regarding patients' medical data including diagnosis, complain, length of the disease, patients' present and past medical & surgical history. It included 8 questions.

Tool II: Physiologic parameters assessment: It included patients' heart rate, respiratory rate, systolic blood pressure and diastolic blood pressure, adopted from **(Jayawardena, et al., 2020).** It included 4 items.

Tool III: - Pittsburgh Sleep Quality Index (PSQI): This scale was used to assess patients' quality of sleep in the adults, adapted from **(Lin, et al., 2019)**. It included 11 items

Scoring system: The PSQI consists eleven components (each scored from 0 to 3) 0 (no difficulty), 1 (low difficulty), 2 (moderate difficulty) to 3 (severe difficulty). The global PSQI consists of seven components only and is modified to eleven components.

Tool IV: Fatigue Assessment Scale: It was used to assess patients' fatigue and to evaluate the ability of the patient to cope in different activities, adopted from **(Hamed & Mohamed Abdel Aziz, 2020)**. It contained 10 items

Scoring system: The 5-point rating scale varies from 1= never, 2 = sometimes; 3 = regularly; 4 = often and 5 = always. The total score comes out adding the score of each question. (1-2) low fatigue level, (3) moderate fatigue level & (4-5) high fatigue level.

Tools validity:

The face and content validity of the tools were checked by five experts in the field of Medical Surgical Nursing from the Faculty of Nursing, Benha University, the consensus among experts regarding the tools was between 98% to 100% for most items

Reliability of tools:

Cronbach's alpha for physiologic parameters assessment was (r= 0.711 (HF), (r= 0.642 (RF), for sleep quality scale was (r= 0.754 (HF), (r= 0.791 (RF) and for fatigue assessment scale was (r= 0.771 (HF), (r= 0.814 (RF)

Ethical considerations:

This study was conducted after primary approval obtained from Ethics Committee of Faculty of Nursing, Benha University. Then, official permission was obtained from medical director and head of Cardiac Care Unit and

Hemodialysis Unit at Benha University Hospital. The researcher assured patients that all collected data would be absolutely confidential and used only for their benefit and for the purpose of the study and that they had the right to withdraw at any time without any consequences.

Pilot study:

A pilot study was conducted on **10%** of the study sample (7 patients with heart failure and 7 patients with renal failure) of the total studied patients. No modifications were done so the patients involved in the pilot study were included in the main study sample.

Field work:

Data collection:

The data collection process was performed over a period of six months, started from January till the end of June 2023. The study was conducted through the following four phases: Assessment phase: During this phase, the researcher assessed heart and renal failure patients by using tools of data collections. Planning phase: The patients' booklet developed by the researcher regarding alternate nostril breathing exercise. Implementation phase: The researcher attended three days/week, divided the HF into 10 subgroups and RF patients into 10 subgroups, each group contained seven patients in every session and the technique implementation was carried out for each group through the conduction of three sessions during their hospital stay and the booklet was given to them to guide them in ANB practice. Evaluation phase: The posttest was done by using the same study tools of the pretest for patients after 1 month and 3 months of using ANB exercise to determine the effect of alternate nostril breathing exercise technique.

Results

Table (1) shows that, the mean age of the heart failure and renal failure patients were 43.72 ± 8.64 and 40.78 ± 9.49 respectively, while 51.4% of HF patients were females and 61.4% of RF patients respectively were males respectively, 68.6% and 64.3% of them respectively were married.

Table (2) shows that, 72.9% & 42.9% of the heart failure and renal failure patients had the disease for more than 2 years and 60% & 72.9% of them respectively had other diseases.

Table (3) shows that mean physiologic parameters measurement was improved for both groups but improved more in RF compared to HF patients, pre ANB, after one month and after 3 months, mean heart rate (HR) of HF patients was 116.77±8.39, 94.14±6.70 & 88.14± 6.20 respectively as compared to 119.15±12.01, 87.02±6.49 & 79.30±6.68 among RF patients respectively. In addition, there were highly significant statistical differences between pre ANB intervention as compared to after 1 month and 3 months intervention among both HF & RF patients ($p < 0.001$).

Figure (1) illustrates that 65.7% of HF patients had severe sleep difficulty in pre ANB intervention then became 20% after 1 month then 2.9% after 3 months of ANB intervention, as compared to 30% among RF patients in pre ANB intervention then became 4.3% after 1 month then 2.9% after 3 months of ANB intervention. It is apparent that HF patients had more severe sleep difficulty than RF patients.

Figure (2) illustrates that total fatigue level in HF patients was high (always bothered by fatigue) in 48.6% in pre ANB intervention then became 8.6% after 1 month then 7.1% after 3 months of ANB intervention, as compared to 30% in pre ANB intervention then became 2.9% after 1 month then 1.4% after 3 months of ANB intervention among RF patients. It is apparent that fatigue level among HF patients is higher than RF patients.

Table (4) shows that there was high significant statistical positive correlation between total sleep quality level and total fatigue level among

HF & RF patients pre ANB intervention ($p < 0.001$) and there was no significant statistical correlation between them after 1 month of ANB intervention while there was significant statistical positive correlation between them among HF patients only after 3 month of ANB intervention ($p<0.05$), r (.541, .592, .222, .141, .284, .204).

Table (5) multivariate linear regression analysis in this table reveals that sleep quality among studied patients with heart failure was best predicted by length of disease (p= 0.022* respectively), accounting for 0.046 % of the variance of sleep quality as well as was best predicted among studies patients with renal failure by length of disease (p= 0.009*) accounting for 0.022 % of the variance through the follow-up phase.

Table (6) multivariate linear regression analysis in this table reveals that fatigue level among studied patients with heart failure was best predicted by age and length of disease (p= 0.007*& 0.021* respectively), accounting for 0.465% of the variance of total fatigue level as well as was best predicted among studied patients with renal failure by length of disease (p= 0.046*) accounting for 0.255% of the variance through the follow-up phase.

Table (1): Distribution of the studied patients regarding their personal data (N=140).

Patients' personal data	Heart failure (N=70)		Renal failure (N=70)		X^2	p-value
	No	%	No	%		
Age (in year)						
20 - < 30	4	5.7	9	12.9	5.428	.143
30 - < 40	19	27.1	27	38.6		
40 - < 50	23	32.9	16	22.9		
50 - 60	24	34.3	18	25.7		
Min –Max	**23 - 58**		**25 - 58**			
Mean ±SD	**43.72 ± 8.64**		**40.78 ± 9.49**			
Gender						
Male	34	48.6	43	61.4	.029	.866
Female	36	51.4	27	38.6		
Marital status						
Single	4	5.7	7	10.0	3.486	.323
Married	48	68.6	45	64.3		
Widow	16	22.9	12	17.1		
Divorced	2	2.9	6	8.6		
Educational level						
Don't read and write	10	14.3	11	15.7	.901	.825
Read and write	10	14.3	7	10.0		
Intermediate education	37	52.9	36	51.4		
University education	13	18.6	16	22.9		
Occupation						
Office work	16	22.9	18	25.7	1.065	.587
Manual work	21	30.0	25	35.7		
Don't work	33	47.1	27	38.6		
Residence						
Rural	49	70.0	45	64.3	.518	.472
Urban	21	30.0	25	35.7		

Table (2): Distribution of the studied patients regarding their medical data (N=140).

Patients' medical data	Heart failure (N=70)		Renal failure (N=70)		X^2	p-value
	No	%	No	%		
Length of the disease					12.95	.002*
< 1 year	9	12.9	20	28.6		
1-2 years	10	14.3	20	28.6		
> 2 years	51	72.9	30	42.9		
Have other diseases						
Yes	42	60.0	51	72.9	2.594	.107
No	28	40.0	19	27.1		
What's disease	**(N=42)**		**(N=51)**			
Diabetes mellitus	17	40.5	12	23.5		
Hypertension	15	35.7	18	35.3		
Lung diseases	5	11.9	14	27.5		
Liver diseases	5	11.9	7	13.7		
Have surgical history						
Yes	55	78.6	56	80.0	0.043	.835
No	15	21.4	14	20.0		
Type of surgery	**(N=55)**		**(N=56)**			
Cardiac catheterization	42	76.4	0	0.0		
Cardiac stent	13	23.6	14	25.0		
Kidney stone surgery	0	0.0	28	50.0		
Ureteral dilatation	0	0.0	14	25.0		
Family history						
Yes	21	30.0	15	21.4	1.346	.246
No	49	70.0	55	78.6		

Table (3): Mean physiological parameters measurement of the studied patients pre and post intervention (N=140).

Physiologic parameters	Pre				After 1 month				After 3 month			
	Heart failure		Renal failure		Heart failure		Renal failure		Heart failure		Renal failure	
	Mean	±SD	Mean	±SD	Mean	±SD	Mean	±SD	Mean	±SD	Mean	±SD
Heart rate	116.77	8.39	119.15	12.01	94.14	6.70	87.02	6.49	88.14	6.20	79.30	6.68
t test / p-value	1.362		.175		6.426		.000**		8.111		.000**	
Respiratory rate	25.52	2.78	25.55	2.49	19.27	1.00	16.66	1.40	17.44	.89	14.50	1.38
t test / p-value	0.064		.949		12.731		.000**		14.965		.000**	
Systolic BP	167.00	13.17	157.14	10.48	135.42	4.40	127.31	7.25	128.64	5.10	121.35	6.25
t test / p-value	4.900		.000**		8.099		.000**		7.555		.000**	
Diastolic BP	107.50	8.71	105.21	7.04	87.14	2.49	83.33	3.39	83.35	2.36	79.85	4.58
t test / p-value	1.707		.090		7.666		.000**		5.679		.000**	

Independent t test was used ****highly significance P <0.001**

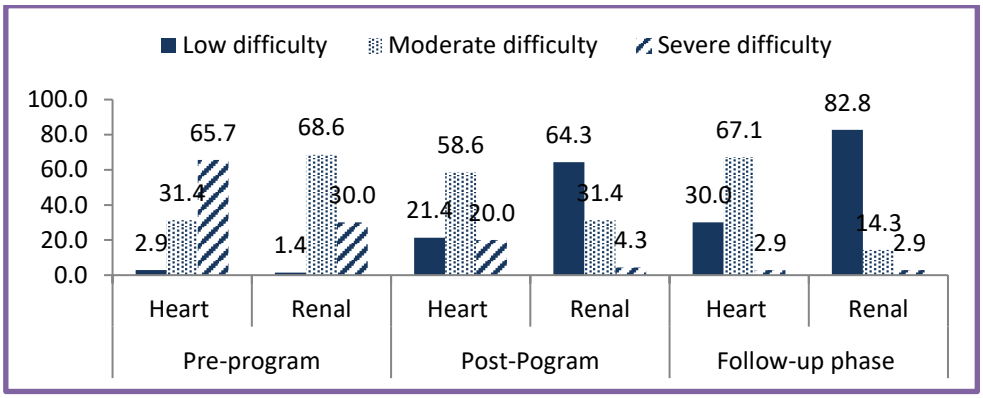

Figure (1): Percentage distribution of the studied patients regarding their total sleep quality pre and post intervention (N=140).

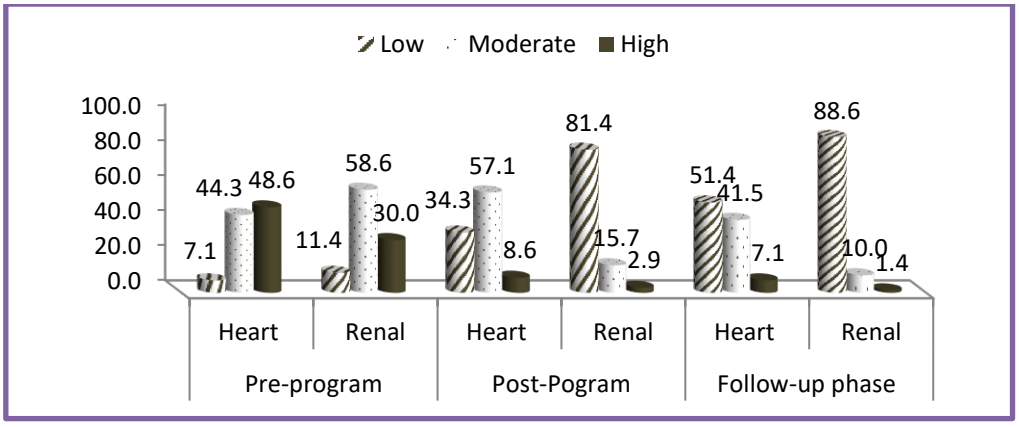

Figure (2): Percentage distribution of the studied patients regarding their total fatigue level pre and post intervention (N=140).

Table (4): Correlation between total sleep quality and total fatigue level among the studied patients pre and post intervention (N=140).

Items		Total Sleep quality					
		Pre		After 1 month		After 3 month	
		Heart failure	Renal failure	Heart failure	Renal failure	Heart failure	Renal failure
Total Fatigue level	r	.541	.592	.222	.141	.284	.204
	p-value	.000**	.000**	.065	.246	.017*	.091

****highly significance P<0.001 * statistical significance P < 0.05**

Table (5): Multiple Linear Regression Analysis for Predictor Variables of total sleep quality among the studied patients post three months of ANB intervention (n=140).

Predictor variables	Heart failure					Renal failure				
	Standardized Coefficients		Unstandardized Coefficients			Standardized Coefficients		Unstandardized Coefficients		
	B	SEB	Beta	t	Sig.	B	SEB	Beta	t	Sig.
(Constant)	32.769	30.964		1.058	.294	-7.504	12.719		-.590-	.557
Age	-.013	.109	-.023	-.124	.902	.097	.069	.237	1.391	.169
Gender	.474	1.400	.046	.338	.736	1.009	1.007	.131	1.002	.320
Have other diseases	-1.927	1.454	-.185	-1.325	.190	-.405	1.136	-.047	-.357	.723
length of the disease	-3.927	1.654	-.375	-2.525	.022*	.618	.332	.338	2.654	.009*
Have surgical operation	-4.293	1.944	-.345	-2.208	.031*	-.510	1.335	-.053	-.382	.704
Heart rate	.045	.105	.055	.431	.668	.083	.072	.143	1.144	.257
Respiratory rate	-.829	.738	-.144	-1.124	.266	-.154	.360	-.055	-.426	.672
Systolic BP	.036	.245	.036	.149	.882	.222	.264	.358	.841	.404
Diastolic BP	.016	.533	.007	.030	.976	-.190	.360	-.225	-.528-	.599
Regression=	Adjusted R^2 =0.046 p value=.223					Adjusted R^2 =0.022 p value=0.586				

Dependent Variable: Sleep quality score (**) Highly significant statistically (*) Significant statistically (B): Beta Co-Efficient (SEB): Standard Error

Table (6): Multiple Linear Regression Analysis for Predictor Variables of total fatigue level among the studied patients post three months of ANB intervention (n=140).

Predictor variables	Heart failure					Renal failure				
	Standardized Coefficients		Unstandardized Coefficients			Standardized Coefficients		Unstandardized Coefficients		
	B	SEB	Beta	t	Sig.	B	SEB	Beta	t	Sig.
(Constant)	33.510	13.959		2.401	.019	8.327	5.455		1.527	.132
Age	.139	.049	.415	2.819	.007*	-.005	.030	-.026-	-.166-	.868
Gender	.669	.631	.117	1.060	.293	.852	.432	.236	1.973	.053
Have other diseases	-.685	.656	-.117-	-1.046	.300	.810	.487	.200	1.663	.102
length of the disease	-4.927	1.854	-.385	-2.325	.021*	.599	.329	.287	1.874	.046*
Have surgical operation	-2.261	.876	-.323-	-2.580	.012*	-.113	.573	-.025	-.197	.844
Heart rate	.066	.047	.142	1.394	.168	-.009	.031	-.034	-.297	.768
Respiratory rate	.157	.333	.049	.472	.639	.112	.155	.085	.726	.470
Systolic BP	-.006	.110	-.010-	-.053	.958	.118	.113	.406	1.042	.302
Diastolic BP	-.224	.240	-.183-	-.932	.355	-.054	.155	-.136	-.349	.728
Regression=	Adjusted R^2=0.465 p value=.000**					Adjusted R^2 =0.255 p value=0.028*				

Dependent Variable: Fatigue level score (**) Highly significant statistically
(*) Significant statistically (B): Beta Co-Efficient (SEB): Standard Error

Discussion

Heart failure and renal failure diseases have become the most common health problems in both the developing and the developed countries. Alternate nostril breathing (ANB) is recognized as the most beneficial complementary and alternative therapy, it improves symptoms of atrial fibrillation, anxiety, depression, fatigue, enhances cardiorespiratory system, pulmonary functions, blood pressure, heart rate, improve modifiable risk factors for cardiovascular diseases and renal failure diseases with the pharmacological treatment **(Chandrababu, et al., 2019)**.

Regarding age, results of the present study revealed that more than one third of heart failure patients' age ranged between fifty to sixty years old with mean age **(43.72 ± 8.64)** years. The reason for this may be due to heart failure is common in middle and old age than young age.

This finding is in line with a study carried out by **Mahdavikian, et al., (2021)** about "Comparing the effect of aromatherapy with peppermint and lavender essential oils on fatigue of cardiac patients" in Iran revealed that more than half of heart failure patients were 50-65 years old. While more than one third of renal failure patients were aged from thirty to less than forty years old with mean age **(40.78 ± 9.49)** years, this result is incongruent with **Hamed & Mohamed (2020)** who made a study about " Effect of deep breathing exercise training on fatigue level among maintenance hemodialysis patients" in Alexandria, Egypt revealed that more than half of the renal failure patients' age was between 50-60 years old.

Regarding gender, the results of the present study revealed that more than half of heart failure patients were females, these results disagree with **Azeez, et al., (2021)** who studied "Effect of short-term yoga-based-breathing on peri-operative anxiety in patients undergoing cardiac surgery" in India and reported that more than half of heart failure patients were males.

While more than half of renal failure patients were males, these results agreed with **Kharbteng, (2020)** who conducted a study about "Effectiveness of a breathing training program on quality of life in patients with predialysis chronic kidney disease" in India and noted that more than half of renal failure patients were males.

In relation to patient' marital status, the results of the present study revealed that more than half of both heart failure and renal failure patients were married, these results agree with **Dionne-Odom, et al., (2020)** who performed a study about "Effects of a telehealth early palliative care intervention for family caregivers of persons with advanced heart failure" in Birmingham and concluded that the majority of heart failure patients were married. Also, this result agrees with **Sanad, (2023)** who stated in their study entitled "Effect of progressive muscle relaxation technique on sleep quality among hemodialysis patients" in Iran who mentioned that the majority of renal failure patients were married.

Regarding the length of the disease, results of the present study revealed that about three quarters of heart failure patients had the disease for more than two years because they need hospitalization due to deterioration of the disease, these results are on the same line with **Kavalieratos, et al., (2022)** in the study entitled "Primary palliative care for heart failure provided within ambulatory cardiology" in Emory who found that the majority of heart failure patients had the deteriorative degree of the disease for more than 2 years. While more than two fifth of renal failure patients had the disease for more than two years. But this result is incongruent with study done by **Sanad, (2023)** who reported that the majority of renal failure patients had the disease from 6 months to 1 year.

Concerning having other diseases, results of the present study revealed that more than half of heart failure and about three quarters of renal failure patients had other diseases as chronic disease affects negatively on other systems on the body, this result comes in the same line with **Hossein Pour, et al., (2020)** in their study about "The effect of inspiratory muscle training on fatigue and dyspnea in patients with heart failure" in Iran who reported that the majority of heart failure patients had other diseases. Also these results agree with **Kharbteng, et al., (2020)** who mentioned that the majority of renal failure patients had comorbidities.

As regards to mean physiologic parameters measurement, results of the current study illustrated that mean was significantly improved for both heart failure (HF) and renal failure patients (RF) after alternate nostril breathing (ANB) intervention and there were highly statistical significance differences between pre ANB intervention as compared to after 1 month and 3 months intervention in both HF & RF patients, as breathing exercises improve blood

flow to vital organs; these results agree with **Simandalahi, et al., (2019)** in the study entitled "The effect of alternate nostril breathing exercise in vital signs of congestive heart failure patients" in Indonesia who mentioned in their study that ANB play a role in stabilizing the vital sign of HF patients.

Also these results supported by **Rubio-López, et al., (2023)** in a study entitled "Role of breathing training programs on quality of life in chronic kidney disease patients" who showed that the mean of physiologic parameters was improved and there were statistical significant differences in physiologic parameters measurement after breathing training programs intervention.

In relation to total sleep quality of heart failure and renal failure patients, the present study illustrated that the majority of HF patients' total sleep quality was significantly improved from severe sleep difficulty to moderate sleep difficulty 1 month & 3 months after ANB intervention as breathing exercise techniques leads to muscle relaxation so improve sleep quality; these results supported by **Ghorbani, et al., (2019)** in a study entitled "The effects of deep-breathing exercises on postoperative sleep duration and quality in patients undergoing coronary artery bypass graft (CABG)", in Iran who revealed that deep breathing exercises improve sleep quality.

About sleep quality of renal failure patients, the results of the present study revealed that the majority of RF patients' total sleep quality was improved from severe sleep difficulty to mild sleep difficulty, this result is consistent with a study conducted by **Natale, et al., (2019)** in a study entitled "Interventions for improving sleep quality in people with chronic kidney disease" in Italy who reported that breathing and relaxation decreases sleep disturbance.

In relation to total fatigue level of heart failure and renal failure patients, the results of the present study revealed that, total fatigue level was high or always bothered by fatigue pre ANB intervention then became low fatigue level 1 month & 3 months post ANB intervention among both HF & RF patients; these results supported with **SE, (2021)** who done a study entitled "An evidence-based approach in the management of fatigue due to heart failure: breathing exercises" in Turkey and revealed that breathing exercises for HF patients decreases total fatigue level.

These results also agree with **Moussa, et al., (2022)** in a study entitled "Effect of different types of deep breathing training on functional capacity and fatigue level in hemodialysis patients" in Cairo, Egypt who documented that breathing exercises for RF patients improve functional capacity and decrease total fatigue level.

Regarding correlation between total sleep quality and total fatigue level among heart failure and renal failure patients, the results of the current study revealed that there was significant statistical positive correlation between total sleep quality level and total fatigue level among heart failure and renal failure patients pre and post ANB intervention, from the researcher point of view it occurs because poor sleep quality increases fatigue level, these results agree with **Hajj, et al., (2020)** in the study entitled "Sleep quality, fatigue, and quality of life in individuals with heart failure" in United States and the results revealed that there was a correlation between sleep quality and fatigue level among heart failure patients. These results also supported with **Rubio-López, et al., (2023)** in a study revealed that there was a correlation between sleep quality and fatigue level in chronic kidney disease patients pre and post breathing exercise intervention.

As for multiple linear regression analysis for predictor variables of sleep quality among the studied patients post three months of ANB intervention, the results of the present study revealed that sleep quality among heart failure

patients was best predicted by length of disease as by increasing disease duration, the sleep quality decreases in patients, these results agreed with **Kim, et al., (2019)** in a study entitled "Sleep duration and mortality in patients with coronary artery disease" in Atlanta who showed that there is a regression between sleep disturbances and length of disease of heart failure patients.

In relation to multiple linear regression analysis for predictor variables of sleep quality among renal failure patients post three months of ANB intervention, the results of the present study revealed that sleep quality among renal failure patients was best predicted by length of disease, these results agree with **Khosravizad, (2020)** who conducted a study entitled "Study the lifestyle of patients with chronic kidney failure" in Iran and revealed that there is a regression between sleep patterns, length and severity of the disease of renal failure patients.

Concerning multiple linear regression analysis for predictor variables of fatigue level among the studied patients post three months of ANB intervention, the results of the present study revealed that fatigue level among heart failure patients was best predicted by age, length of disease and surgical operation, as by increasing age, the fatigue level increases in patients, these results agree with **Bekfani, et al., (2020)** who carried out a study entitled "Skeletal muscle function, structure, and metabolism in patients with heart failure with reduced ejection fraction and heart failure with preserved ejection fraction" in Germany and stated that there is a regression between fatigue level, age and length or severity of the disease among heart failure patients.

Concerning multiple linear regression analysis for predictor variables of fatigue level among renal failure patients post three months of ANB intervention, the results of the present study revealed that fatigue level among renal failure patients was best predicted by length of disease these results agree with **Sarıaslan & Kavurmacı, (2020)** in a study entitled "Evaluation of healthy lifestyle behaviors and affecting factors of hemodialysis patients" in Turkey and reported that there is a regression between fatigue level and length of disease of renal failure patients.

Conclusions

- Applying of alternate nostril breathing exercise was very effective on improving heart failure and renal failure patients' physiological parameters, quality of sleep and fatigue level (patients' outcomes) as compared to pre alternate nostril breathing exercise application which supports the study hypotheses, while have been shown higher improvement among renal failure patients compared to heart failure patients.

Recommendations

-Alternate nostril breathing exercise recommended being involved as a nursing role for patients with heart failure (HF) and renal failure (RF) in the early course of the disease, so that patients can experience the maximum benefit.

-Replication of the study using a larger probability sample from different geographical areas to attain more generalizable results.

- Further studies may be needed to assess effect of using different non-pharmacological methods on improvement of HF & RF patients' outcomes.

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مرضى فشل القلب مقابل مرضى الفشل الكُلوي فيما يتعلق بنتائج التنفس الأنفي المتبادل: دراسة مقارنة

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التنفس الأنفي المتبادل هو تمرين تنفس فعال, له فوائد علاجية على وظائف القلب والجهاز التنفسي لكل من الأصحاء ومرضى فشل القلب والفشل الكُلوي، لذلك هدفت هذه الدراسة إلي تقييم تأثير تمارين التنفس الأنفي المتبادل على نتائج مرضى فشل القلب والفشل الكُلوي. تم استخدام تصميم دراسة مقارنة شبه تجريبية لتحقيق هدف هذه الدراسة. و تم إجراء هذه الدراسة في وحدة رعاية القلب ووحدة الغسيل الكُلوي بمستشفى بنها الجامعي, اشتملت عينة الدراسة على ٧٠ مريض قلب و ٧٠مريضا فشل كلوي من المرضى البالغين من كلا الجنسين الذين تتراوح أعمارهم بين ٢٠-٦٠ سنة؛ خلال فترة الدراسة. واظهرت النتائج فيما يتعلق بالمؤشرات الفسيولوجية وجودة النوم ومستوى التعب لدى مرضى فشل القلب والفشل الكُلوي أوضحت الدراسة أن هناك فرقاً إحصائياً كبيرا بينهم قبل ممارسة تمارين التنفس الأنفي المتبادل وبعد شهر من ممارستها و كذلك بعد ثلاثة أشهر من ممارسة التمارين.الاستنتاج: تمارين التنفس الأنفي المتبادل فعاله في تحسين المؤشرات الفسيولوجية وجودة النوم ومستوى التعب لمرضى فشل القلب والفشل الكُلوي بعد ممارسة التمارين مقارنة بما قبل ممارستها. واوصت الدراسة بإدراج ممارسة تمارين التنفس الأنفي المتبادل في خطة الرعاية التمريضية لمرضى فشل القلب والفشل الكُلوي في المراحل الأولى من تشخيص المرض، حتى يتم تحقيق أقصى إستفادة للمرضى.