

Effect of Alternate Nostrils Breathing Exercise on Selected Outcomes among Patients with Anemia

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Abstract

Background: Anemia is global health problem among population resulting in an impaired oxygen-carrying capacity to meet the tissues' physiological demands. Thus, Alternate Nostrils Breathing is one of the most beneficial, exercise that could improve health status. **Aim:** Was to evaluate the effect of Alternate Nostrils Breathing Exercise on selected outcomes among patients with anemia. **Design:** Quasi Experimental (Pre-Post) test, Non-equivalent control group design. **Sample:** Purposive sample of 60 patients their age was from 18 years old and had mild or moderate anemia. **Setting:** It was conducted at the Medical and Surgical Departments at one of an Educational Hospital (Kasr AL Ainy Hospital); Egypt **Tools: Tool (1)** Demographic Medical Data Form (DMDF). **Tool (2)** Research and Development (RAND) 36-Short Form Ver. 1.0. **Results:** Regarding demographic and medical parameters were homogenous. There was a statistically significant difference between the study and the control groups at post measurements with highly significant difference at the second post measurement regarding respiratory rate and oxygen saturation as (t-test=12.03 and 5.29 respectively; both was at p value=0.000). Moreover, health status total average mean scores of both study and control groups pre-test were homogenous as (t-test= 1.29 at p value=0.20). While there was a statistically significant mean of difference at post measurements with highest significant result at the second post measurement as (t-test= 13.33 at p value=0.000). **Conclusion:** Respiratory rate, oxygen saturation and health status parameters were improved for study group after implementation of Alternate Nostrils Breathing exercise. **Recommendations:** Practicing of Alternate Nostrils Breathing Exercise should take a place for patients with different types of anemia.

Keywords: *Alternate Nostrils Breathing Exercise, Anemia, O2 Saturation, Respiration rate & Health status parameters.*

Introduction

Anemia is the most common blood disorder that; occurs when number of red blood cells circulating in the body decreases. Other health conditions, such as those with interfering with the body's production of healthy red blood cells (RBCs) or in case of increasing the rate of the breakdown or loss of these cells can cause anemia. Also, anemia can lead to several symptoms that include; fatigue, shortness of breath, and lightheadedness. In Addition, there are several types of Anemia(s) but the most common types of Anemia (s) consist of; iron deficiency anemia, vitamin B12 deficiency anemia, aplastic anemia and hemolytic anemia (Goodwin & Lam, 2022).

Badireddy & Baradhi, (2022); standing on the National Cancer Institute; reported that anemia(s) in general is divided on four grades related to the Hemoglobin (Hgb) levels variable. It is graded as mild, moderate, severe and life threatening; that produced the following decreasing in Hgb. Levels: Mild: Hemoglobin 10.0 g/dL to lower limit of normal. Moderate: Hemoglobin 8.0 to 10.0 g/d. Severe: Hemoglobin 6.5 to 7.9 g/dL and Life-threatening:

considers when hemoglobin is less than 6.5 g/d. additionally; anemia is a well-recognized comorbidity in many chronic illnesses. It has been related to the increasing of mortality and morbidity rates that; including the increasing of healthcare costs and hospitalization, cardiovascular response during exercise, all of which might be impaired due to anemia has seldom been used for functional assessment (Guo, et al., 2015).

Dezube, (2021) Emphasized that anemia is a result of decreasing of Red Blood Cells, that might be caused by loss of blood or Iron deficiency...etc, consequently it causes shortness of breath & chest discomfort...etc. Besides, Sahoo (2021) underlined that Alternate Nostril Breathing regulates breath through the mouth and throat. It increases oxygenation in the lungs and has a relaxing effect on the nervous system which in turn improved patient's concentration and balances the energies. Garcia, et al. (2023) highlighted that, reliable researches related to anemia as one of the solitary causes of shortness of breath. Though, several studies were focusing on finding the link between decreasing of the physical function and oxygenation.

Actually; long time ago; as reported by **Solome & Aaron (2015)**; through their review articles over twenty-five researches related to breathing exercise reported that; there are variety of medical respiratory conditions with the aim of breathlessness management and symptom control, mobility and function improvement or maintenance, airway clearance and cough enhancement or support. Breathing exercises is used as strategy in Lung expansion therapy. Furthermore; **Garg (2022)** concluded that, there are several breathing exercises; the easiest one is Pursed Lip Breathing, Breath Focus Technique, Diaphragmatic Breathing, Lion's Breath, Resonant Breathing, Equal Breathing, Deep Breathing Sitali Breathing, Humming (Bee) Breath and Alternate Nostrils Breathing. Moreover, **WebMD (2021)** Added that based on the name of Alternate Nostril Breathing, focuses on practice of breathing through alternate nostrils, one side at a time. This breathing technique for both patients and persons can practice for a short time. In addition, researches show that practicing for 10 minutes brings its most benefits.

Also; **Barga, et al. (2022)** noted that Alternate Nostril Breathing practice, even have several physiological responses regarding healthy individuals; that; enable persons for controlling different diseases in addition to its specific effects on respiratory functions. Additional, doing breathing exercises through the left nostril increases parasympathetic activity as left nostril; decrease in systolic blood pressure, diastolic blood pressure and mean pulse rate/minute has been reported after five minutes of left nostril breathing exercise. Besides; the strength of respiratory muscles improves and cleanses respiratory secretions. On the other hand; there is a systematic use of diaphragmatic and abdominal muscles during the practicing, also; emptying and filling the respiratory apparatus with reduced viscous resistance and elasticity of the lung present during inspiration. Alternate Nostrils Breathing improves the capability of respiratory muscles and lung compliance, as it acts as a stimulus for various respiratory activities or lung functions, even lung surfactants released into alveolar spaces, which increases lung passivity.

Considering that; related studies for patients practicing breathing exercise were reported boosting in red blood cells count; which is essential for caring oxygen and the body's cells can get enough oxygen as well (**Gurrero, 2019**). So by considering that breathing exercise is a part of patients' daily practice that is guided by the nurses; it was relatively valuable to train patients with anemia by applying Nostrils breathing exercise; that is could improve patients with anemia (s) condition related to certain parameters (respiratory rate, oxygen saturation and health status

parameters) specially there are scanty related researches regarding Nostrils Breathing Exercise, particularly for patients with such a disease that has downside effect on the lung capacity; Thus; hopefully; this study might perform a role to share in building evidence among those with anemia; considering the benefits of Alternate Nostrils Breathing. Indeed, Alternate Nostrils Breathing could be counted as one of most beneficial, simple and safe breathing exercise.

Significance of the study:

According to World Health Organization (**WHO, 2019**), global anemia prevalence was 29.9%, while in Egypt was around 26%, Whereas according to an estimation by the same organization, up to 30% the world's population experience iron deficiency anemia (IDA) (**Kumar, et al., 2022**). Also, **Turner, et al., (2022)** reported that, the prevalence of anemia increases by age likewise, among older adult. Approximately, anemia represents one-third of patients who have nutritional deficiency, such as iron, folate, and vitamin B12 deficiency. Whereas, the second third have renal insufficiency and/or chronic inflammation whiles the third one has anemia that is unexplained.

Additionally; **Singh, (2022) & Cumpler, et al., (2022)**; stated that recently Alternate Nostrils Breathing is one of several breathing exercise that control Breathing. Correspondingly there are recently several of these breathing exercises that patients with anemia can get benefit through; as it improves the lung capacity, enhances respiratory endurance, improves the oxygen level that bound with blood and increase the Hemoglobin (Hgb.) level consequently over time; besides promote overall well-being; specially for non-advanced anemia that is mostly related to iron deficiency or poor nutrient intake **Ghiya, (2017)** reported that forty four research papers corroborated that none of the study volunteers experienced any side effects from practicing Alternate Nostrils Breathing Exercise, and all patients have been able to share in the exercise.

Moreover, the current researchers claimed that; tremendous patients with anemia have various underlining causes but presents asymptomatic anemia and as a part of the nursing role those patients preferably to be retrieved before the anemic condition becomes symptomatic and lead to further complications that might cause a serious illness. Particularly; Alternate Nostrils Breathing exercise recently is considered one of the breathing exercises that nurses can apply it as one of the nursing roles that could be applied efficiently with several diseases as it considers a priceless for patients that could improve several patients' health status with

symptomatic and a symptomatic anemia. The current breathing exercise is counted as easy practice for those patients with anemia (s). As (Singh, 2022) added that this technique involves breathing from one nostril to the next. On the inhale, that holds the breath for a brief period of time). So; hopefully that Alternate Nostrils Breathing Exercise; might improve patients' health with mild/moderate anemia; by being reflected on their selected outcomes of respiration, oxygen saturation and health status parameters. In deed Alternate Nostrils Breathing exercise has a real bound to improve body function as it has direct and indirect link to improve body conditions by enhancing the lung capacity; that nourish the body systems with oxygen.

Operational Definitions:

Selected outcomes:

Vital signs related to respiratory rate that measured by counting breathing over one minutes/each and oxygen saturation measured by using standardized portable pulse oximetry device.

Health status: In the current study referred to various health status parameters as physical status, role limitations caused by physical and emotional problems, social status, emotional well-being, fatigue, pain that measured by Research and Development Tool (RAND) 36-SF Ver. 1.0.

Subjects & Methods:

Aim of the study:

The aim of the current study was to evaluate the effect of Alternate Nostrils Breathing Exercise on selected outcomes (respiratory rate, oxygen saturation and health status parameters) among patients with anemia.

Research Hypotheses:

H1: Study group who performs Alternate Nostrils Breathing Exercise would have a significant different total respiratory rate mean scores than the control group who receives routine hospital care only.

H2: Study group who performs Alternate Nostrils Breathing Exercise would have a significant different total oxygen saturation mean scores than the control group who receives routine hospital care only.

H3: Study group who performs Alternate Nostrils Breathing Exercise would have a significant different total health status parameter(s) mean scores than the control group who receives routine hospital care only.

Research design:

Quasi Experimental (Pre-Post) test, Non-equivalent control group design was utilized for the current study. Initially; the study and control groups received

the pre assessments form; then post 1 and post 2 with times interval. The study and the control groups have been given the routine treatment equally, besides that; the study group was received the experimental treatment; knowing that the given treatment in the current study; represented the Alternate Nostrils Breathing Exercise.

Schematic presentation of research design

Groups	Pre (1 st reading) Before proceeding the study	Treatment	Post 1 (2 nd reading) After 5 days	Post-2 (3 rd reading) After 10 days
Control	X	Routine Hospital care only (Over 10 days)	X	X
Study	X	Alternate Nostrils Breathing + Routine Hospital care (Over 10 days)	X	X

Setting:

The study was conducted at the medical and surgical departments at one of an Educational Hospital (Kasr AL Ainy Hospital); Egypt. Each department includes right and left sides with 24 beds/side in addition to 3 private rooms each one contains 2-3 beds. Section always at its low busy capacity as it considers limited flow.

Sample:

Purposive sample of total 60 adult male and female patients their age was starting from 18 years old; they had mild or moderate anemia over six consecutive months were enrolled in the current study. **Inclusion criteria;** patients who had Mild/Grade 1: Hemoglobin 10.0 g/dL to lower limit of normal. Moderate: Hemoglobin 8.0 to 10.0 g/d., the anemia(s) grades were built on **Badireddy & Baradhi, (2022)**. **Exclusion criteria;** severe anemia, patients with bleeding or undertaking of any medication that boosts the immunity or with any advanced symptomatic diseases that affected the pulmonary functions (cardiovascular, pulmonary, renal...etc diseases, or uncontrolled diabetes mellitus or patients who were unconscious or unable to communicate, patients with high fever's grades or common cold, influenza. Also; any patient with surgical procedure or surgery that might hinder the upper and/or lower air ways have been excluded.

Tools:

In order to achieve the purpose of the current research the following two tools were used as follows:

Tool (1): Demographic Medical Data Form (DMDF) was constructed by the researchers that included two parts. **Part (a):** Contained Demographic data as participant code, age, gender, education...etc; while; **Part (b):** Included; medical data form; as the diagnosis, medication...etc. Selected vital signs (Respiratory rate, pulse rate & oxygen saturation)

Tool (2): Research and Development (RAND) 36-Short Form Version (1.0) (Sherbourne & Hays, 1993); it aims to measure patients' health from different perspectives. It is perchance the most widely used for health in the world. It is comprised of 36 items that assess eight health concepts: physical functioning, role limitations caused by physical health problems, role limitations caused by emotional problems, social functioning, emotional well-being, energy/fatigue, pain, and general health perceptions, in addition to a single item that represents of the perceived change in the general health.

RAND 36-SF. Ver. 1.0 Item's Health is two-steps process. First step, recoded numeric values were recoded per the scoring key given in. All the items were scored so that a high score defines a more favorable health state. In addition, each item was scored on a grade from 0 to 100 range so that the lowest and highest possible scores have been set at 0 and 100, respectively. Scores represent the percentage of total possible score achieved. In the second step, items in the same scale were averaged together to create the 8 scale scores. Also, the missing data would not be counted, when calculating the scale scores. In addition, the scale scores represent the average for all items in the scale that the respondent answered.

The calculation is as follow; Items tool's questions numbers' consequently: Questions numbers (QN) of (1,2,20,22,34 and 36) at the original tool's scaled as (1,2,3,4,5) would be recorded (100,75,50,25,0). While (QN) of (2,3,5,6,7,8,9,10,11 and12) at the original tool's scaled as (1,2,3) will be recorded (0,50,100). Whereas (QN) of (13, 14,15,16,17, 18 and19) at the original tool's scaled as (1, 2) will be recorded (0,100). Where (QN) of (21,23,26,27 and 30) at the original tool's scaled as (1,2,3,4,5,6) would be recorded (100,80,60,40,20,0). On the other hand, (QN) of (24,25,28,29 and 31) at the original tool's scaled as (1,2,3,4,5,6) will be recorded (0,20,40,60,80,100). Finally; (QN) of (32,33,35) at the original tool's scaled as (1,2,3,4,5) will be recorded (0,25,50,75,100). RAND 36 is by (Sherbourne & Hays, 1993).

As well, Abdulmohsin, Coons, Draugalis & Hays on (1997), reported that the English version Cronbach alpha reliability was ranged between (0.56 up to 0.89)

While for the Arabic version was ranged between (0.60 up to 0.87) for the eight tested concept consequently.

Alternate Nostrils Breathing Exercise steps as assembled by Cumpler, et al., (2022) as follows:

Patients at the study group were instructed to do the following steps:

- Sit with your back straight and your legs folded; as in sitting position.
- Place your right hand's tips of the index and middle finger on your forehead, between your eyebrows
- Now, gently place the thumb over your right nostril
- Place your ring finger on the left nostril
- Lift your thumb and inhale from your right nostril and place your hand back on your right nostril
- Exhale from your left nostril and then inhale from the same nostril.
- This considers one cycle.
- Continue for up to 5 minutes.

Instructions related to practicing Alternate Nostrils breathing; by Sayer (2022).

- Do it twice a day (Morning and night).
- Repeat 5-10 cycles; that continues for up to 5 minutes.
- Practice it on daily basis
- If do it after a meal; weight for four hours; before practicing it.
- Make sure not to force the breathing.
- Always complete the practice by finishing with an exhale on the left side.
- Both the inhale and exhale should be through the nose and not through the mouth, and instructor want to make sure that practitioners are breathing from their diaphragm, rather than shallow chest breathing."

Instructions to stop the practicing immediately by (WebMD, 2021)

- Shortness of breath
- Dizziness
- Chest pain
- Fainting
- Vomiting

Ethical consideration:

Initially an official approval was taken from the research Ethics Committee at faculty of Nursing Cairo University (IRB, 2019041701). Each patient was informed about the nature and the purpose of the study. A written Consent has been taken from all patients individually. The researchers were emphasized that each patient was free to either participate or not in the current study and had the right to withdraw from the study at any time without any rationale and it would not affect care provided also, participation in the study was completely

voluntary; anonymity and confidentiality which would be were maintained though coding the obtained data. By the end of the whole research; the researchers have been sure that the control group was received the Nostrils Breathing Exercises flyer to maintain equity per both groups.

Pilot study:

Once agreement was granted from the Ethical Committee, a pilot study on ten of the patients; was carried out before starting the data collection. Additionally, panel of juries of expertise reviewed the applied tools to test its content validity. The study tools were feasible; no additional modification was required; consequently, sample of the pilot study was added to the sample of the current study.

Procedure:

Once approval to conduct the current study was obtained; from the Research Ethics Committee-Faculty of Nursing-Cairo University the researchers was precede in the current study. Firstly, **the preparatory step:** The researchers informed the patients about the nature and the aim of the current study then got their written consent individually; in case they accepted to join the current research.

Regarding **the implementation step** primarily the researchers was assessing patients' medical and nursing management regarding anemia and have been certain that all had the same routine regimen. The researchers were using Tool (1) Parts 1.a. & 1.b. DMDF; followed by Tool (2) RAND-36 SF. Ver. 1.0, that measurement was counted as 1st measurement (Pre) intervention then the researchers divided the patents randomly into control and study groups by using simple random technique; as every second patients with anemia at the department was a part of the control group, followed by the study group. Researchers were started collecting data from the control group to avoid study group's Nostrils Breathing Exercise contamination. Regarding the study group, the researchers have been trained each patient individually until they be able to practice the Alternate Nostrils Breathing Exercise which was guided by the handed flyer; noticed that this training was not exceeded more than one day. The researchers were assisting the patients at the study group to practice the exercise twice/day up to 10 consecutive days.

Lastly, **the evaluation Step:** In order to evaluate patients' progression after implementation of breathing exercise regarding their measure parameters under investigation were taken twice after implementation step, as follows; 1st evaluation-post practicing of Nostrils Breathing Exercise would take a place after the first 5 days; of practicing that considers 2nd measurement; as a recent research

conducted by **Kalaivani, et al., (2019)** proved that in general a marked improvement could be monitored after five days of practicing Alternate Nostrils Breathing Exercise; then the 2nd evaluation-post practicing of Nostrils Breathing Exercise; was considered the 3rd measurement, which was after 10 days of practicing. All post evaluation readings of 2nd& 3rd measurements for both (control & Study) groups, was gathered through using of Tool (1) part b. and Tool (2).

Statistical analysis:

The data was coded and presented by using a personal computer. Statistical Package for Social Science (SPSS) version 20 was used (Kirkpatrick & Lee, 2013) Data was presented using descriptive statistics as mean, SD, frequency...etc and inferential statistics in the form of t-test...etc. in relation to research variables. Statistical significance was considered at P-value ≤ 0.05 .

Results:

The following statistics would be existing in the subsequent manners; Section (1) (Tables) 1, 2 in addition to figure-1-represented the demographic and medical data results; while section (2) (Tables) 3,4, 5 and 6 highlighted the relation statistical results of the variables under study.

Section 1:**Table (1): Personal demographic characteristics of frequencies and percentages distribution among study and control groups (n= 60)**

Variables	Study group (n=30)		Control group (n=30)		χ^2	P- value
	No.	%	No.	%		
Age / yrs.:						
1. 18 < 30	7	23.3%	9	30%	5.09	0.27
2. 30 < 40	17	56.7%	16	53.3%		
3. 40 ≤ 50	6	20%	5	16.7%		
Mean ± SD	33.53±6.99		32.93±7.56			
Gender:						
1. Male	14	46.7%	14	46.7%	0.15	0.69
2. Female	16	53.3%	16	53.3%		
Marital status						
1. Married	20	66.7%	23	76.7%	0.34	0.84
2. Divorced	1	3.3%	0	0%		
3. Single	9	30%	7	23.3%		
Education Level:						
1. Can read and write	15	50%	19	63.3%	6.18	0.18
2. Technical institute	2	6.7%	3	10%		
3. University	13	43.3%	8	26.7%		
Place of Residence:						
1. Urban	17	56.7%	12	40%	1.83	0.17
2. Rural	13	43.3%	18	60%		
Profession:						
1. Does not work	9	30%	7	23.3%	5.82	0.75
2. Employee	4	13.4%	2	6.7%		
3. Technical Work	10	39.3%	8	26.7%		
4. House wife	7	23.3%	13	43.3%		
Smoking:						
1. Yes	7	23.3%	6	20%	2.98	0.84
2. No	23	76.7%	24	80%		

* Significant ≤ 0.05

Table (2): Medical data frequencies and percentages distribution among both study and control groups (n= 60).

Variables	Study group (n=30)		Control group (n=30)		χ^2	P- value
	No.	%	No.	%		
Anemia Types						
1. Iron Deficiency	10	39.3%	9	30%	4.15	0.38
2. Normochromic	17	56.7%	14	46.7%		
3. Microcytic	3	10%	7	23.3%		
Hemoglobin Level:						
1. Mild up to 10 mg/dl	4	13.4%	3	10%	0.28	0.59
2. Moderate 8 < 10 mg/dl	26	86.6%	27	90%		
Mean±SD	9.31±0.55		9.50±0.44			
BMI:						
1. Normal BMI = 18.5–24.9	16	53.3%	14	46.7%	0.067	0.79
2. Underweight = <18.5	0	0%	0	0%		
3. Overweight/ Obesity = ≥25	14	46.7%	16	53.3%		
Mean±SD	24.81±2.12		25.12±2.77			

Variables	Study group (n=30)		Control group (n=30)		χ^2	P- value
	No.	%	No.	%		
Respiratory:						
Pre					0.93	0.33
1. 12 < 20 br/min	10	39.3%	6	20%		
2. ≥ 20 br/min	20	66.7%	24	80%		
Post 1						
1. 12 < 20 br/min	27	90%	4	13.3%		
2. ≥ 20 br/min	3	10%	26	86.7%		
Post 2						
1. 12 < 20 br/min	30	100%	6	20%		
2. ≥ 20 br/min	0	0%	24	80%		

* Significant ≤ 0.05

BMI: By National Institute of Health. (2023).

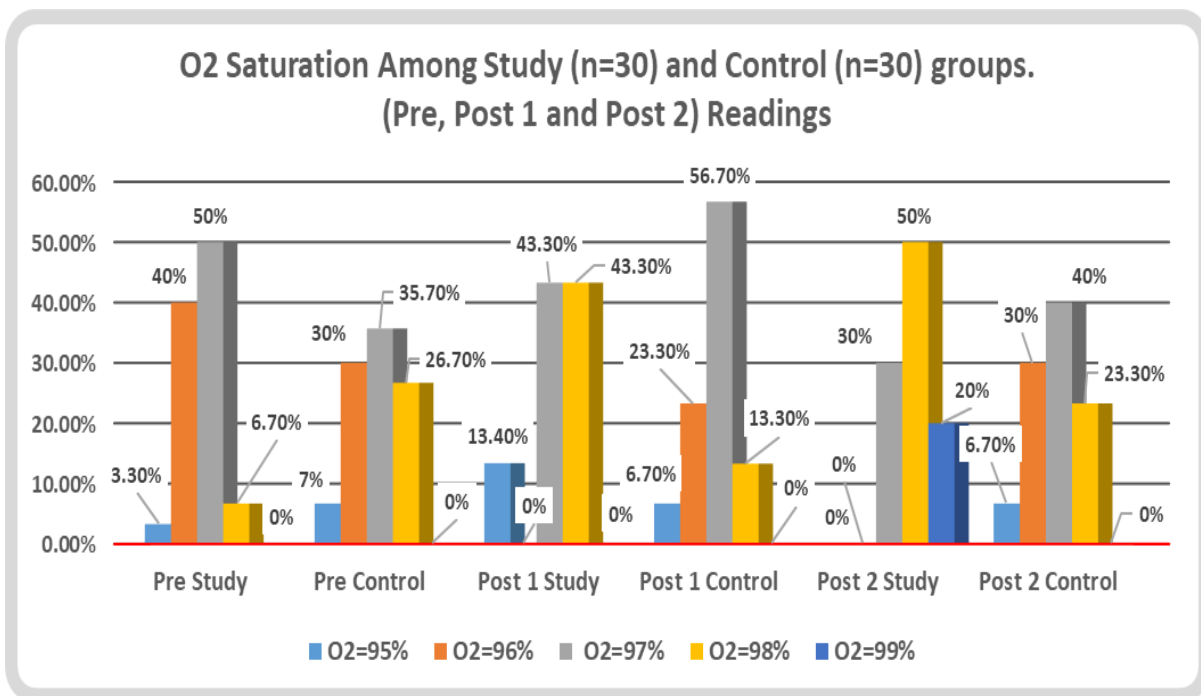


Figure (1): O2 Saturation among Study and Control Groups

Section 2:

Table (3): Comparison of mean scores respiratory rate before and after intervention of Nostrils Breathing Exercise among study and control groups (n=60).

Respiratory Rate	Study group (n=30) Mean ± SD	Control group (n=30) Mean ± SD	t-test	p-value
Pre	21.30±1.66	21.60±1.37	0.75	0.45
Post (1)	19.23±1.10	22.10 ±.02	10.40	**0.000
Post (2)	17.66±1.32	21.13±0.86	12.03	**0.000
ANOVA test	51.49	5.68		
P- value	0.000**	0.005		

* Significant ≤ 0.05

Table (4): Comparison of mean scores Oxygen Saturation before and after intervention of Nostrils Breathing Exercise among study and control groups (n=60).

Oxygen Saturation	Study group (n=30) Mean ± SD	Control group (n=30) Mean ± SD	t-test	p-value
Pre	96.60±0.67	96.83±0.91	1.126	0.26
Post (1)	97.30±0.70	96.76±0.77	2.79	**0.007
Post (2)	97.90±0.71	96.80±0.88	5.29	**0.000
ANOVA test	26.81	.045		
P- value	0.000**	0.95		

* Significant ≤ 0.05 **Table (5): Comparison of Health Status Parameters average total mean scores regarding before and after intervention of Nostrils Breathing Exercise among study and control groups (n=60).**

Health status parameters Average	Study group (n=30) Mean ± SD	Control group (n=30) Mean ± SD	t-test	p-value
Physical Function:				
-Pre	26.50±12.04	26.16±7.27	0.13	0.89
-Post (1)	43.66±18.09	26.00±7.35	4.96	0.000**
-Post (2)	58.50±23.38	25.66±8.87	7.19	0.000**
Role Limitation due to physical health:				
-Pre	1.66±6.34	0.00±0.00	1.43	0.15
-Post (1)	49.16±33.14	0.00±0.00	8.12	0.000**
-Post (2)	57.50±34.20	0.00±0.00	9.20	0.000**
Role Limitation due to emotional health:				
-Pre	22.93±19.80	16.66±16.95	1.31	0.19
-Post (1)	65.90±13.17	16.66±16.95	11.37	0.000**
-Post (2)	83.33±24.36	11.11±15.98	13.57	0.000**
Energy/Fatigue:				
-Pre	28.33±9.49	26.83±7.82	0.66	0.50
-Post (1)	45.83±11.37	27.00±7.53	7.45	0.000**
-Post (2)	50.33±7.06	25.00±7.87	13.11	0.000**
Emotional Well-being:				
-Pre	50.66±12.38	49.0±9.22	0.59	0.55
-Post (1)	65.90±13.17	38.96±7.13	9.84	0.000**
-Post (2)	72.80±7.30	40.40±7.52	16.91	0.000**
Social Function:				
-Pre	30±9.04	31.25±9.13	0.53	0.59
-Post (1)	52.50±15.87	35.41±5.76	5.53	0.000**
-Post (2)	58.75±13.59	34.58±7.10	8.63	0.000**
Pain:				
-Pre	30.08±12.78	23.83±3.45	2.58	0.12
-Post (1)	48.51±17.57	23.50±3.05	7.68	0.000**
-Post (2)	53.66±16.22	23.83±3.45	9.85	0.000**
General Health:				
-Pre	38.33±7.58	39.16±11.22	0.33	0.73
-Post (1)	37.33±8.58	26.33±4.90	6.09	0.000**
-Post (2)	38.16±7.12	26.50±4.93	7.36	0.000**

* Significant ≤ 0.05

Table (6): Comparison of Health Status total average mean scores before and after intervention of Nostrils Breathing Exercise among study and control groups (n=60).

Health Status Total Average	Study group (n=30) Mean ± SD	Control group (n=30) Mean ± SD	t-test	p-value
Pre	28.56±7.16	26.61±4.12	1.29	0.20
Post (1)	52.44±14.67	24.23±4.31	10.10	0.000**
Post (2)	59.13±14.06	23.36±4.23	13.33	0.000**
ANOVA test	50.03	4.70		
P- value	0.000**	0.011*		

* Significant ≤ 0.05

Table (1): Shown up that study and control groups regarding; age, gender, marital status, educational level, place of residence, profession and smoking; were homogenous as $\chi^2= 5.09, 0.15, 0.34, 6.18, 1.83, 5.82$ and 2.98 at non-significant p-value. Concerning; demographic data percentages; it was as follows; age $30 < 40$ represented 56.7% and females = 53.3% on both groups. Related marital status 66.7% of the study group and 76.7% of the control group were married. Educational level who can read and write= $50\%, 63.3\%$. Place of resident at urban areas= $56.7\%, 40\%$. Their profession as technical work at study group= 39.3% and as a house wife at control group= 43.3% . Smoking habits was 76.7% and 80% were not smoking; among the study and the control groups respectively.

Table (2): Represented that, normochromic anemia with $56.7\%, 46.7\%$; while hemoglobin level with moderate level was $86.6\%, 90\%$, also Body Mass Index (BMI) was 46.7% and 53.3% at overweight regarding study and control groups respectively. Also, χ^2 shown up homogenous groups as it equaled $4.15, 0.28$ and 0.067 at non-significant p value regarding anemia types, hemoglobin level and BMT consequently. It was signified; that both study and control groups was homogenous as there was no difference between both groups as χ^2 was 0.93 at non-significant p value for the respiration sign; Noticing that; at pre respiration measurement; was 66.7% and 80% at ≥ 20 br./min; while at post (1) measurement it was 90% and 13.3% at $12 < 20$ br./min. Finally, at post (2) measurement it was 100% and 20% at $12 < 20$ br./min of respiration among study and control groups correspondingly.

Figure (1): Shown up that the highest normal O₂ saturation at pre measurement was at 97% of O₂ saturation as represented $50\%, 35.7\%$ of patients; while at the post 1 it increased to be at 98% of O₂ saturation with 43.3% and 13.3% of patients. Finally, at post 2 it was increased to be at 99% of O₂ saturation with 20% but 0% of patients. The observing was regarding the study and the control groups; respectively.

Table (3): Revealed that; there was statistical mean of difference between the three respiratory rate measurements of study group; also, there was mean of difference between the three-respiratory rate measurements of the control group as well; however,

the highest significant difference was between the study group over its three measurements as $F= 51.49$ at $p= 0.000$. and there was a statistically significant difference between the study and the control groups at post measurements with highly statistically significant mean of difference at post (2) as $t\text{-test}= 12.03$ at p value $=0.000$.

Table (4): Discovered that; there was statistically significant mean of difference between the three oxygen saturation measurements of study group; as $F= 26.81$ at $p= 0.000$. Also, there was a statistically significant difference between the study and control groups at post measurements with highly statistically significant difference at post (2) as $t\text{-test}= 5.29$ at p value $=0.000$.

Table (5): Shown up; that both study and control groups was homogenous as pre-measurements of Health Status Parameters Average; based on the t-test was $=0.13, 1.43, 1.31, 0.66, 0.59, 0.53, 2.58,$ and 0.33 and all findings was at non-significant as its p-value= $0.89, 0.15, 0.19, 0.50, 0.55, 0.59, 0.12, 0.73$; regarding, physical function, limitation due to physical health, limitation due to emotional health, energy/fatigue, emotional well-being, social function, pain and general health respectively. Moreover; at post measurements all parameters averages were improved with observed highest statistical significant mean of difference at post 2 as follows; physical function= 7.19 , limitation due to physical health= 9.20 , limitation due to emotional health= 13.57 , energy/fatigue= 13.11 , emotional well-being= 16.91 , social function= 8.63 , pain= 9.85 and general health= 7.36 and all findings was at p value= 0.000

Table (6): Reported that; Health Status Total Average mean scores regarding both study and control groups pre-measurement was homogenous as $t\text{-test}= 1.29$ at p value= 0.20 . Nevertheless, the highest significant difference was among the study group over its three measurements as $F= 50.03$ at $p=0.000$. Also; there was a statistically significant mean of difference between the study and the control group at post measurements with highest significant result at post (2) as it was= 13.33 at p value= 0.000 .

Discussion:

Alternate nostrils breathing (ANB) is an effective breathing exercise with therapeutic outcome on respiratory function. The autonomic nervous system's activities are enhanced by alternate nostril breathing by the way of balancing the cooling effect of left-nostril breathing exercise with the energizing effect of right-nostril breathing exercise. It acts as a harmonizing process (Ismail, et al., 2023). Consequently, the current study focused on the evaluation of the effect of Alternate Nostrils Breathing Exercise on selected outcomes among patients with anemia.

The current study finding displayed that, initially; there was homogeneity between study and control groups concerning the demographic characteristics. And it was revealed that; more than half of both study and control groups their age was ranged between thirty to less than forty years old and also more than half of both groups were female. Concerning study and control groups respectively; it was found that more than three quarter and the most of them were married, while regarding educational level, half of patients and almost three third can read and write. Likewise, their place of resident was reported that more than half and merely half of them were living at urban areas. And at study group more than one third was working at a technical work and less than half of them was house wives at control group. But related to the smoking habits the current study revealed that the majority of both study and control groups were not smokers. Besides that, about half of both groups their Body Mass Index (BMI) interpreted as overweight; this finding might reflect the hazards of increasing patient's weight and developing anemia. This finding is in line with Uğur & Uysal (2020) who concluded that, three quarter of their patients were female and the body mass index (BMI) of them was at overweight with class one obese category.

Actually, anemia is a blood disorder in which there are no enough healthy red blood cells or hemoglobin to carry oxygen to the body's tissues. Even though, different studies revealed that Iron deficiency anemia is the most common type of anemia; the current study found nearly half of both study and control groups were suffering from normochromic anemia followed by iron deficiency anemia and almost most of them their hemoglobin level was moderate similar to a study that was conducted by (Akbarpour, et al., 2022) who stated that, the most prevalent degree was mild anemia among the male and female patients and the highest percentage was related to normochromic/microcytic followed by hypochromic/microcytic.

Regarding respiratory rate; primarily both study and control groups was homogenous as there was no

statistically significant difference between both groups before the proceeding. Also, it was observed that; at pre-intervention; respiration rate measurement; was found that the most of the study group and the majority of the control group their breathing rate was more than 20 br. /min; while at the first post measurement it was found that related to the study group the majority and less than quarter of the control group; was allocated between 12<20 br /min. Finally, at the second post measurement it was found that; all study group and only merely quarter of the control group was at 12<20 br/min of respiration. The researchers interpreted the current finding as tachypnea respiratory rate must be taken as a serious nursing problem for patients with anemia even if its increasing was on the higher border level of normal but it remained tachypnea as it occurred at rest and should be taken in consideration for the early management for those patients with anemia (s).

Yaqeen, (2021) reported that it is clear that patients with anemia their breathing pattern is affected but by different degrees; as it depends on the grade on anemia. So, by practicing the ANB the researchers of the current study concerning respiratory rate and they adopted the first hypothesis and clarified that, patients who demonstrated Alternate nostrils breathing (ANB) exercise their respiratory rate was better than the control group with highly significant difference. Similar finding by (Jahan, et al., 2020) was in agreement with the current study as stated that respiratory function is significantly improved after the ANB exercise. Therefore, ANB can be recommended for increasing respiratory efficiency. Also, Barga, Nalgirkar, et al., (2022) Evaluate the effect of left Nostril Breathing on Cardiorespiratory Parameters and found that there was a significant reduction in respiratory rate by $(14.26 \pm 2.15/\text{minute}$ to $13.17 \pm 2.03/\text{minute}$ and this interpreted as Alternate nostril breathing exercise calms the nervous system and triggers the relaxation response, as it works by engaging the vagus nerve-b which consequently improve lung functioning and help one breathe more efficiently.

Regarding oxygen saturation; the current researchers found that both study and control groups were homogenous regarding the oxygen saturation level; which was before the proceeding. The current research shown up that the highest normal O₂ saturation level at pre measurement was at 97% of O₂ saturation as represented half of the study group and more than one third of the control group; while at the first post measurement it was increased to be at 98% of O₂ saturation with merely half of the study patients' group and less than one quarter of the control patients' group. Finally, at the second post measurement it was increased to be at 99% of O₂

saturation with merely quarter of the study group comparing to no patients at the control group. The current researchers interpreted that, findings that both the study and control groups allocated on normal scale from day one till the end of the research process; but the positive gaining from Alternate Nostrils Breathing Exercise; that its enhancement of oxygen saturation normality as improved it to be away from the low normal and allocated them to the high normal which represented as a valuable benefit for patients with anemias.

Furthermore, the current study highlighted that, oxygen saturation score was increased through the three measurements among the study group (pre-exercise, post one and post two after exercise) as there was a statistically significant difference between the study and control groups at post measurements with highly significant difference at the second measurement which proved the second hypothesis; thus the researchers accepted the second hypothesis that stated; patients who demonstrated Alternate nostrils breathing (ANB) exercise their oxygen saturation level would be better than the control group. This might be interpreted as inspite that most of the targeted patients in the current study their hemoglobin level was at the moderate level and the rest of them were at the mild level; however, there was a statistical effect of nostril breathing exercise on the improving of oxygen saturation level with even slightly increasing. In the same, line (Copur, et al 2018) found that anemia, itself, does not cause hypoxemia. Though, the effect of anemia in decreasing the total oxygen content in the blood; it can be compensated by increasing the cardiac output and oxygen extraction ratio. Consequently, till very low levels of hemoglobin are observed, hypoxemia is not a concern in patients suffering from anemia. Also, (Suherlim, et al., 2018) mentioned that, there was no understandable cut point relation between hemoglobin concentration and oxygen saturation. Additionally, in the same context, (Jahan, et al, 2021) stated that different studies detected that, there is a positive effect of alternate nostril breathing exercise on various diseases as well as normal healthy subjects as Eighteen percent improvement of O₂ consumption was observed after one month of exercising.

Moreover; the current study shown up; that both study and control groups was homogenous as pre-measurement of Health Status Parameters Average; regarding, physical function, limitation due to physical health, limitation due to emotional health, energy/fatigue, emotional well-being, social function, pain and general health. It was found that at post measurement of study group health status parameters averages were improved; specifically, with observed

highest statistically significant mean of difference at post 2 regarding; physical function, limitation due to physical health, limitation due to emotional health, energy/fatigue, emotional well-being, social function, pain and patients' general health. These optimistic findings reflect the improvement which was consequently with Alternate nostrils breathing exercise; as the current researchers interpreted that by increasing the oxygenated tissue could enhance the body muscles that might improve their physical health and improve their body energy that take a positive role on those patients' social function and empower their emotional status as well.

This finding was compatible with (Weheda, et al., 2021) who concluded that, implementation of alternate nostril breathing exercise helped in decreasing targeted sample fatigue, anxiety and stress. In addition, Villani, (2023) reported that, stress is a counted result is a negative effect on one's physical functioning. Alternate nostrils breathing helps balance the right and left hemispheres of the brain, as well as manage or improve symptoms of certain health conditions also Muthukrishnan, et al., (2023) concluded that, Alternate nostril breathing shows promising results in reducing stress which in-turn improve emotional status and general health.

Also, regarding the Health Status Total Average mean score among study group; it was found that there was a statistically significant mean of difference at post measurements with significant highest result at post 2. The current researchers deduced this finding as a logic consequence of the improvement of each health parameters that lead to cumulative improvement of the entire patients' health status. On the same line Jahan, et al, (2021) reported that; by practicing ANB there is a shifting of sympathovagal balance toward parasympathetic predominance that could has a role. Also, they claim that the regular practice of ANB might improve patients' parameters functions; that accordingly would improve patients' health well-being. Thus, the researchers of the current study accepted the third hypothesis which stated; performing Alternate Nostrils Breathing Exercise would have a significant different total health status parameter (s) mean scores than the control group who receives routine hospital care only.

Conclusion:

The current study proved that by practicing of Alternate Nostrils Breathing Exercise there was improvement of parameters understudy of (Respiratory rate, oxygen saturation level).

Also, there was significant improvement of health status parameters in general which was (physical function, limitation due to physical health, limitation due to emotional health, energy/fatigue, emotional well-being, social function, pain and general health).

In addition to the valuable improvement of Health Status Total Average.

Recommendations

1. Practicing of Alternate Nostrils Breathing Exercise should take a place for patients with different types of anemia
2. Replication of Alternate Nostrils Breathing Exercise on larger patients' sample size.
3. Replication of Alternate Nostrils Breathing Exercise on other diseases which causing limitation of lung function.

Nursing Implications:

Research:

Sharing in the building of proved results of research on the positive safe effectiveness of practicing Alternate Nostrils Breathing Exercise. Also, it could be taken as a serious branch in complementary therapy practice in nursing discipline related to diseases as anemia which is interfering against breathing function and oxygen level.

Education:

Obviously breathing exercise generally is taken a portion in nursing education. But it is time to give a valuable focusing on the newly proved breathing exercises as Alternate Nostrils Breathing Exercise (ANB); that considers one of those optimistic breathing exercises. Especially it counts as simple breathing exercise that nursing students can learn simply and focus on its benefits for patients' health status.

Practice:

Patient with anemia(s) disease suffers from tremendous health problems; as fatigue; social emotional problems.....etc; on the top of all these problems the disturbance of breathing which might lead to serious drawback cardiac illness in the future. Also, as nurses present the spine of the health system; so it is valuable to instruct patients with anemia to practice ANB on daily basis; especially; it is cost effectiveness practice.

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