Effect of Nadi Shodhana Pranayama Exercise on Blood Pressure and Anxiety among Preoperative Patients

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1.ABSTRACT

Background: Surgery is often the only therapy that can alleviate disabilities and reduce the risk of death from common conditions. Anxiety is a common phenomenon among hospitalized patients awaiting any surgical procedure. Preoperative anxiety is known to increase patient's release of catecholamines, resulting in an increase in blood pressure. Therefore, aim of this study: is to examine the effect of Nadi shodhana pranayama exercise on blood pressure and anxiety among preoperative patients. **Subjects and method**: Quasi experimental design was utilized at surgical departments at Mansoura University Hospital throughout six months. Purposive sample of (100) preoperative patients was divided into two groups with equal size. **Tools:** Three tools were used to collect data and achieve aim of study as follows: Tool I: Structured interviewing questionnaire, tool II: Beck Anxiety Inventory scale and tool III: Clinical assessment (mercury blood pressure measurement**). Results**: showed that there was statistically significant reduction in median of overall anxiety scores among study group (16.0%) after practicing Nadi Shodhana pranayama exercise compared to control group (22.0%) as (P ≤ 0.01) and showed that there was statistically improvement in measurements of blood pressure among study group after practicing Nadi Shodhana pranayama exercise as (P =0.002**). The study concluded; practicing of Nadi shodhana pranayama exercise has positive effect on decrease level of anxiety and regulate blood pressure among preoperative patients. The study recommends; patients undergoing surgical operations should be encouraged to practice exercise of Nadi Shodhana pranayama, and this can be helped by providing them with illustrated, colored and simplified booklet.

 Keywords: Blood Pressure, Nadi Shodhana Pranayama Exercise, Preoperative anxiety.

2.Introduction:

The global community has long overlooked the central role of surgical and anesthesia care in the achievement of resilient health systems **(WHO, 2017).** The preoperative phase starts with the scheduling of the surgery and finishes when the patient arrives in the anesthesia induction room **(Pestana-Santos, Pires, Goncalves, Parola, Santos, & Lomba, 2021)**. The preoperative period is one of the stressful events for surgical patients scheduled for surgery **(Wondmieneh, 2020)**. Worldwide, over 300 million surgeries requiring anesthesia care are performed annually. Among general surgery patients, over 30% experience a complication **(Mathis, et al., 2021)**. Globally reported incidence of pre-operative anxiety ranges from 60% to 92% in surgical patients **(Dhungana, M., Limbu, R., & Shrestha, M. 2019)**.

The patient may pay an additional cost for the management of postoperative complications commonly associated with preoperative anxiety**.** Therefore, preoperative nursing care should focus on the reduction of patient anxiety through the establishment of preoperative educational interventions, administrating required medications,

and providing non-pharmacological treatment methods **(Wondmieneh, 2020)**.

Preoperative anxiety is also known to increase the patient's release of catecholamines, resulting in an increase in blood pressure, heart rate and arrhythmia **(Lemos, Lemos-Neto, Barrucand, Verçosa, & Tibirica, 2019)**. Blood pressure is one of the most important monitoring parameters in clinical medicine. High blood pressure means the pressure in your arteries is higher than it should be **(Rodrigues, 2019)**. Hypertension is the commonest avoidable medical reason for postponing surgery. Approximately 95% of patients presenting with raised blood pressure will be considered to have primary hypertension **(Aronow, 2017).** Blood pressure determination forms an integral part of anesthesiologist's evaluation of the patient prior to and during surgery. 25% of surgical patients have hypertension preoperatively **(Mengistu, & Geleta, 2019).**

Nurses are a key part of the preoperative period. They have to check and identify risk factors for the surgery, assess patients' needs, managing

patients´ expectations and understanding patient vulnerabilities (**Ruiz Hernández et al., 2021**). Most effective way of lowering blood pressure after a stressful episode was to use simple yoga type breathing methods (**Begum et al., 2018**). Deep breathing exercises has been shown to be effective in reducing the perception and symptoms of anxiety (**Chand, Marwaha, & Bender, 2021**). pranayama means alternate nostril breathing. It is also called as Nadi Shodhana pranayama. Nadis are the subtle energy channels in the body that get blocked due to various reasons and Shodhana means purification (**Bhowate, & Valsalan, 2020**).

The practice of pranayama influences many physiological variables and produces a positive impact on the cardiorespiratory system. Its practice with low respiratory rate decreased significantly both the systolic and diastolic blood pressure, with a modest decrease in heart rate (**Novaes, et al., 2020**).

Aim of the study

The aim of this study was to examine the effect of Nadi shodhana pranayama exercise on blood pressure and anxiety among preoperative patients.

Research hypothesis:

H1: Preoperative patients who perform Nadi shodhana pranayama exercise will experience less anxiety than those who receive routine preoperative care.

H2: Preoperative patients who perform Nadi shodhana pranayama exercise will experience normal blood pressure than those who receive routine preoperative care.

3. Subjects and methods

Study Design:

A quasi-experimental research design was used throughout this study.

Setting:

This study was conducted at surgical departments (7), (8), (11), (12) at Mansoura University Hospital. Surgical departments (7&8) are located on the second floor at the hospital, each department serves about 20 beds on male ward. Surgical departments (11&12) are located on the third floor at the hospital, each department serves about 20 beds on female ward.

Sample technique:

A purposive sample of 100 preoperative patients, the study participants divided into two equal groups: Group (A) study group: patients who received Nadi shodhana pranayama exercise

instructions plus routine hospital care, Group (B) control group: patients who received routine hospital care only. Study included patients aged between 20-60 years, of both sexes, patients suffer from anxiety, patients having the ability to communicate and willing to participate in the study, and excluded patients who having hearing impairment, patients take tranquilizer or anxiolytic (such as propranolol) during the past 24 hours, and patients take anti-hypertensive drugs.

Tools of data collection:

Three tools were used to collect data pertinent to the study:

Tool I: A structured interviewing questionnaire: This tool was developed by the researcher based on reviewing relevant literatures and scientific references to collect the required baseline data (**Zoroufchi, et al., 2020**). It included the following two parts:

Part (1): Patient's demographic data: This part was used to collect the personal data of the patients; it included (patient's gender, age, marital status, level of education and occupation).

Part (2): Health relevant data: This part focused on patient's medical history, type and date of surgery.

Tool II: Beck Anxiety Inventory (BAI) scale: This tool was adopted from (**Beck, Epstein, Brown, & Steer, 1988**). This scale is a self-report measure of patient's anxiety. It is a Likert scale ranging from 0-3. (0=not at all, 1= mildly, but it didn't bother me much, 2= Moderately – it wasn't pleasant at times, 3= severely – it bothered me a lot). The total score is calculated by finding the sum of the 21 items and its scores were divided into the following: score of 0-21 = low anxiety, score of 22-35 = moderate anxiety, and score of 36 and above = potentially concerning levels of anxiety. For data reduction and analysis, the SPSS for Windows-edition 14, was conducted. Findings showed that the Persian version of BAI proved a good reliability ($r = 0.72$, $p < 0.001$), a very good validity ($r = 0.83$, $p < 0.001$), and an excellent internal consistency (Alpha = 0.92) (**Kaviani, & Mousavi, 2008**).

Tool III: Clinical assessment (mercury blood pressure measurement): Blood pressure was recorded by using standard mercury sphygmomanometer, by auscultatory method (**Tripathy, & Sahu, 2019**). According to American Heart Association (**AHA, 2017**), blood pressure numbers of less than 120/80 mm Hg are considered within the normal range.

Data collection process:

Phase I: Preparatory phase:

- Ethical approval was obtained from the Faculty of Nursing, Mansoura University as well as Research Scientific Ethical Committee.

- An official permission to conduct the study was obtained from the dean of Faculty of the Nursing Mansoura University.

- An official written permission to carry out the study was obtained from the director of the departments of surgery in Mansoura University Hospital, to obtain his approval to conduct the study after explanation of the nature and purpose of the study.

- The researcher met the head nurses of the surgery departments and the coordination of the study process was conducted among nursing staff.

- A simple colored booklet was developed for preoperative patients and reviewed by experts.

Tools development:

Tool (1): A structured interviewing questionnaire: It was constructed by the researcher based on reviewing related literatures **(Zoroufchi, et al., 2020).**

Tool (II): Beck Anxiety Inventory (BAI) scale: It was translated into Arabic language by the researcher and vice versa.

- All tools were tested for its content validity by a jury of five experts in the field of Medical Surgical Nursing department, of Mansoura University and required modifications were done. Clarity, relevance, applicability, comprehensiveness, free of mistakes and ease for implementation.

- Oral / written consent was obtained from each patient in the study after clear and proper explanation of the study aim and nature.

- All relevant ethical aspects were considered for ensuring patient's privacy and confidentiality of the collected data during the study. The aim of the study was clarified to each patient, voluntary participation and right to refuse to participate in the study and withdrawn at any time was emphasized to patients and each patient was informed that refusal to participate in the study wouldn't effect on their care.

Pilot study

The pilot study was carried out on 10% of the study sample (11) to ensure the feasibility, clarity, relevance, comprehensiveness, free of mistakes & applicability of the developed tool before conducting large scale study to test plan and method of research study, to allow necessary adjustment before starting the large scale study, to estimate the time needed to fill the questionnaire sheet. Each sheet lasted about 30-40 minutes to be filled, and the patients who included in the pilot study were excluded from the study sample. Reliability of pilot study was 0.82.

Ethical consideration and human rights

- Prior to the study, oral and written informed consent was obtained from each patient enrolled in the study after providing comprehensive information about the nature, aim, benefits and risks of the study.

- The researcher emphasized participation is completely and confidentiality.

- Participants were informed that they have the right to refuse to participate in the study and withdrawn at any time and the refusal to participate in the study wouldn't influence on their care.

- Anonymity, privacy, safety and confidentiality were absolutely assured throughout the whole study.

Phase II: Implementation phase:

- When the necessary approvals were obtained، the researcher started to collect data. Data collection extended over a period of six months, from the beginning of August 2021 to the end of January 2022.

- Most of the days of the surgery were on Saturdays, Sundays, Tuesdays and Wednesdays. Researcher chose to interview patients at least two days before the surgery. The investigator went to surgical departments (7), (8), (11), (12) at Mansoura University 5 hours/ day (from 9;00 AM to 2:00 PM), 3 days/week (Saturday, Monday and Wednesday).

- The aim and the nature of the study were explained to all included patients in the study to gain their cooperation in data collection.

- Data collection was started by assessing socio demographic data, health relevant data, through conducting an interview with each patient by using tool I.

- Patients who matched sampling criteria & who accepted to participate in the study were divided randomly into two equal groups, group (A) study group who received Nadi shodhana pranayama exercise instructions plus routine and group (B) control group who received

routine hospital care only.

- In study group, the researcher assessed patient's anxiety by using tool II, and the researcher assessed patient's blood pressure by using tool III before practicing Nadi shodhana pranayama exercise.

- The researcher taught study group by using a simple booklet.

- In study group, educational and practical training session were implemented for all patients, educational session took about (5-10 minutes) and then practical training session took about (20 minutes). In the educational session the researcher used simple and understandable sentences. Instructions continued until learning was completed.

- The followings are steps of Nadi shodhana pranayama exercise that where be taught to study group:

  - The subjects practiced the Nadi Shodhana Pranayama exercise for 20 minutes.

  - The subjects where be instructed to sit in any meditative posture.

  - close the right nostril with the right thumb and exhale completely through the left nostril.

  - Then inhale deeply through the left nostril, close the left nostril with ring and little finger, release the right nostril.

  - Now exhale slowly and completely through the right nostril.

  - Inhale deeply through the right nostril then close the right nostril and exhale through the left nostril.

  - This was one round of Nadi Shodhana Pranayama, it was repeated for 20 rounds **(Apar, Raghavendra, & Manjunath, 2019).**

- Then the researcher reassessed level of anxiety of study group by using tool II, and the researcher reassessed blood pressure of study group by using tool III after specified period (20min) from practicing Nadi Shodhana Pranayama exercises

- In control group, the researcher assessed patient's anxiety by using tool II, and the researcher assessed patient's blood pressure by using tool III.

- Control group received a routine hospital care by the nurse of the surgical unit.

- Then the researcher reassessed level of anxiety

of control group by using tool II, and the researcher reassessed blood pressure of control group by using tool III after receiving routine hospital care.

Phase III: Evaluation phase: The efficacy of practicing of Nadi Shodhana pranayama exercise on level of anxiety was evaluated by using tool II and blood pressure was evaluated by using tool III among preoperative patients after performing exercise for 20 minutes.

Limitation of the study

Some patients were reluctant to express their concern about the surgical operation, because they were fearing from delaying the date of operation after expressing their concern.

Statistical analysis

The collected data were organized, tabulated and statistically analyzed using SPSS software (Statistical Package for the Social Sciences, version 26, SPSS Inc. Chicago, IL, USA). The categorical variables were represented as frequency and percentage. Whereas ordinal and non-parametric continuous variables were presented as median and interquartile range (IQR). The Mann-Whitney U test was used to test the difference between two unrelated groups on the same non-parametric continuous variables. Wilcoxon signed rank test was utilized to test difference of non-parametric continuous variables between paired groups. Marginal homogeneity test was utilized to test difference between paired group related categorical variables (more than two categories). A Chi square test and fisher exact test were used to test relationship between categorical variables and homogeneity between study and control group related to their demographic characteristics and health data. Statistically significant was considered at p-value ≤ 0.01 & 0.05.

4. Results:

Table (1): shows Demographic characteristics of the studied patients (n=100). In relation to age, (36.0%) of study group ranged between (40 - < 50) years old and (42.0%) of control group ranged between (30 - <40) years old with mean age 46.34±3.25 years of the study group, and 45.81±4.26 years of the control group. Regarding to gender, it was noticed that females were prevalent than males (64.0 % and 70.0%) in both study group and control group respectively. In relation to marital status, (72.0% and 78.0%) of study group and control group respectively were married. Concerning educational level, about two third of study group and control group respectively (64.0% and 74.0%) had basic-intermediate

education. Regarding to occupation, about half of study group and control group respectively were working (62.0% and 56.0%). This table illustrates that the two groups were matched and there weren't statistically significant differences between the two groups as (P >0.05).

Table (2): reveals health relevant data of the studied patients (n=100). The majority of study group and control group **hadn't** any medical history (78.0 and 80.0%) respectively. Concerning type of surgery, a percentage of study group (22%) and control group (26.0%) admitted for performing a hernia operation. As regards time of admission, study group and control group respectively (62.0% and 70.0%) admitted before surgery with two days. This table illustrates that the two groups were matched and there weren't statistically significant differences between the two groups as (P >0.05).

Table (3): illustrates that there wasn't statistically significant difference between study group and control group related to anxiety levels before practicing Nadi Shodhana pranayama exercise as (P = 0.82). About half of study group and control group respectively had moderate anxiety level (52.0% and 48.0%).

Table (4): shows that there was statistically difference in anxiety levels among study group compared to control group after practicing Nadi Shodhana pranayama exercise as (p=0.009**). More than two-third of study group had low level of anxiety after practicing Nadi Shodhana pranayama exercise (74.0%) compared to (44.0%) of control group had mild anxiety.

Table (5): shows that there wasn't statistically difference in measurements of blood pressure among study group and control group before Nadi Shodhana pranayama exercise as (P >0.05), also it shows that (46.0%) of study group had blood pressure measurement (130/90), and (42.0%) of control group had blood pressure measurement (≤ 120/80).

Table (6): shows that there was statistically improvement in measurements of blood pressure among study group after practicing Nadi Shodhana pranayama exercise as (P =0.002**). A bout two-third of study group had blood pressure (≤ 120/80), and percentage of (26.0) of study group after practicing Nadi Shodhana pranayama exercise had blood pressure (130/90).

Table (7): Shows that there wasn't statistically relationship between anxiety levels among study group and their demographic characteristics before practicing of Nadi Shodhana pranayama exercise as (P >0.05). Also, shows that there wasn't statistically relationship between anxiety levels among study group and their demographic characteristics after practicing of Nadi Shodhana pranayama exercise except in educational level as (P =0.04*).

Table (8): shows that there wasn't statistically relationship between anxiety levels among control group and their demographic characteristics before and after receiving routine hospital care as (P >0.05).

Table 1 *Demographic characteristics of the studied patients (n=100)*

Characteristics	Study group (n=50)		Control group (n=50)		χ2	P
	N	%	N	%		
Age						
▪ **20- < 30**	12	24.0	6	12.0		
▪ **30 - <40**	13	26.0	21	**42.0**	5.22	0.16
▪ **40 - < 50**	18	**36.0**	13	26.0		
▪ **50 - <60**	7	14.0	10	20.0		
Mean ± SD	46.34±3.25		45.81±4.26		T=0.70	0.48
Gender						
▪ **Male**	18	36.0	15	30.0	0.41	0.52
▪ **Female**	32	**64.0**	35	**70.0**		
Marital status						
▪ **Unmarried**	14	28.0	11	22.0	0.48	0.49
▪ **Married**	36	**72.0**	39	**78.0**		
Education						
▪ **Illiterate**	11	22.0	9	18.0		
▪ **Basic-Intermediate education**	32	**64.0**	37	**74.0**	1.38	0.50
▪ **Higher education**	7	14.0	4	8.0		
Occupation						
▪ **Work**	31	**62.0**	28	**56.0**	0.37	0.54
▪ **Don't work**	19	38.0	22	44.0		

χ2: Chi-squared tests   * Significant if (p ≤ 0.05)   No significant if (p > 0.05)

Table 2 *Health relevant data of the studied patients (n=100)*

Health profile	Study group (n=50)		Control group (n=50)		FE /or χ2	P
	N	%	N	%		
Medical history						
▪ Diabetes mellitus	7	14.0	7	14.0		
▪ Chronic disease	4	8.0	3	6.0	0.16	0.93
▪ Not at all	39	**78.0**	40	**80.0**		
Type of surgery						
▪ Hernia	11	**22.0**	13	**26.0**		
▪ Sleeve gastrostomy	3	6.0	2	4.0		
▪ Cholecystectomy	6	12.0	5	10.0		
▪ Colostomy	3	6.0	2	4.0		
▪ Palmar Hyperhidrosis	2	4.0	1	2.0		
▪ Resection of thyroid gland	4	8.0	6	12.0	FE	0.99
▪ Resection of the intestine	4	8.0	3	6.0		
▪ Varicocele	1	2.0	0	0.0		
▪ Anal hemorrhoids	5	10.0	4	8.0		
▪ Anal fissure	4	8.0	6	12.0		
▪ Fistula	6	12.0	5	10.0		
▪ Others	1	2.0	3	6.0		
Time of admission						
▪ Two days before surgery	31	**62.0**	35	**70.0**	0.71	0.40
▪ Three days before surgery	19	38.0	15	30.0		

FE: Fisher Exact   * Significant if (p ≤ 0.05)   No significant if (p > 0.05)

Table 3 *Anxiety levels among the study and control group before Nadi Shodhana pranayama exercise(n=100)*

Anxiety levels	Study group (n=50)		Control group (n=50)		χ2	P
	N	%	N	%		
▪ Low anxiety	18	36.0	21	42.0		
▪ Moderate anxiety	26	**52.0**	24	**48.0**	0.40	**0.82**
▪ Potentially concerning levels of anxiety	6	12.0	5	10.0		

* Significant if (p ≤ 0.05)   No significant if (p > 0.05)

Table 4 *Anxiety levels among study and control group after Nadi Shodhana pranayama exercise(n=100)*

Anxiety levels	Study group (n=50)		Control group (n=50)		χ2	P
	N	%	N	%		
▪ Low anxiety	37	**74.0**	22	**44.0**		
▪ Moderate anxiety	10	20.0	22	44.0	9.13	**0.009****
▪ Potentially concerning levels of anxiety	3	6.0	6	12.0		

**statistically significant at p ≤ 0.01

Table 5 *Blood pressure of the study group and control group before Nadi Shodhana pranayama exercise(n=100)*

Blood pressure	Study group (n=50)		Control group (n=50)		χ2	P
	N	%	N	%		
▪ **≤ 120/80**	16	32.0	21	**42.0**		
▪ **130/90**	23	**46.0**	19	38.0	1.48	0.69
▪ **140/95**	8	16.0	6	12.0		
▪ **150/100**	3	6.0	4	8.0		

*statistically significant at p ≤ 0.05

Table 6 *Blood pressure of study group before and after Nadi Shodhana pranayama exercise (n=50)*

Blood pressure	Before Nadi Shodhana pranayama exercise		After Nadi Shodhana pranayama exercise		MH Statistic	P
	N	%	N	%		
▪ ≤ 120/80	16	32.0	31	**62.0**		
▪ 130/90	23	46.0	13	**26.0**	4.58	**0.002****
▪ 140/95	8	16.0	4	8.0		
▪ 150/100	3	6.0	2	4.0		

* Significant if (p ≤ 0.05)   No significant if (p > 0.05)

Table (7) *Relationship between anxiety levels among the study group of preoperative patients and their demographic characteristics before and after Nadi Shodhana pranayama exercise(n=50*

Characteristics	Anxiety levels before Nadi Shodhana pranayama exercise						FE or χ2 / p	Anxiety levels after Nadi Shodhana pranayama exercise						FE or χ2 / p
	Low anxiety		Moderate anxiety		Potentially concerning levels of anxiety			Low anxiety		Moderate anxiety		Potentially concerning levels of anxiety		
	N	%	N	%	N	%		N	%	N	%	n	%	
Age														
▪ 20- < 30	4	33.3	7	58.3	1	8.3	FE/ 0.98	9	75.0	3	25.0	0	0.0	FE / 0.21
▪ 30 - <40	5	38.5	7	53.8	1	7.7		12	92.3	0	0.0	1	7.7	
▪ 40 - < 50	6	33.3	9	50.0	3	16.7		12	66.7	5	27.8	1	5.6	
▪ 50 - <60	3	42.9	3	42.9	1	14.3		4	57.1	2	28.6	1	14.3	
Gender														
▪ Male	9	50.0	8	44.4	1	5.6	FE/ 0.29	14	77.8	3	16.7	1	5.6	FE/ 0.87
▪ Female	9	28.1	18	56.3	5	15.6		23	71.9	7	21.9	2	6.3	
Marital status														
▪ Unmarried	3	21.4	8	57.1	3	21.4	FE/ 0.25	9	64.3	3	21.4	2	14.3	FE/ 0.27
▪ Married	15	41.7	18	50.0	3	8.3		28	77.8	7	19.4	1	2.8	
Education														
▪ Illiterate	1	9.1	6	54.5	4	36.4	FE/ 0.29	5	45.5	3	27.3	3	27.3	FE/ **0.04***
▪ Basic- Intermediate education	15	46.9	15	46.9	2	6.3		27	84.4	5	15.6	0	0.0	
▪ Higher education	2	28.6	5	71.5	0	0.0		5	71.4	2	28.6	0	0.0	
Occupation														
▪ Work	13	41.9	15	48.4	3	9.7	FE/ 0.51	24	77.4	5	16.1	2	6.5	FE/ 0.76
▪ Don't work	5	26.3	11	57.9	3	15.8		13	68.4	5	26.3	1	5.3	

FE: Fisher Exact / No significant if (p > 0.05) / *statistically significant at p ≤ 0.05

Table (8) *Relationship between anxiety levels among the control group of preoperative patients and their demographic characteristics before and after receiving routine hospital care.*

Characteristics	Anxiety levels before receiving routine hospital care						FE or χ2 / p	Anxiety levels after receiving routine hospital care						FE or χ2 / p
	Low anxiety		Moderate anxiety		Potentially concerning levels of anxiety			Low anxiety		Moderate anxiety		Potentially concerning levels of anxiety		
	N	%	N	%	N	%		N	%	N	%	n	%	
Age														
▪ **20- < 30**	4	66.7	2	33.3	0	0.0	FE/ 0.77	6	100.0	0	0.0	0	0.0	FE/ 0.07
▪ **30 - <40**	8	38.1	10	47.6	3	14.3		10	47.6	8	38.1	3	14.3	
▪ **40 - < 50**	4	30.8	7	53.8	2	15.4		4	30.8	7	53.8	2	15.4	
▪ **50 - <60**	5	50.0	5	50.0	0	0.0		2	20.0	7	70.0	1	10.0	
Gender														
▪ **Male**	8	53.3	6	40.0	1	6.7	FE/ 0.60	6	40.0	8	53.3	1	6.7	FE/ 0.75
▪ **Female**	13	37.1	18	51.4	4	11.4		16	45.7	14	40.0	5	14.3	
Marital status														
▪ **Unmarried**	3	27.3	7	63.6	1	9.1	FE/ 0.50	6	54.5	3	27.3	2	18.2	FE/ 0.45
▪ **Married**	18	46.2	17	43.6	4	10.3		16	41.0	19	4.7	4	10.3	
Education														
▪ **Illiterate**	4	44.4	4	44.4	1	11.1	FE/ 1.00	3	33.3	5	55.6	1	11.1	FE/ 0.28
Basic-Intermediate education	15	40.5	18	48.6	4	10.0		15	40.5	17	45.9	5	13.5	
▪ **Higher education**	2	50.0	2	50.0	0	0.0		4	100.0	0	0.0	0	0.0	
Occupation														
▪ **Work**	12	42.9	12	42.9	4	14.3	FE/ 0.50	13	46.9	12	42.9	3	10.7	FE/ 1.00
▪ **Don't work**	9	40.9	12	54.5	1	4.5		9	40.9	10	45.5	3	13.6	

FE: Fisher Exact / No significant if (p > 0.05) / *statistically significant at p ≤ 0.05

5. Discussion

The preoperative period is one of the stressful events for surgical patients scheduled for surgery **(Wondmieneh, 2020).** preoperative anxiety usually starts 2 days before the operation and increases until the day of the procedure. This unpleasant situation affects a patient's comfort and well-being, leading to physiological and psychological changes such as tachycardia and hypertension and ultimately endangering the patient's health **(Baytar, & Bollucuoğlu, 2021).** The practice of pranayama has positive effects on measures of clinical stress and anxiety. It also influences many physiological variables and produces a positive impact on the cardiorespiratory system, where slow-paced breathing leads to decreased systolic and diastolic blood pressure **(Novaes, et al., 2020).** Therefore; This quasi-randomized, controlled study highlights the effect of Nadi Shodhana pranayama exercise on blood pressure and anxiety among preoperative Patients**.**

The results of the present study revealed that more than one third of preoperative patients in study group between forty to less than fifty years old, and about half of control group aged between thirty and less than forty. This is in the line with the study by **Caumo et al., (2015)** on risk factor for preoperative anxiety in adults, which reported that age between thirty and forty-five years was associated with higher preoperative anxiety. This result is inconsistent with the study conducted by **Nigussie, Belachew, & Wolancho, (2014)**, which reported that the presence of preoperative anxiety among patients aged fifty to fifty- nine years.

Regarding gender, the present study showed that females were more prevalent in the studied subjects. This result is consistent with the study conducted by **Abd El GwadElkalashy, R& Masry, (2018)** in Egypt, which reported that most of the studied subjects in both groups were females. This discrepancy may be due to women are sensitive to fearful events and differences in hormone fluctuations. Concerning marital status, the present study revealed that approximately three-

quarters of studied groups were married. Similarly, the study by **Ramesh, Nayak, Pai, George, George, & Devi, (2017)**, which reported that the majority of patients undergoing coronary artery bypass graft surgery were married. From the investigator's point of view, that normal range of marriage's age is between twenty-sixty years.

About educational level, about two-third of the studied groups had basic intermediate education, and the educational characteristics of these subjects were consistent with **Mulugeta, Ayana, Sintayehu, Dessie, & Zewdu, (2018)** study, a larger proportion of anxious surgical patients had lower education level. Contrary to this, the results of study that conducted in Nigeria by **Akinsulore, Owojuyigbe, Faponle, & Fatoye, (2015)** revealed that the level of preoperative anxiety appeared to increase with increasing level of education. This may due to cultural or social differences in learning from one community to another. Regarding occupation, the present study showed that about half of studied group were working. This result is consistent with the study conducted by **Abd El GwadElkalashy, R& Masry, (2018)** in Egypt**, which reported that about half of study and control groups were working.

The present study showed most of studied patients hadn't any medical history. This is the line with the study conducted by Raslan**, Salem, M.AbdElaal, Mahmoud, & Almanzlawi, (2021)** in Egypt on Preoperative Anxiety Level and Fear of Covid 19 among Adult Patients undergoing Elective Surgery, which reported that about two-third of studied group hadn't chronic diseases. This is inconsistent with a study by **Lei, et al (2020)** that showed about third of patients suffered from hypertension and diabetes. From the investigator's point of view that exclusion criteria of studied patients included patients take anti-hypertensive drugs.

Concerning type of surgery, the present study showed that about quarter of studied groups admitted for performing a hernia operation. Similarly, a study by **Seib, et al (2018)** which report that about half of patients had hernia repair. This finding may be due to inguinal hernias more occur in males due to lifting or pushing heavy objects, strenuous physical activity and aging, while umbilical hernias more occur in female due to obesity and pregnancy.

The present study illustrates that there wasn't statistically significant difference between study group and control group related to anxiety levels before practicing Nadi Shodhana pranayama exercise. This is in the line with a study conducted by **(Bhowate, & Valsalan, 2020)**, which reported that in pre-intervention, very few samples of experimental group had mild and sever anxiety, maximum with moderate. In pre-intervention, very few samples of control group had mild, a few had sever anxiety and maximum with moderate.

The present study revealed a significant reduction in anxiety levels among study group after practicing Nadi Shodhana pranayama exercise. This result is roughly consistent with the study conducted by **Chandrababu, Kurup, Ravishankar, & Ramesh, (2019)** on effect of pranayama on anxiety and pain among patients undergoing cardiac surgery**, which reported that there was a more significant decrease in anxiety among patients in the experimental group. This may be due to breathing exercises can help to relax, because they make our bodies feel like they do when we are already relaxed. Deep breathing is one of the best ways to lower stress in the body. This is because when we breathe deeply, it sends a message to our brain to calm down and relax. The brain then sends this message to our body.

The present study shows that there wasn't statistically difference in measurements of blood pressure among study and control groups before practicing Nadi Shodhana pranayama exercise. This is consistent with a study was conducted in turkey by **Uğur, & Uysal, (2020)**, which revealed that no significant difference was observed between first measurements of clinical SBP and DBP in the both groups (study and control group).

The present study revealed a significant improvement in measurements of blood pressure among study group. A bout two-third of study group had blood pressure ($\leq 120/80$), and less than one-third of study group after practicing Nadi Shodhana pranayama exercise had blood pressure (130/90). This is in the line with a study was conducted by **Agrawal, Sinha, & Garg, (2020),** which revealed that there was a significant decline in both systolic and diastolic blood pressure after Pranayama. This may be due to the slow and deep breathing technique activates the parasympathetic nervous system, which effectively manages the heart rate and dilates blood vessels, which in turn controls overall blood pressure. Nadi shodhana pranayama produces a positive impact on the cardiorespiratory system, where slow-paced breathing leads to decreased systolic and diastolic blood pressure.

The present study revealed that there wasn't statistically significant relationship between anxiety levels among study group and their demographic characteristics before and after practicing of Nadi

shodhana pranayama exercise except in educational level after practicing of exercise. Also, it revealed that there wasn't statistically significant relationship between anxiety levels among control group and their demographic characteristics before and after receiving of routine hospital care. This result was consistent with **Wondmieneh, (2020)**, who reported that Socio-demographic factors such as age, sex, religion, marital status, ethnicity, occupation, monthly income, and educational status have not shown any significant association with preoperative anxiety. Unlike a study was conducted by **Mulugeta, et al (2018)**, which found that the socio-demographic characteristics that were significantly associated with preoperative anxiety were sex and educational level. This may due to cultural or socio-demographic differences from one community to another.

6. Conclusion

The results of the present study showed that, Nadi Shodhana pranayama exercise has a positive effect on decrease level of anxiety and regulate blood pressure among preoperative patients.

7. Recommendations

Patients undergoing surgical operations should be encouraged to practice exercise of Nadi Shodhana pranayama, and this can be helped by providing them with illustrated, colored and simplified booklet. The same study could be replicated on a large sample size of patients in a different clinical setting, and with a different diagnosis.

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