

## Effect of Practicing Deep Breathing Exercise on Improving Quality of Life of Gastroesophageal Reflux Disease Patients

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**Abstract:** Breathing could play a role in overall treatment plan of gastroesophageal reflux disease (GERD). A 2011 study published in *The American Journal of Gastroenterology* indicates diaphragm exercises may have a positive effect on reflux symptoms. Aim: Was to study the effect of practicing deep breathing exercises on improving quality of life of gastroesophageal reflux disease patients. Design: a quasi-experimental study design. Setting: The study was carried out in medical units and outpatient clinics of two hospitals, EL-Hussein and Bab-ELSharia university hospitals, Egypt. Subjects: A convenient sample of 50 adult patients from both genders who agreed to participate in the study according to inclusion criteria. Tools: Three tools were used to collect data include: tool I. Patient socio-demographic characteristics data, tool II. Interview questionnaire sheet, tool III. GERD- Health Related Quality of Life Questionnaire (GERD-HRQD) Pre, post and follow up breathing exercises. Results: total score of study group pre breathing exercise had highly significant correlation with total score of study group post and follow up breathing exercise ( $P= 0.00,.002$ ). So, the breathing exercise has a positive effect in improving the gastroesophageal reflux disease and patients' quality of life. Conclusion: Considering its safety and cost effectiveness the breathing training exercise could play a crucial role in the management of mild GERD and improvement of health outcomes. Recommendations: Encourage patients of GERD to make lifestyle changes which can play an important role in GERD therapy and education of patients with GERD to do deep breathing exercise, lose weight, quit smoking and eat healthy food can help in managing symptoms. Pay more attention to the importance of identification and management of psychological impact in improving QOL in GERD patients besides physical symptoms of it. Don't replace GERD treatments and apply the breathing exercise as a complementary therapy.

**Key words:** Breathing exercises, Gastro-esophageal reflux disease (GERD), Health related Quality of life (HRQOL).

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### I. Introduction

Gastro-esophageal reflux disease (GERD) is a common health problem consisting of typical symptoms such as acid regurgitation and heartburn at least once weekly, GERD is frequently accompanied by chest pain, which is the most common atypical symptom of GERD. In fact, gastroesophageal reflux is considered the primary mechanism responsible for chest pain without cardiac origin, commonly known as non cardiac chest pain (NCCP), (Zhang, et al., 2017[1]) and (American College of Gastroenterology (ACG), 2016 [2]) mentioned that more than 60 million Americans experience heartburn at least once a month. Symptoms include: burning sensation in the center of chest that lasts from several minutes to an hour or two, feeling of chest pressure or pain that is worse if patient bends over or lies down, sour, bitter, or acidic taste in the back of throat and feeling that food is “stuck” in throat or the middle of chest.

Heartburn and gastroesophageal reflux disease, or GERD, are frequent causes of sleeplessness. As many as one in four people who experience sleep disturbances report that they have nighttime heartburn. For people who have been diagnosed with GERD, the rate is even higher, three people out of four report having nocturnal GERD symptoms. These individuals are more likely to suffer sleep problems such as insomnia, sleep apnea, and daytime sleepiness as a result of their nighttime heartburn. Sleeplessness poses a serious health problem. In addition to the physical and mental effects that stem from lack of sleep, people who experience nocturnal GERD are at greater risk for some of the worst complications of the disease, including erosive esophagitis, dyspepsia, and esophageal cancer (Thompson, 2011[3]).

Gastroesophageal reflux is a frequent cause of chronic persistent cough. Approximately 10% of chronic persistent cough patients have prominent GERD symptoms; however, GERD can be clinically ‘silent’ in up to

75% of patients with GERD-related cough. Asthmatics also have a high GERD prevalence and have predisposing factors for GERD development. Therapy for GERD has the potential to improve asthma symptoms. Similar to chronic cough, GERD may be clinically 'silent' in up to 65% of asthmatics who do not have GERD symptoms. Patients with COPD have a higher incidence of heartburn and dysphagia and are more likely to use GERD medications (**Ali, Abdelhamid and Shalaby, 2016[4]**).

Symptoms of GERD may also result from increased intra-abdominal pressure (such as from obesity, ascites, pregnancy, or even tight clothes), when the gastric contents are located near the gastroesophageal junction (such as in the recumbent position, bending over, or with a hiatal hernia), or with decreased saliva. Emotional stress may cause a worsening of GERD, especially in people with high levels of anxiety (**Johnson, et al., 2010[5]**).

Health related quality of life (HRQOL) can be defined as the functional effect of an illness and its therapy on an individual, as perceived by the individual himself or herself. The domains that determine HRQOL include physical and occupational function, emotional state, social interactions, and somatic sensation. These determinants can also be further classified as simply disease related, including symptom severity, treatment efficacy, and adverse effects of treatment, or disease independent factors, such as sex or age, education and knowledge, personality and coping skills, culture, and beliefs (**Mouli and Ahuja, 2011[6]**).

Deep-breathing exercises can decrease acid reflux in adults with mild gastroesophageal reflux disease, or GERD, according to a recent clinical trial published in the American Journal of Gastroenterology. Researchers believe the breathing technique can strengthen the muscles of the diaphragm, preventing the esophagus from opening and allowing stomach acid to back up (**Fetters, 2011[7]**).

Gastroesophageal reflux results from failure of the barrier mechanism of the lower esophageal sphincter (LES), allowing the distal esophagus to be exposed to gastric juice. This loss of barrier function has been considered a defective LES in patients with gastroesophageal reflux disease (GERD). Some studies have shown that contraction of the crural diaphragm increases LES pressure and help strengthen the muscles that surround the lower esophageal sphincter, which controls the flow of stomach contents (**Sun , Shang , Wang , Liu , Fang and Ke, 2016[8]**).

#### **Significance of the study:**

Gastroesophageal reflux disease (GERD), or "heartburn", is a common phenomenon; in United States, 15-20% of people have heartburn or regurgitation at least once a week, and 7% of people suffer from those symptoms daily. GERD occurs due to the abnormal passage of acidic stomach contents, or refluxate, into the esophagus. A variety of symptoms occur with GERD, including retrosternal burning, acid regurgitation, nausea, vomiting, chest pain, laryngitis, cough, and dysphagia. The injury to the esophagus can include esophagitis, stricture, the development of columnar metaplasia (Barrett's esophagus), and adenocarcinoma (**Wileman, et al, 2010[9]**).

Age, male sex, obesity, and hiatus hernia (HH) were the purported risk factors for GERD. Changes in preference to a more Westernized diet and lifestyle were considered responsible for the increase in reflux disease in Asia. There are no population based studies describing the prevalence of GERD in the African countries (**Gado, Ebeid, Abdelmohsen and Axon, 2015[10]**). In a 2003 German study of more than 6,000 GERD patients, most reported that their quality of life had been compromised because of problems with food, drink, and sleep, as well as social and physical limitations. There are also financial repercussions due to buying so many heartburn medications (**Macmillan Amanda, 2011[11]**).

#### **Aim of the study:**

Was to study the effect of practicing deep breathing exercises on improving quality of life of gastroesophageal reflux disease patients through:

1. Assessing the knowledge and symptoms of GERD patients.
2. Assessment of HRQOL of GERD patients.
3. Implementing a training deep breathing exercise for participants.
4. Evaluate the effectiveness of practicing deep breathing exercises on improving quality of life and decreasing symptoms of reflux.

#### **Hypothesis:**

Deep breathing exercises will improve the quality of life of gastroesophageal reflux disease patients.

## **II. Subjects and methods**

**2.1. Research Design:** The study utilized a quasi-experimental study design.

**2.2. Settings:** The study was carried out in medical units and outpatient clinics of two hospitals, EL-Hussein University Hospital and Bab-ELSharia University Hospital, Egypt.

**2.3. Subjects:** A convenient sample of 50 adult patients from both genders who agreed to participate in the study according to inclusion and exclusion criteria, then divided randomly into two equal groups, control group and study group 25 patients in each. The inclusion criteria were; a. History of typical reflux symptoms such as heartburn, acid reflux, and regurgitation for a minimum of 6 months, b. Age between 20 and 60 years. The exclusion criteria were; a. History of upper gastrointestinal surgery, b. Women who was pregnant or lactating.

**2.4. Data collection tools:** Three tools were used to collect data include:

**2.4.1. Patient's socio- demographic characteristics data:** This tool was developed by the researchers after reviewing the recent related literature. It consists of two parts: Part 1: Socio-demographic characteristics such as age, sex and educational level. Part 2: It includes patient's medical history which includes diagnosis, previous history of reflux, presence of chronic disease, smoking, type of diet and weight.

**2.4.2. Interview questionnaire sheet:** This tool was developed by the researchers after reviewing the recent related literature. It is used to assess signs and symptoms of reflux pre, post (after 4 weeks) and follow up (after 8 weeks) of respiratory exercises application. It contains questions about presence of heartburn, chest pain, hoarseness, sore throat, cough, nausea, disturbance of sleep and asthma. Scoring system: Questions were scored one = Yes, and zero = No.

**2.4.3. GERD- Health Related Quality of Life Questionnaire (GERD-HRQL):** Pre, post and follow up breathing Exercises, this tool adopted from **Velanovich, (2007[12])**. It is translated to Arabic by the researchers. It has 16 items scored on 6-point Likert scales addressing domains like severity of heartburn, conditions of heartburn, change, pain occurrence, difficulty of swallowing and regurgitation. **Scoring system:** Questions were scored as the following: Zero was given for no symptoms, 1 for Symptoms noticeable but not bothersome, 2 for Symptoms noticeable and bothersome but not every day, 3 for Symptoms bothersome every day, 4 for Symptoms affect daily activity and 5 for Symptoms are incapacitating to do daily activities. **Total Score:** Calculated by summing the individual scores to questions 1-15. **(a)** Greatest possible score (worst symptoms) = 75, **(b)** Lowest possible score (no symptoms) = 0. **Heartburn Score:** Calculated by summing the individual scores to questions 1-6. **(a)** Worst heartburn symptoms = 30, **(b)** No heartburn symptoms = 0, Scores of  $\leq 12$  with each individual question not exceeding 2 indicate heartburn elimination. **Regurgitation Score:** Calculated by summing the individual scores to questions 10-15. **(a)** Worst regurgitation symptoms = 30, **(b)** No regurgitation symptoms = 0, Scores of  $\leq 12$  with each individual question not exceeding 2 indicate regurgitation elimination.

### **Tools Validity and Reliability**

The validity of the tools was tested by offered to 5 academic expertise of Adult nursing (medical surgical nursing) from the Faculty of Nursing. To determine relevance, clarity, completeness and comprehensiveness of the tools, experts responses were either agree or disagree for the face validity. Then their opinions are reviewed and final questionnaire were prepared and used. The reliability of the tools was measured through ten percent of the patients using the established questionnaire and retested after four week on the same sample and the results were the same in each time.

### **I. Pilot Study**

A pilot study was carried out on 10% of sample size, involving 5 patients to evaluate the efficiency, reliability, clarity and applicability of the tools, and then the tools were adapted according to the pilot study results. Subjects included in pilot study not excluded from the total sample as no modification of study tools were done.

### **II. Ethical considerations**

The ethical research consideration in this study was including the following: 1. The researchers explain the objective and aim of the study to the subjects who agreed to participate in the study. 2. Subjects were informed that they are allowed to choose to participate or not in the research and that they have the right to withdraw from the research at any time. 3. Data collection was for research only and it burned after data analysis.

### **III. Field work**

After obtaining official permission to carry out the study, the researchers were introduced themselves to the patients and explained the purpose of the study. The oral consent was obtained from the participants. The data collection of the study was covered a period of four months from beginning of November 2017 and to the end of February 2018 in the previously mentioned settings, and the researchers were available in the

study settings 3 times/week from 9.00 a.m. to 1.00 p.m. The structured interview questionnaire took about 25 minutes to be filled. Post-test were conducted at the end of the exercises training.

**Administrative Design:**

The present study was carried out after taking an official permission from the administrators of the study settings at EL-Hussein University Hospital and Bab-ELSharia Hospital outpatient clinics by presented of an official letter taken from the Faculty of Nursing, Helwan University, after the aim of the study were explained clearly.

**The Breathing Exercise was done in four phases:**

**Assessment phase:** The researchers interviewed each subject individually and clarified the aim of the study, informed not to stop any medication of GERD, then asked for participation. They met the subject's and filled the questionnaire to evaluate their symptoms and to collect personal data and assess patient condition. The data that was obtained during this phase was considered the basis for the training exercise (pre-test).

**Planning phase:** After identified the patient condition and symptoms the training exercise was explained by the researchers, based on the assessment phase results. It was designed to improve subject's respiration and strengthen the diaphragm muscles.

**Implementation phase:** The training of deep breathing exercise explained in simple Arabic language to be appropriate for subject's understanding. The exercise was done first by the researchers and asked the subject to do it in front of the researchers to assert the accuracy of doing the exercise; the session for theoretical and application part took about 30 minutes. The training exercise was executed in 2 months given in an average for three days per week.

**Evaluation phase:** The evaluation was assessed after 4 weeks through posttest using the same format of pretest tools and follow up after another 4 weeks. The researcher explained the deep breathing exercise to the control group after finishing the study and they had the freedom to apply it or not if they wanted it.

**Limitation of the study**

Some patients were not present every week so some data of post exercise and follow up collected through telephone call. Some patients refused to participate in the research and to attend the training session due to time and over crowdedness of outpatient's clinic.

**Statistical analysis**

All statistical analyses were performed using SPSS for windows version 20.0. Data were tested for normality of distribution prior to any calculations. Continuous data were normally distribute and were expressed in mean  $\pm$  standard deviation (SD). Categorical data were expressed in number and percentage. The chi-square test was used for comparison of variables with categorical data. Statistical significance was set at  $p < 0.05$ .

**III. Results**

**Table (1):** Descriptive statistics for both study and control group regarding socio-demographic characteristics (n=25 for each group).

Items	Study (n=25)		Control (n=25)		X <sup>2</sup>	P
<b>1. Age/Years</b>						
Mean $\pm$ SD	2.96 $\pm$ 1.05		3.08 $\pm$ .953			
Range	20-60		20-60			
	N	%	N	%		
<b>2. Age Category [n(%)]</b>						
a. 20-30 years	4	16	1	4.0	5.19	.817
b. 31-40 years	2	8.0	7	28.0		
c. 41-50 years	10	40	6	24.0		
d. 51-60 years	9	36.0	11	44.0		
<b>3. Gender [n (%)]</b>						
a. Male	11	44.0	16	64.0	2.93	.87
b. Female	14	56.0	9	36.0		
<b>4. Educational level [n (%)]</b>						
a. Illiterate	13	52.0	10	40.0	12.75	.17
b. Read & write	7	28.0	7	28.0		
c. Diploma	2	8.0	5	20.0		
d. University	3	12.0	3	12.0		

Table (1) shows that, the study group (44.0%) were males and (56.0%) were females with mean and standard deviation of age (2.96±1.05) years old. (40%) of them were between age 41-50 years old and (36.0%) were between age 51 to 60 years old. In relation to education level, (52%) of the study sample were illiterate, (28%) of them can read and write while (12%) of them were university education. In the control group, (64%) were males and 36% were females with mean and standard deviation of age (3.08±.953) years old. (44%) of them were between age 51-60 years old and (28%) were between age 31-40 years old and (24%) were between age 41-50 years old. In relation to education level, (40%) of the study sample were illiterate, (28%) of them can read and write while, (20%) were diploma and (12%) of them were university education.

**Table (2):** Descriptive statistics for both study and control group regarding medical history (n=25 for each group).

Items	Study (n=25)		Control (n=25)		X <sup>2</sup>	P
	N	%	N	%		
<b>1. Hospital unit</b>						
a. Medical unit	5	20.0	5	20.0	.000	1.000
b. Outpatient clinic	20	80.0	20	80.0		
<b>2. Diagnosis</b>					3.81	.701
a. Hernia	4	16.0	6	24.0		
b. Peptic ulcer	9	36.0	7	28.0		
c. Others	12	48.0	12	48.0		
<b>3. Previous history of reflux</b>					.108	.742
a. Yes	15	60.0	14	56.0		
b. No	10	40.0	11	44.0		
<b>4. Presence of chronic disease</b>					1.025	.599
a. Hypertension	7	28.0	7	28.0		
b. Others	18	72.0	18	72.0		
<b>5. Take medication for chronic illness</b>					.244	.622
a. Yes	14	56.0	10	40.0		
b. No	11	44.0	15	60.0		
<b>6. Smoking</b>					.427	.513
a. Yes	10	40.0	12	48.0		
b. No	15	60.0	13	52.0		
<b>7. Type of diet</b>					8.667	.469
a. Spicy food	6	24.0	10	40.0		
b. Fatty food	12	48.0	12	48.0		
c. Fried diet	2	8.0	2	8.0		
d. Caffeinated beverages	5	20.0	1	4.0		
<b>8. Weight</b>					1.159	.282
a. Obese	9	36.0	9	36.0		
b. Not Obese	16	64.0	16	64.0		

Table (2) reveals that, in the study group (80%) of patients in the study group were presented to outpatient clinic, (36%) of them had peptic ulcer, (16%) of them had hernia and (48%) of them were had other complains. As regards previous history of reflux, (60%) of them suffered from it, and (72%) of them had different chronic illness while, (28%) of them had hypertension and more than half of them were take medication for chronic illness. In relation to smoking, (60%) of the study sample did not smoke, about half of them ate fatty food, (24%) of them preferred spicy food and (20%) of them were take caffeinated beverages. Regarding to weight, (64%) of the study group were not obese while, (36%) of them were obese.

In relation to control group, (80%) of them presented to outpatient clinic, (28%) of them diagnosed by peptic ulcer, (24%) of them had hernia, while, (48%) of them had other complains. As regards to previous history of reflux, (56%) of them had it. In relation to chronic illness, the same percentage as study group (72%) had chronic illnesses other than hypertension and (40%) of control group took medication to it. As regards to smoking, (52%) of control group did not smoke. (48%) of them preferred fatty food and (40%) of them were ate spicy food. As the study group, (64%) of the control group were not obese.

**Table (3):** Comparison between the two studied groups regarding their signs and symptoms pre and post breathing exercise (n=25 for each group).

Items	Pre breathing Exercise				Post breathing exercise (1 month)			
	Study group		Control group		Study group		Control group	
	N	%	N	%	N	%	N	%
<b>1-Do you have horrible heart burn?</b>								
Yes	22	88	23	92	6	24	23	92
No	3	12	2	8	19	76	2	8
Mean± SD	0.88±0.33		0.92±0.27		0.24±0.43		0.92±0.27	
<b>2- Do you suffer from chest pain?</b>								
Yes	11	44	10	40	1	4	10	40
No	14	56	15	60	24	96	15	60
<b>3- Do You feel pain worsens at rest?</b>								
Yes	19	76	16	64	2	8	16	64
No	6	24	9	36	23	92	9	36
<b>4- Do you suffer from pain post meal?</b>								
Yes	24	96	23	92	4	16	23	92
No	1	4	2	8	21	84	2	8
<b>5-Do you feel bitter taste?</b>								
Yes	22	88	22	88	11	44	22	88
No	3	12	3	12	14	56	3	12
<b>6-Presence of hoarseness</b>								
Yes	2	8	5	20	0	-	5	20
No	23	92	20	80	25	100	20	80
<b>7- Presence of sore throat</b>								
Yes	9	36	11	44	4	16	11	44
No	16	64	14	56	21	84	14	56
<b>8-Presence of cough, chronic cough and wheezing</b>								
Yes	8	32	12	48	3	12	12	48
No	17	68	13	52	22	88	13	52
<b>9- Presence of Extra Saliva</b>								
Yes	18	72	14	56	8	32	14	56
No	7	28	11	44	17	68	11	44
<b>10-Do you have nausea</b>								
Yes	16	64	15	60	1	4	15	60
No	9	36	10	40	24	96	10	40
Mean± SD	0.64±0.48		0.60±0.50		0.04±0.02		0.60±0.50	
<b>11-Do you suffer from asthma?</b>								
Yes	8	32	3	12	2	8	3	12
No	17	68	22	88	23	92	22	88
<b>12-Do you suffer from trouble swallowing?</b>								
Yes	22	88	23	92	7	28	23	92
No	3	12	2	8	18	72	2	8
<b>13-Do Acid reflux disturb your sleep?</b>								
Yes	20	80	23	92	4	16	23	92
No	5	20	2	8	21	84	2	8
<b>14-Do you drink extra water with meals?</b>								
Yes	13	52	15	60	8	32	15	60
No	12	48	10	40	17	68	10	40
<b>15-Do you wear any tight cloths or belts?</b>								
Yes	9	36	2	8	4	16	2	8
No	16	64	23	92	21	84	23	92

Table (3) shows that, ( 88%) of the study group were suffer from horrible heart burn before practicing the breathing exercise, this percentage decreased after practicing the exercise to (24%). In relation to chest pain more than (40%) of them were suffer from chest pain before exercise and improved after exercise to (4%) , (76%) of them felt pain worsens at rest before practicing the exercise decreased to (8%) after exercise and the majority of them suffer from pain post meal improved to (16%) after exercise. As regards to feeling by bitter taste (88%) of them felt it before exercise decreased to (44%) after practicing the exercise.

The same table also reveals improvement of signs and symptoms of GERD of the study group in relation to presence of hoarseness, sore throat, presence of cough and wheezing and presence of extra saliva after practicing the breathing exercise. As regards to having nausea, (64%) of the study group has it before exercise improved to (4%) after it. (88%) of the study group suffered from trouble swallowing was improved to (28%) after practicing exercise. In relation to if acid reflux disturb sleep (80%) of the study group suffered from it before practicing breathing exercise improved to (16%) after it. (52%) of the study group were drink extra

water with meals decreased to (32%) after applying the exercise. In relation to wearing tight cloths or belts, (36%) of the study group were wear it before exercise and decreased to (16%) after exercise. This table also illustrates that, the control group answers not changed from interview and after one month.

**Table (4):** Comparison between the two studied groups regarding their signs and symptoms after 2 month from applying breathing exercise (n=25 for each group).

Items	Follow up (2 months from breathing exercise)				2 months			
	Study group				Control Group			
	N	%	t	p	N	%	t	p
<b>1-Do you have horrible heart burn?</b>								
Yes	7	28	3.05	.00**	23	92	16.61	.000*
No	18	72			2	8		
<b>2- Do you suffer from chest pain?</b>								
Yes	3	12	1.80	.083	10	40	4.00	.001*
No	22	88			15	60		
<b>3- Do You feel pain worsens at rest?</b>								
Yes	5	20	2.44	.022**	16	64	6.53	.000*
No	20	80			9	36		
<b>4- Do you suffer from pain post meal?</b>								
Yes	10	40	4.00	.001**	23	92	16.61	.000*
No	15	60			2	8		
<b>5-Do you feel bitter taste?</b>								
Yes	12	48	4.70	.000**	22	88	13.26	.000*
No	13	52			3	12		
<b>6-Presence of hoarseness</b>								
Yes	3	12	1.80	.083	5	20	2.44	.022*
No	22	88			20	80		
<b>7- Presence of sore throat</b>								
Yes	5	20	2.44	.022**	11	44	4.34	.000*
No	20	80			14	56		
<b>8-Presence of cough, chronic cough and wheezing</b>								
Yes	3	12	1.80	.083	12	48	4.70	.000*
No	22	88			13	52		
<b>9- Presence of Extra Saliva</b>								
Yes	2	8	1.44	.161	14	56	5.52	.000*
No	23	92			11	44		
<b>10-Do you have nausea</b>								
Yes	1	4	1.00	.327	15	60	6.00	.000*
No	24	96			10	40		
<b>11-Do you suffer from asthma?</b>								
Yes	2	8	1.44	.161	3	12	1.80	.083
No	23	92			22	88		
<b>12-Do you suffer from trouble swallowing?</b>								
Yes	12	48	4.70	.000**	23	92	16.61	.000*
No	13	52			2	8		
<b>13-Do Acid reflux disturb your sleep?</b>								
Yes	4	16	2.13	.043**	23	92	16.61	.000*
No	21	84			2	8		
<b>14-Do you drink extra water with meals?</b>								
Yes	10	40	4.00	.001**	15	60	6.00	.000*
No	15	60			10	40		
<b>15-Do you wear any tight cloths or belts?</b>								
Yes	6	24	2.75	.011**	2	8	1.445	.161
No	19	76			23	92		

**\*\*Significant at p<0.05**

Table(4) illustrates that, Breathing exercise had significant effect on decreasing the manifestations of GERD in the study group after two months of practicing breathing exercise as heart burn(28%), chest pain (12%), feeling by bitter taste(48%), presence of hoarseness(12%) and sore throat (20%) comparing to pre exercise. It is worth mentioning that, some percentages increased in follow up than it in after post exercise (1 month) of applying breathing exercise like suffering from trouble swallowing(48%), acid reflux disturbing sleep(16%), drinking extra water with meals (40%) and wearing any tight belts or cloths(24%). This table also shows that, the control group answers not changed from interview and after two months

Figure (1): Comparison between the two study groups regarding effect of acid reflux on sleep disturbance.

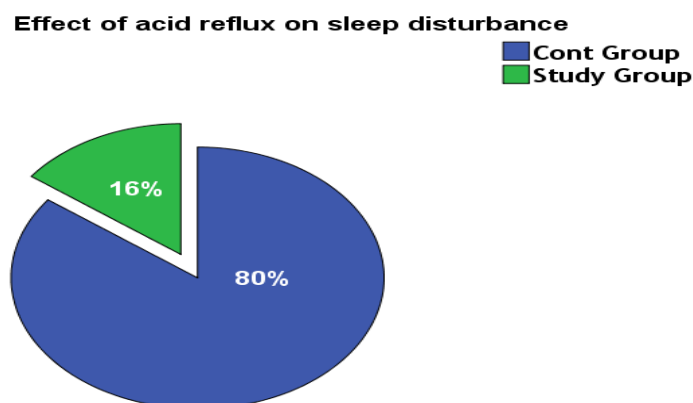


Table (5): Descriptive statistics of the two studied groups pre the breathing exercise regarding Health related Quality of Life questionnaire (GERD-HRQL)(n=25 for each group)

Items	Pre breathing Exercise											
	No Symptoms (0)		Symptoms noticeable but not bothersome (1)		Symptoms noticeable and bothersome but not every day (2)		Symptoms bothersome every day (3)		Symptoms Affect daily activity (4)		Symptoms are incapacitating to do daily activities (5)	
	N	%	N	%	N	%	N	%	N	%	N	%
<b>1-How bad is the heart burn?</b>												
Study group	-	-	10	40	3	12	6	24	6	24	-	-
Control group	1	4	4	16	7	28	10	40	3	12	-	-
<b>2- Heart burn when lying down?</b>												
Study group	-	--	5	20	11	44	1	4	5	20	3	12
Control group	4	16	7	28	3	12	8	32	1	4	2	8
<b>3-Heart burn when standing up?</b>												
Study group	9	36	7	28	2	8	6	24	-	-	1	4
Control group	2	8	9	36	14	56	-	-	-	-	-	-
<b>4- Heart burn after meals?</b>												
Study group	-	-	2	8	-	-	2	8	8	32	13	52
Control group	-	-	-	-	3	12	5	20	2	8	15	60
<b>5-Does heart burn changes your diet?</b>												
Study group	-	-	1	4	4	16	5	20	11	44	4	16
Control group	-	-	-	-	5	20	15	60	3	12	2	8
<b>6-Does heart burn wakes you from sleep?</b>												
Study group	2	8	10	40	10	40	2	8	1	4	-	-
Control group	-	-	9	36	11	44	5	20	-	-	-	-



<b>7- Do You have difficulty swallowing?</b>													
Study group	4	16	14	56	3	12	2	8	-	-	2	8	
Control group	-	-	13	52	8	32	4	16	-	-	-	-	
<b>8-Do you have pain with swallowing?</b>													
Study group	3	12	13	52	4	16	1	4	4	16	-	-	
Control group	3	12	12	48	6	24	4	16	-	-	-	-	
<b>9- If you take medication does this affect your daily life?</b>													
Study group	2	8	3	12	6	24	8	32	5	20	1	4	
Control group	-	-	2	8	17	68	6	24	-	-	-	-	
<b>10-How bad is the regurgitation?</b>													
Study group	2	8	-	-	7	28	-	-	5	20	11	44	
Control group	-	-	4	16	8	32	-	-	4	16	9	36	
<b>11-Regurgitation when lying down?</b>													
Study group	2	8	5	20	6	24	6	24	5	20	1	4	
Control group	-	-	2	8	9	36	10	40	1	4	3	12	
<b>12-Regurgitation when standing up?</b>													
Study group	9	36	7	28	5	20	3	12	-	-	1	4	
Control group	-	-	7	28	12	48	4	16	-	-	2	8	
<b>13-Regurgitation after meals?</b>													
Study group	-	-	-	-	1	4	4	16	9	36	11	44	
Control group	-	-	-	-	9	36	6	24	2	8	8	32	
<b>14-Does regurgitation changes your diet?</b>													
Study group	-	-	1	4	4	16	5	20	11	44	4	16	
Control group	-	-	-	-	1	4	13	52	11	44	-	-	
<b>15-Does regurgitation wakes you from sleep?</b>													
Study group	3	12	14	56	5	20	1	4	2	8	-	-	
Control group	-	-	12	48	7	28	-	-	-	-	2	8	

Table(5) shows that, (40%) of the study group had Symptoms noticeable but not bothersome related to bad heart burn while, about one quarter of them had symptoms bothersome every day and the same percentage found these symptoms affect daily activity. (44%) of the study group had heart burn when lying down which were noticeable and bothersome but not every day and (20%) of them had symptoms affect daily activity. In relation to heart burn after meals, (52%) of the study group these symptoms were incapacitating to do daily activities. (44%) of the study group found that heart burn change their diet and affect their daily activities. As regards to how bad is the regurgitation, (44%) of the study group answered that the symptoms were incapacitating to do daily activities, and the same percentage found that regurgitation after meals was also incapacitating to do daily activities.

This table also illustrates that (40%) of the control group had heart burn bothersome every day, (56%) of them had heart burn when standing up which were noticeable and bothersome but not every day. In relation to heart burn after meals, (60%) of the control group mentioned that, it was incapacitating to do daily activities and the same percentage had heart burn changed their diet and bothersome every day. As regards regurgitation when standing up,(48%) of them found that it was noticeable and bothersome but not every day and (52%) of them stated that regurgitation change their diet and bothersome every day.

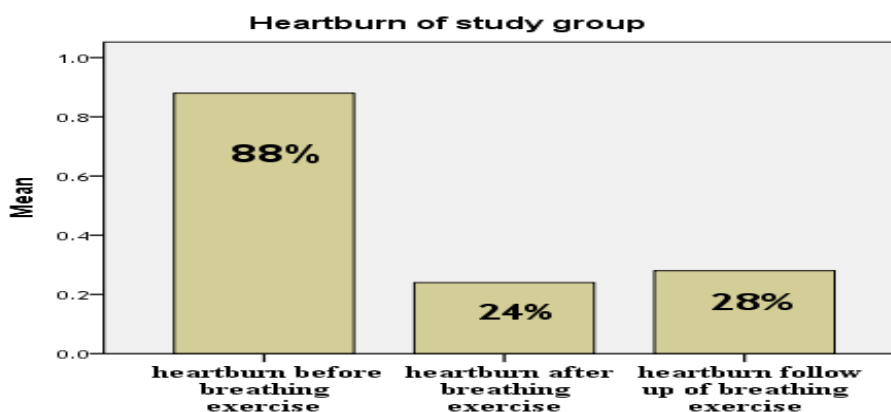
**Table (6):** Comparison between the study group post and follow up( 2 months) after practicing the breathing exercise( n=25).

Items	Study group Post & follow up breathing Exercise											
	No Symptom s (0)		Symptoms noticeable but not bothersome (1)		Symptoms noticeable and bothersome but not every day(2)		Symptoms bothersome every day (3)		Symptoms Affect daily activity (4)		Symptoms are incapacitating to do daily activities (5)	
	N	%	N	%	N	%	N	%	N	%	N	%

<b>1-How bad is the heart burn?</b>												
Post												
Follow up	10 6	40 24	10 13	40 52	- 3	- 12	5 1	20 4	- 2	- 8	- -	- -
<b>2- Heart burn when lying down?</b>												
Post												
Follow up	5 3	20 12	12 13	48 52	- 4	- 16	5 1	20 4	- 4	- 16	- -	- -
<b>3-Heart burn when standing up?</b>												
Post												
Follow up	18 13	72 52	1 7	4 28	5 5	20 20	1 -	4 -	- -	- -	- -	- -
<b>4- Heart burn after meals?</b>												
Post	2	8	2	8	10	40	9	36	2	8	-	-
Follow up	2	8	5	20	7	28	9	36	2	8	-	-
<b>5-Does heart burn change your diet?</b>												
Post												
Follow up	4 1	16 4	9 9	36 36	6 9	24 36	2 2	8 8	4 1	16 4	- 3	- 12
<b>6-Does heart burn wake you from sleep?</b>												
Post												
Follow up	12 4	48 16	11 18	44 72	2 3	8 12	- -	- -	- -	- -	- -	- -
<b>7- Do You have difficulty swallowing?</b>												
Post												
Follow up	13 10	5 40	8 13	32 52	1- -	4 -	3 2	12 8	- -	- -	- -	- -
<b>8-Do you have pain with swallowing?</b>												
Post												
Follow up	14 13	56 52	5 7	20 28	4 1	16 4	2 2	8 2	- 2	- 8	- -	- -
<b>9- If you take medication does this affect your daily life?</b>												
Post												
Follow up	5 2	20 8	12 14	48 56	6 4	24 16	2 5	8 20	- -	- -	- -	- -
<b>10-How bad is the regurgitation?</b>												
Post												
Follow up	2 2	8 8	7 5	28 20	11 14	44 56	5 4	20 16	- -	- -	- -	- -
<b>11-Regurgitation when lying down?</b>												
Post												
Follow up	7 6	28 24	10 9	40 36	3 7	12 28	5 1	20 4	- 2	- 8	- -	- -
<b>12-Regurgitation when standing up?</b>												
Post												
Follow up	15 15	60 60	6 6	24 24	4 4	16 16	- -	- -	- -	- -	- -	- -
<b>13-Regurgitation after meals?</b>												
Post	-	-	7	28	10	40	6	24	2	8	-	-
Follow up	-	-	5	20	6	24	1 3	52	1	4	-	-
<b>14-Does regurgitation changes your diet?</b>												
Post												
Follow up	1 1	4 4	12 10	48 40	5 6	20 24	5 5	20 20	2 3	8 12	- -	- -
<b>15-Does regurgitation wakes you from sleep?</b>												
Post												
Follow up	15 10	60 40	5 10	20 40	4 5	16 20	1 -	4 -	- -	- -	- -	- -

Table (6) reveals that, in the study group (40%) of them had no symptoms after practicing the breathing exam and also the same percentage has symptoms but not bothersome. In relation to heart burn when standing up, (72%) of them had no symptoms after breathing exercise, (48%) did not have heart burn wake them from sleep while (56%) were not had pain with swallowing. In relation to regurgitation, (60 %) of the study group did not had it when standing up and the same percentage found that regurgitation not wake them from sleep. This table also shows that, after 2 months of follow up of practicing breathing exercise, most of percentages improved more than in post study findings.

**Figure (2):** Heart burn of study group (pre-post- follow up) breathing exercise.



**Table (7):** Descriptive statistic between the two study groups regarding their condition satisfaction (n=25 for each group).

	Study group						Control Group	
	Pre exercise		Post exercise		Follow u p		N	%
	N	%	N	%	N	%		
<b>Satisfied</b>	5	20	7	28	8	32	6	24
<b>Neutral</b>	3	12	13	52	10	40	10	40
<b>Dissatisfied</b>	17	68	5	20	7	28	9	36

Table (7) shows that, the satisfaction of the study group of their condition improved in post practicing the breathing exercise more than pre exercise (20%) pre it and became (28%) post it. And increased to (32%) at follow up period (2 months after), while (24%) were satisfied by their condition in the control group.

**Table (8):** Correlation between the two study groups in relation to total score of interview questionnaire sheet and GERD-HRQL.

Correlations	Total score control group	Total score study group pre exercise	Total score study group post exercise	Total score study group follow up exercise
<b>Total score control group</b>	1.00	0.227 0.276	0.289 0.160	0.179 0.393
<b>Total score study group pre exercise</b>	0.227 0.276	1.00	0.680** 0.000	0.598** 0.002
<b>Total score study group post exercise</b>	0.289 0.160	0.680** .000	1.00	0.372 0.067
<b>Total score study group follow up exercise</b>	0.179 0.393	0.598** 0.002	0.372 0.067	1.00

\*\*Significant at p<0.05

Table(8) reveals that, total score of study group pre breathing exercise had highly significant correlation with total score of study group post and follow up breathing exercise (P= 0.00,.002) respectively.

#### IV. Discussion

Gastroesophageal reflux disease (GERD) is a common chronic disorder, which has a significant impact on patients' quality of life. Deep breathing exercise technique can provide accurate benefits and improving health outcome for patients suffering from GERD, in the same way breathing technique also improves patient health outcomes in a cost effective way. Breath and patterns of breathing can be changed by the focused and deliberate control of the individual. Purposefully and consciously changing the breathing patterns enables the individual to gain control and provide a positive response to stress, **Bakal and Davidson (2013) [13]**.

The results of the current study revealed that, in the study group 44.0% were males and 56.0% were females with mean and standard deviation of age 2.96±1.05 years old. 40% of them were between age 41-50 years old and 36.0% were between age 51 to 60 years old. In relation to education level, 52% of the study sample were illiterate, 28% of them can read and write while 12% of them were university education.

In the control group, 64% were males and 36% were females with mean and standard deviation of age  $3.08 \pm 9.53$  years old. 44% of them were between age 51-60 years old and 28% were between age 31-40 years old and 24% were between age 41-50 years old. In relation to education level, 40% of the study sample was illiterate, 28% of them can read and write while 20% were diploma and 12% of them were university education. This contradicts the research of **Akshay Metgud, Reshmina Chandni Clara Dsouza, Achshah Dhas and Rhea Pinto (2016) [14]** who stated that, The mean age was  $33.6 \pm 10.0$  years. Females (62%) were the predominant when compared to males. Heartburn was present in 50%, regurgitation in 40% and the presence of both symptoms was observed in 48.3%. Regarding to age group from age 25 to 34 years were 51%, from 35 to 44 years were 23%, from 45 to 54 17% and from 55 to 65 were 9%.

The current study also showed that, in the study group 80% of them were present in outpatient clinic, 36% of them were had peptic ulcer, 16% of them were had hernia and 48% of them were had other complains. As regards previous history of reflux, 60% of them had it, 72% of them had different chronic illness while 28% of them had hypertension and more than half of them were take medication for chronic illness. In relation to smoking, 40% of the study sample was smoking, about half of them ate fatty food, 24% of them preferred spicy food and 20% of them were take caffeinated beverages. 64% of the study group were not obese while 36% of them were obese.

In relation to control group, 80% of them were present in outpatient clinic, 28% of them diagnosed by peptic ulcer, 24% of them were had hernia, while 48% of them were had other complains. As regards to previous history of reflux, 56% of them had it. In relation to chronic illness, the same percentage as study group had chronic illnesses other than hypertension and 40% of control group were take medication to it. As regards to smoking, 52% of control group were not smoke 48% of them were preferred fatty food and 40% of them were ate spicy food. As the study group, 64% of the control group was not obese.

This is consistent with **Gado, et al, (2015)[10]** who mentioned that, in their study (33%) of the patients were had a history of smoking, (28%) were taking aspirin or NSAIDs and (2%) were consuming alcohol. (23%) had acid regurgitation symptoms. (24%) were found to have Reflux esophagitis, (24%) had Hiatal Hernia, (4%) gastric ulcers and (10%) duodenal ulcers. This consistent also with **Rafat, et al, (2017)[15]** who stated that obesity, particularly abdominal obesity, was shown to be an independent risk factor for GERD and was correlated with severity of it.

**Chait Maxwell, (2010) [16]** reported that, many of the medications noted taken by elderly patients adversely affect esophageal motility. Many diseases that can negatively affect esophageal motility appear with greater frequency with advancing age, such as Parkinson's disease, cerebrovascular disease, cardiovascular disease, pulmonary disease and diabetes mellitus. Also **Vaezi Michael, (2016) [17]** confirmed that there are a number of medications that can increase the risk of GERD, either by relaxing the LES, interfering with the digestive process, or further irritating an already inflamed esophagus. These medications include NSAIDs, Calcium channel blockers (often used to treat high blood pressure. Certain asthma medications, including beta-agonists Anticholinergics, medications used to treat conditions such as seasonal allergies and glaucoma.

According to **Allison Ryan, (2016) [18]**, Preparing GERD-friendly meals is perhaps the first and most important defense against the painful symptoms of acid reflux. When cooking for someone who suffers from GERD, it's important to be familiar with the foods that are most likely to trigger acid production. Common aggravators such as tomato products, fried and fatty foods, chocolate, whole-fat dairy, mints, citrus, and alcohol should be strictly limited or avoided entirely.

In relation to manifestations of GERD, the present study illustrated that 88% of the study group were suffer from horrible heart burn before practicing the breathing exercise, this percentage decreased after practicing the exercise to 24%. In relation to pain more than 40% of them suffered from chest pain before exercise and improved after exercise to 4%. Also, 76% of them felt pain worsens at rest before practicing the exercise decreased to 8% after exercise and the majority of them suffer from pain post meal improved to 16% after exercise. As regards to feeling by bitter taste 88% of them felt it before exercise decreased to 44% after practicing the exercise.

Study findings also showed improvement of signs and symptoms of GERD of the study group in relation to presence of hoarseness, sore throat, presence of cough and wheezing and presence of extra saliva after practicing the breathing exercise. As regards to having nausea, 64% of the study group had it before exercise improved to 4% after it. 88% of the study group suffered from trouble swallowing improved to 28% after practicing exercise. In relation to if acid reflux disturbs sleep 80% of the study group suffered from it before practicing breathing exercise improved to 16% after it. 52% of the study group was drinking extra water with meals decreased to (32%) after applying the exercise. In relation to wearing tight cloths or belts, (36%) of the study group.

Regarding to effect of breathing exercise on pain, **Zautra, Fasman, Davis, and Craig, (2010)[19]**, evaluated the effects of slow breathing on subjects' pain sensation. The results indicated slow breathing to

significantly reduce pain and negative affect ratings. The slow breathing had a stronger effect when moderate pain was presented.

As regards to Reflux symptoms, heart burn, regurgitation, nausea, pain after meals and sore throat, **Sun, et al, (2016) [8]** mentioned that all the reflux symptoms were significantly improved at the end of the 8-week initial treatment compared with baseline in both the diaphragm breathing exercise + rabeprazole group (from  $12.50 \pm 0.68$  to  $3.45 \pm 0.51$ ,  $P < 0.001$ ) and the rabeprazole group (from  $11.78 \pm 0.63$  to  $4.05 \pm 0.4$ ,  $P < 0.001$ ). The reflux symptom scores were not significantly different.

In relation to GERD–health-related quality of life (GERD-HRQOL), the current study revealed that total score of study group pre breathing exercise had highly significant correlation with total score of study group post and follow up breathing exercise ( $P = 0.00, .002$ ) respectively. This indicated improvement of patient's quality of life at the end of the study.

According to (**Eherer, et al, 2012) [20]** they represented that in their study, there was a significant decrease in time with a pH in the training group, but there was no change in the control group. QOL scores improved significantly in the training group after training; but no changes in QOL were seen in the control group. **Andrew Ming-Liang Ong, et al, (2018) [21]**, in their study they also reported that In the study group the GERD symptoms was decreased than control group and QOL significantly improved in study group than control group.

## V. Conclusion

Considering its safety and cost effectiveness the breathing training exercise could play a crucial role in the management of mild GERD and improvement of health outcomes.

## Recommendations

**Based on the finding of the current study, the following recommendations are:**

1. Encourage patients of GERD to make lifestyle changes which can play an important role in GERD therapy and education of patients with GERD to do deep breathing exercise, lose weight, quit smoking and eat healthy food can help in managing symptoms.
2. The study recommended paying more attention to the importance of identification and management of psychological impact in improving QOL in GERD patients besides physical symptoms of it.
3. Don't replace GERD treatments by exercise and apply the breathing exercise as a complementary therapy.

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