Mansoura Nursing Journal (MNJ) Vol. 12. No. 1 – 2025
Print ISSN: 2735 – 4121 **Online ISSN : 2735 – 413X**

Original Article

Effect of Buteyko Breathing Exercise on Asthma Control in Asthmatic Elderly Patients

Laila Salama Salama Elkafrawy[1], Nadia Mohamed Hassan Saleh [2], Magda Abdel-Salam Ahmad Ahmad [3], Heba Noshy Abd El-Aziz Mohamed [4]

1 Assistant lecturer of Gerontological Nursing -Faculty of Nursing-Mansoura University

2 Assist. Prof. of Gerontological Nursing -Faculty of Nursing- Mansoura University

3 Professor of Chest Medicine - Faculty of Medicine- Mansoura University

4 Assist. Prof. of Gerontological Nursing - Faculty of Nursing-Mansoura University

1-ABSTRACT

Background: Asthma is a major and prevalent worldwide health issue that can lead to major health complications in older adults, when left untreated. Buteyko breathing can increase lung function or alter bronchial responsiveness, lessen the intensity of an attack's symptoms and improve asthma control **Aim:** to measure the effect of Buteyko breathing exercise on asthma control in asthmatic elderly patients. **Method:** A quasi-experimental research design (study-control) was used in this study**. Setting:** This study was done at Chest Disease Department affiliated to Mansoura University Hospital. **Subjects:** A purposively selection of 80 elderly patients divided to two groups (40) for each group attending the previous mentioned setting who fulfilled requirements for inclusion. **Tools:** Three tools were used in this study; Demographic and Health related Data Structured Interview Schedule, Asthma Control Questionnaire 5 and Buteyko Breathing Technique Observational Checklist. **Results:** Asthma control did not show any statistically significant variations between the buteyko and control groups prior to the training program's implementation (P= 0.879), but there were statistically significant variations between the two groups three and six months after the training sessions (P= 0.024 and P= 0.002, respectively). In addition, there was a positive significant correlation between total practice score and asthma control. **Conclusion:** Buteyko breathing exercise can be used safely for elderly patients with asthma. Therefore, the implementation of buteyko breathing exercise training had positive effects in improving asthma control. **Recommendation:** Development of educational and training programs for all elderly patients in all health care hospitals to increase their benefits from the effect of Buteyko exercise.

Key words: *Asthma, Asthma control, Buteyko Breathing Exercise, Elderly Patients*

2-Introduction:

The chronic inflammatory disease of the airways known as asthma is a result of hyperresponsiveness of the airways, leading to recurrent episodes of breathing difficulties coughing, wheezing, and tightness in the chest, particularly in the evening or early morning. Numerous cells and cellular components are involved in asthma **(Nafie et al., 2017).**

Elderly people are a fragile population that needs extra attention. There will be 1.2 billion adults over 60 years in the world by 2025, and that number will rise to 1.9 billion by 2050. Additionally, sixty percent of older adults reside in developing nations; by 2050, that number is expected to rise to 80%. Based on the findings of the general population census conducted over the last 20 years, the percentage of Egyptians aged 60 and above increased from 5.6% to 6.1% during the 1986 and 2006 censuses, and is predicted to reach in 2050 to 12.3% **(Hassan, 2015).**

Numerous aging-related changes to lung shape and physiology take place, which probably have an effect on asthma. Reduced strength of respiratory muscle, increased rigidity of chest wall and a noticeable elastic recoil decrease are all linked to aging **(Lowery et al., 2013).**

According to **Herscher et al. (2017),** older persons with asthma are susceptible to infections of respiratory system like pneumonia and influenza that cause persistent exhaustion. As a result, they grow fragile and lose their independence in carrying out everyday activities. Due to socioeconomic difficulties, poor adherence, comorbidities, misconceptions about asthma as a disease, and a decline in cognitive or physical capacities, treatment for older adult asthmatic patients is difficult (**Nanda et al., 2020).**

It may be challenging for elderly patients to adhere to therapy recommendations because of those problems. Furthermore, certain asthma drug types require a certain level of manual coordination and specialized abilities, making them challenging

for older persons to use (**Yawn & Han, 2017).** It takes special attention to self-management to control asthma and prevent exacerbations. This includes avoiding triggers like cigarette smoke and allergens, getting frequent checkups from a healthcare professional, and using daily medications as prescribed. Sadly, a lot of patients don't continue to practice appropriate behaviors of self-management **(Hsu et al., 2018).**

Controlling the condition and enabling patients to live regular, healthy lives while managing their asthmatic episodes are the two main objectives of asthma management. One important factor influencing a patient's health outcomes with asthma is medication adherence. The most frequent causes of uncontrolled asthma are noncompliance with medication and insufficient awareness and skill in managing the condition (**Shahin et al., 2020).**

Use of non-pharmacological management is one method of treating asthma. A non-medical therapy called Buteyko breathing (BB) suggests using particular breathing exercises to treat respiratory conditions like asthma. Konstantin Buteyko, a Ukrainian physiologist, invented Buteyko breathing in the 1950s because he thought that a lot of diseases were brought on by hyperventilation or a persistently elevated respiration rate **(Bass, 2021).**

Buteyko breathing reduces the intensity of asthma symptoms and the frequency of asthma attacks, which enhances the function level and ability of older patients for independent living and improves the capacity to manage the illness among elderly patients with bronchial asthma (**Mohamed et al., 2019).**

In asthmatic elderly patients the gerontological nurse plays a major role in Buteyko's breathing exercise. There are certain important roles for nurses that follow such as teach Buteyko's breathing steps, nose breathing during the night and exercise regularly **(Singh & Raghavendran, 2022).**

2.1Significance of the study

One of the widespread non-communicable diseases (NCDs) is asthma. Approximately 339 million individuals worldwide are impacted by it, including both younger and older generations. Asthma ranks among the top twenty causes of years spent disabled, which contribute to a large amount of disability and death worldwide —roughly 1000 people die from it every day. The prevalence of asthma is rising in developing nations. Due to hospitalization and the high cost of medications, in addition, the prevalence of asthma is rising and severely straining socioeconomic conditions **(Mohamed et al., 2019).**

Poorly controlled asthma can have negative effects including lethargy or weariness, inadequate sleep, failing to exercise, deteriorated mental health, pneumonia, and respiratory failure. The long-term consequences of asthma can impact lung functions, general health, and quality of life (**Davidson, 2021).** Elderly patients seem to benefit from practicing Buteyko breathing by increasing lung function or alter bronchial responsiveness, lessen the intensity of an attack's symptoms and the requirement for bronchodilators (**Bass, 2021).**

Therefore, it was important to study the effect of buteyko breathing exercise on asthma control in asthmatic elderly patients.

2.2 Aim of the study

Measure the effect of Buteyko breathing exercise on asthma control in asthmatic elderly patients**.**

2.3 Research Hypothesis

1- Asthmatic elderly patients who practice Buteyko breathing exercise will have an improvement in asthma control than those who don't.

3. Method

3.1 Study Design

A quasi-experimental research design (study-control) was used in this study.

3.2 3Setting

This study took place at Chest Diseases Department affiliated to Mansoura University Hospital. It consists of one floor which contains three rooms, each room contains 10 beds and three intensive care units each unit contains 6 beds. It also contains one unit to measure pulmonary function tests and other unit for sleep disorders.

3.3 Subjects

A purposive sample of 80 elderly patients diagnosed with asthma. The study subjects were divided alternatively into two equal groups (40) elderly patients in each group attending the previous mentioned setting and chosen according to the inclusion criteria:

3.4 Inclusion Criteria

1. 60 years of age or older.
2. Diagnosed with asthma for more than one year.
3. Willingness to taking part in the study and able to communicate.

3.5Exclusion Criteria

1. Elderly patients with cardiac, renal and hepatic diseases.
2. Elderly patients with bronchiectasis, interstitial lung diseases, tuberculosis, and chest infection.
3. Elderly patients with nose disorders or surgeries.
4. Elderly patients with psychiatric disorders such as depression.

3.6 Sample Size Calculation

With a power of research of 80% and a level of significance of 5% based on data from the literature as reported by Prem, Sahoo, and Adhikari (2013), the sample size may be computed using the following formula:

n = [\2(SD)2} × (Zα/2 + Zβ)2}](Difference in mean between two groups)where SD is the standard deviation

$Z_{\alpha/2}$: Depending on the significance level, this is 1.96 for 5%.

Z_{β}: This depends on power, for 80% of it, it is 0.84.

Therefore, $n= [(1.96 + 0.84)^2 \times \{2(0.41)^2\}]/ (0.27)^2=36.2$

According to the previous formula, the sample size of 37 was calculated and added 5% because of defaulter to become 40 in each group, one study and one control group.

3.7 Tool of data collection

Three tools were used in this study to collect the data:

Tool I: Demographic and Health-Related Data Structured Interview Schedule: This two-parts tool was created by the researcher to gather baseline data from the study participants based on a review of literature: **Part 1: Demographic information**: including age, educational attainment, gender, marital status, employment before retirement, and income source. **Part 2: Medical health history:** such as past history of chronic diseases and current medications used.

Tool II: Asthma Control Questionnaire 5 (ACQ-5)

This tool was developed by **Juniper, Svensson, Mörk & Ståhl (2005).** A simple questionnaire to measure how effectively the patient's asthma is controlled. Five questions about symptoms of asthma throughout the previous week were asked. A score of 0 to 6 is assigned to each question. A 7-point Likert scale (0 being no impairment and 6 being the largest amount of impairment) is used. The average of the five questions determines the final score.

ACQ5 Scores interpretation:

- Well Controlled = 0 – 0.75
- Partially Controlled = 0.75 – 1.5
- Not Well Controlled = > 1.5

Tool III: Buteyko Breathing Technique Observational Checklist

The researcher developed this tool following an intensive review of recent **literature (Buteyko Breathing Association, 2021; Prasanna, Sowmiya & Dhileeban, 2015).** To assess the elderly performance of buteyko breathing technique. A three-point Likert scale was used to assess each item on the checklist: 0 represents "not done," 1 represents "done partially," and 2 represents "done completely." The total scores on the checklist are the sum of the scores for each group of items. The following categories applied to the total scores:

- Good practice: more than or equal 75%.
- Fair practice: 60% to less than 75%.
- Poor practice: less than 60%.

Phase I: preparatory phase:

1. <u>Administrative stage:</u>

- The Mansoura University Faculty of Nursing officially granted approval to conduct the study and interview elderly patients in the assigned government hospital.
- Following an explanation of the goal of the study and the timeline for data collection, an official letter was sent with clearance from the head of the Mansoura University Hospital.

Ethical considerations of the study

- Ethical authorization was given by the Research Ethics Committee of the Mansoura University Faculty of Nursing (Ref. No. 0482).
- The researcher informed the study participants of its aim before obtaining their verbal consent to participate.
- The confidentiality of the data gathered was preserved, and the subjects' privacy was guaranteed .
- The participants in the study became aware of their unrestricted right to discontinue participating from it at any time and without consequences.

2. <u>Preparatory stage</u>

Following extensive review of the literature, data collection instruments were created and implemented, and teaching materials for the study were created as a booklet and audiovisual content.

- Tool I (Demographic and Health related Data Structured Interview Schedule) and tool III (Buteyko Breathing Technique Observational Checklist) were designed after review of related literature by the researcher.
- Tool II (Asthma Control Questionnaire 5) was translated into Arabic and put through a test-retest assessment process to determine its reliability.
- The proposed program was developed in a simple Arabic language by the researcher with the addition of pictures, which includes two parts (educational and practical):
  - Educational part including: asthma disease process, causes, risk factors, symptoms, complications and management.
  - Practical part including: buteyko breathing exercise technique.

Study Tools Validity

- To ensure the translation's accuracy, the researcher translated study tools into Arabic. An English language specialist from the Faculty of Education then confirmed the translation's accuracy.
- Five experts in the field of specialization reviewed the data-gathering tools to ensure their content validity and the necessary changes were made.

Reliability of the Study Tools

The internal consistency for study tool was done using test-retest on two occasions of the pilot of the instrument on the same participants. Test-retest reliability phase was considered by Pearson's correlation coefficient as follows: Tool II (r=0.860) and Tool III (r=0.820) which refers to be reliable.

Pilot Study

Prior to beginning the data collection, a pilot study including eight participants from (10%) of the study sample was carried out to evaluate and determine the clarity, feasibility, relevance, applicability, and length of time required to collect data. The appropriate adjustments were made accordingly. The older patients included in the pilot study were excluded from the study sample.

Phase II: Implementation Phase

- The researcher began by introducing herself and briefly outlining the goal of the study to the elderly patient.
- Individual interviews were conducted with every elderly patient in the control group and the study group at the beginning of the proposed program in order to collect baseline data using tool I (Demographic and Health related Data Structured Interview Schedule), Tool II (Asthma Control Questionnaire 5) and tool III, (Buteyko Breathing Technique Observational Checklist). Filling up the study tools took between thirty and forty minutes. The study participants' phone numbers were obtained by the researcher to facilitate ongoing communication, assistance, and motivation.
- Establish a calm and distraction-free atmosphere, enhanced with a back-supporting chair, to encourage elderly patients to fully relax.
- The training program was conducted on individualized basis, the program covered 8 sessions, which were divided into 4 sessions for knowledge provision and 4 sessions for practicing Buteyko breathing exercise. The program was done on 2 sessions weekly for 4 weeks. Each session took nearly 30 to 45 minutes, considering the attention span of the elderly patients.
- In the training sessions, the researcher spoke in short, easy-to-understand sentences. The study group's understanding and practice for each subject were made clear through the usage of an illustrated handbook. Additional instructional strategies included lectures, roundtable discussions, laptop power point presentations, films, in-person demonstrations, and re-demonstration. The researcher highlighted the key aspects in a brief summary that was delivered at the conclusion of each session. Prior to the starting of subsequent sessions, the researcher would pose inquiries concerning the subjects covered in the preceding session; any aspects that were overlooked or ambiguous were reiterated by the researcher.
- The educational handout was given to subjects in the Buteyko group to attract their attention, encourage them, allow for reviewing, and support practice at home.
- After discharge, the sessions have been completed in chest outpatients' clinic. The telephone follow-up for the study group was carried out weekly to encourage and ensure adherence of elderly patients with Buteyko breathing exercise.

- The data collection took place over a ten-month period, beginning on April 2022, and ending on January 2023. The data collection schedule days began from 9 a.m. to 2 p.m.

Phase III: Evaluation phase:

- Immediately after the proposed program implementation, assessment of asthmatic elderly patients' practice of Buteyko breathing exercise using tool III (Buteyko Breathing Technique Observational Checklist) to determine the ability of elderly to practice breathing exercise.
- After 3 months and then 6 months reassessment of the study subjects in both groups by using tool II (Asthma Control Questionnaire 5) and tool III (Buteyko Breathing Technique Observational Checklist).

Statistical analysis

Version 20 of the Statistical Package for Social Science (SPSS) was used to examine the data. For data visualization, Microsoft Excel was used to create graphs. To display the quantitative data; numbers and percentages were used. The one-way analysis of variance (ANOVA) f test and the independent sample t-test were used to compare the groups. Pearson's correlation coefficient (r) is used to assess variables correlation. At $p < 0.05$, the difference was deemed significant.

4- Results:

Table (1): Demographic data of the asthmatic elderly patients in the Buteyko and control groups. The table displays the age of older patients with asthma, ranging from 60 to 80 years. The mean age of the Buteyko group was 70.97±7.37 years, while the control group's mean age was 69.22±6.318 years. In terms of sex, older asthmatic patients are more likely to be female; in the Buteyko group, 65%, whereas in the control group, 72.5% were female.

As for marital status, 62.5% in the Buteyko group and 75.0% in the control group respectively are married. Asthmatic elderly patients who read and write are prevailing among 67.5% and 75% of the elderly in the Buteyko and control groups respectively.

Concerning current work, 87.5% of the Buteyko group and 77.5% of the control group are not working. As for income, 72.5% of the Buteyko group and 62.5% of the control group have not sufficient income. Regarding residence place, 52.5% of the Buteyko group compared to 55% of the control group is residing in rural areas and the differences are not statistically significant in any demographic data item comparing the two groups.

Table (2): Medical history of the asthmatic elderly patients in the Buteyko and control groups. It can be observed from the table that, 62.5% and 50% of the Buteyko and control groups respectively are suffering from asthma from one to three years ago. Regarding previous hospitalization, 65% and 70% of the Buteyko and control groups respectively have a history of previous hospitalization. In relation to the number of hospitalization 65.4% and 78.6% of the buteyko and control groups respectively were admitted to hospital from one to five times. Also, observed from the table that 42.3% of the Buteyko group and 42.9% of control group are staying in hospital less than one week.

Regarding the medication taken for asthma, it was observed that all elderly patients 100% in both groups take corticosteroids and bronchodilators. Concerning compliance with medications, 60% of the Buteyko group and 57.5% of control group are compliant. Also, 75% and 65% of the Buteyko and control groups respectively are suffering from other chronic diseases. Hypertension is the most common disease reported by 80% and 76.9% of the buteyko and control groups respectively and the differences between the two groups are not statistically significant in all items of medical history.

Table (3): Asthma control in the Buteyko and control groups prior to and following the training program implementation. It appears from the table that there was statistically significant differences in the buteyko group at 3 months after the training program (post 1) and the improvement maintained at 6 months after the training program (post 2) (P= 0.001). Compared to the elderly patients in the control group had no statistically significant differences at 3 and 6 months after training program.

It should be noted that, prior to the implementation of the training program, there were no statistically significant differences between the buteyko and control groups in asthma control (P= 0.879). However, at both the 3- and 6-month following the training sessions, there were statistically significant differences between the two groups (P= 0.024 and P= 0.002, respectively).

Figure (1): Performance of Buteyko breathing exercises of the Buteyko group. The total practice score of the Buteyko group improved significantly immediately after training P=0.001, and the improvement was slightly decreased in the

mean score of practice in the Buteyko group after 3 and 6 months (Post 1 & post 2) and remain differ significantly in comparison with before training sessions (p=0.001).

Table (4): Correlation between the study variables in the Buteyko group pre and post the intervention. The table shows that the total practice score and asthma control had a positive, significant connection. As total practice score increased asthma control improved.

Table (1). Demographic Data of the Asthmatic Elderly Patients in the Buteyko and Control Groups

Demographic data	Buteyko group		Control group		Test of significance
	n (40)	(%)	n (40)	(%)	
Age					
60-70	25	62.5	21	52.5	$\chi2$ = 0.818 (0.366)
71-80	15	37.5	19	47.5	
Mean ± SD **Range**	70.97± 7.37 (61-80)		69.22± 6.318 (60-79)		
Sex					
Female	26	65.0	29	72.5	$\chi2$ =0.524 (0.469)
Male	14	35.0	11	27.5	
Marital status					
Married	25	62.5	30	75.0	MC = 3.636 (0.162)
Widow	12	30.0	10	25.0	
Single	3	7.5	0	0.0	
Educational level					
Illiterate	3	7.5	0	0.0	MC = 5.484 (0.241)
Read and write	27	67.5	30	75	
Secondary	5	12.5	6	15.0	
University	5	12.5	4	10.0	
Current work					
Yes	5	12.5	9	22.5	$\chi2$ = 1.385 (0.239)
No	35	87.5	31	77.5	
Income					
Not Enough	29	72.5	25	62.5	$\chi2$ = 0.912 (0.340)
Enough	11	27.5	15	37.5	
Residence					
Rural	21	52.5	22	55.0	$\chi2$ = 0.450 (0.502)
Urban	19	47.5	18	45.0	

Table (2). Medical History of the Asthmatic Elderly Patients in the Buteyko and Control Groups

Medical history	Buteyko group		Control group		Test of significance
	n (40)	(%)	n (40)	(%)	
Duration of disease					
from 1 < 3 years	25	62.5	20	50.0	MC = 3.175 (0.204)
From 3 < 5 years	4	10.0	10	25.0	
5 years and more	11	27.5	10	25.0	
Previous hospitalization					
Yes	26	65.0	28	70.0	$\chi2$ = 0.228 (0.633)
No	14	35.0	12	30.0	
Asthma medication taken					
Corticosteroids	40	100.0	40	100.0	----
Bronchodilator	40	100.0	40	100.0	----
Antibiotic	38	95.0	39	97.5	$\chi2$ =1.257 (0.262)
Mucolytic	16	40.0	21	52.5	$\chi2$ =0.346 (0.556)
Anticholinergics	15	37.5	11	27.5	$\chi2$ =0.912 (0.340)
Compliance with medication					
Yes	24	60.0	23	57.5	$\chi2$ = 0.052 (0.820)
No	16	40.0	17	42.5	
Suffering from other disease					
Yes	30	75.0	26	65.0	$\chi2$ = 0.952 (0.329)
No	10	25.0	14	35.0	
Type of chronic disease[#]	N=30		N=26		
Hypertension	24	80.0	20	76.9	$\chi2$ = 0.078 (0.780)
Diabetes Mellitus	18	60.0	17	65.4	$\chi2$ = 0.172 (0.678)
Osteoarthritis	15	50.0	14	53.8	$\chi2$ = 0.083 (0.774)
Osteoporosis	9	30.0	10	38.5	$\chi2$ = 0.445 (0.505)
Eye disease	6	20.0	4	15.4	FE = 0.202 (0.653)

([#]) More than one answer

Table (3). Asthma Control in the Buteyko and Control Group Pre and Post the Training Program.

Asthma Control	Buteyko group		Control group		Test of significance (*p*)
	n (40)	(%)	n (40)	(%)	
Pre					
Well-controlled	8	22.2	9	25.0	$\chi2$=0.257 (0.879)
Partially controlled	4	11.1	5	13.9	
Uncontrolled	24	66.7	22	61.1	
Post 1					
Well-controlled	11	27.5	9	25.0	$\chi2$ = 7.463 (0.024)*
Partially controlled	18	45.0	7	19.4	
Uncontrolled	11	27.5	20	55.6	
MH-test (P)[a]	38.000 (<0.001)**		5.000 (0.157)		
Post 2					
Well-controlled	16	40.0	9	25.0	$\chi2$ = 12.156 (0.002)**
Partially controlled	16	40.0	6	16.7	
Uncontrolled	8	20.0	21	58.3	

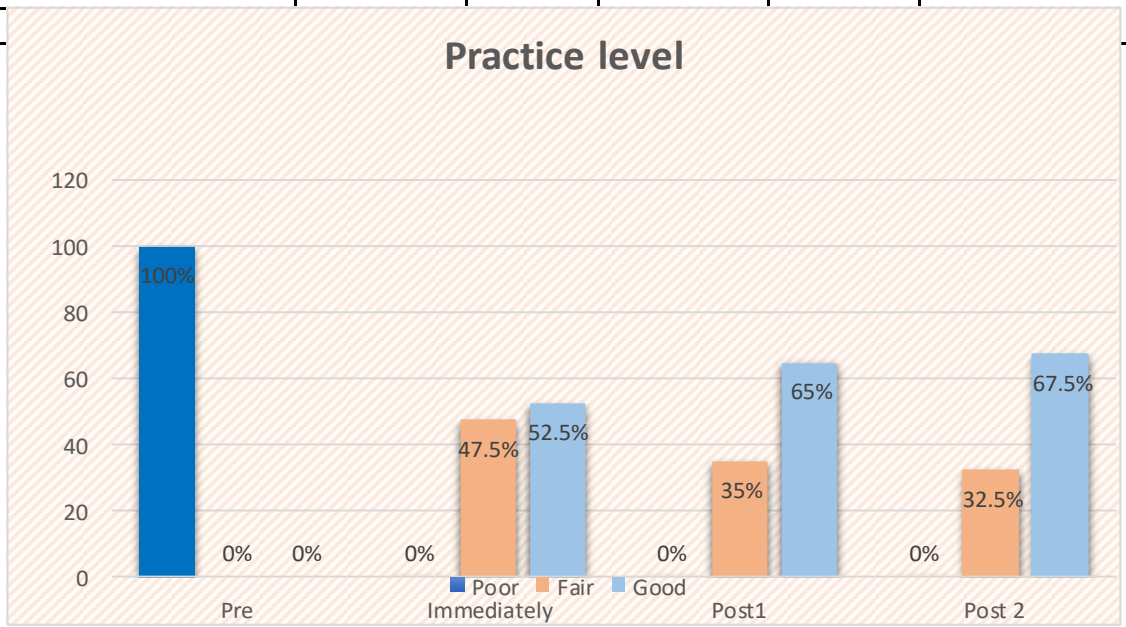

Figure (1). Performance of Buteyko Breathing Exercises of the Buteyko Group Pre- and Post-Training Program Implementation.

Table (4). Correlation Between the Study Variables in the Buteyko Group Pre and Post the Intervention (n=40**)**

Item		Total Practice		
		Pre	Post 1	Post 2
Asthma control	r	-0.159-	-0.464-	-0.466-
	p	0.326	0.003**	0.002**

5- Discussion

Aging is one factor that is thought to contribute to worsening asthma control. If older adults' asthma is not properly treated, it can lead to major health issues **(Dunn et al., 2018)**. This study reported that more than half of the asthmatic elderly patients were young old (60< 70 years) with a mean age 70.97±7.37and 69.22±6.318 for the buteyko and control group respectively. This could be connected to the anatomical, physiological, and immunological changes that aging brings about in the respiratory system. As a result, asthma gets worse and more elderly persons are admitted to hospitals. The same finding was reported by a study done in Turkey by **Gemicioglu et al. (2019)** who stated that the mean age of asthmatic patients was 69.4±3.6 years, and study done in Egypt by **Abd El-fatah et al. (2020)** revealed that more than half of asthmatic older patients ranged in age from 60 to 69 with a mean age of 67.4 ±6.3 years. On the other hand, a study performed in Michigan by **Ross et al. (2013)** reported that more than half of the asthmatic people age ranged between 66 and 92 years old

In this study, there were more women than men. This could be because female sex hormones affect a person's entire life and are linked to inadequate asthma control **(Park et al., 2018).** The same results were found in other studies conducted in Egypt by **Abd El-Rahman et al., (2015)** and in Turkey by **Gemicioglu et al., (2019)** where over half of the asthmatic patients were female. However, research conducted in Egypt by **El-fadl & Sheta (2019)** and **Abd El-fatah et al. (2020)** revealed that less than two-thirds of studied subjects were men.

Concerning marital status; the present study revealed that nearly two-thirds of the elderly in the buteyko group and more than two-thirds of the elderly in the control group were married. The same results were reported in a study carried out in Egypt by **Abd El-fatah et al. (2020)** who reported that the majority of participants were married.

Regarding the educational level, the buteyko and control groups, almost two-thirds of the elderly were read and write. This result could be explained by the fact that most of the patients were from rural areas where there is a lower emphasis on education and a lower degree of health awareness. This result is similar to a study carried out in Egypt by **El-fadl & Sheta (2019)** who found that the majority of patients were illiterate, and in Turkey by **Gemicioglu et al. (2019)** who found that almost half of the participants in their study were illiterate. However, a study conducted in Poland by **Uchmanowicz et al. (2016)** showed that most of the sample had completed high school.

As for occupation of the studied subject, more than half of them were not work. This finding in contrast with study done in Egypt by **Abd El-fatah et al. (2020)** revealed that more than half of the participants were working.

This study conveyed that about two-thirds of the studied elderly in the Buteyko and control groups have not enough income, the results could be attributed to Egypt's high living costs and low retirement incomes, as well as the lack of alternative sources of income that would otherwise negatively impact the quality of life and increase the financial load on the elderly. This in accordance with a study done in Egypt by **Abd El-fatah et al. (2020),** who reported that three-quarters of study participants reported that, their monthly income was not enough. In contrast, a study done in Egypt by **Abd El-Rahman et al., (2015)**, who reported that more than half of the studied participants had adequate income.

This study found that more than half of the studied elderly in the Buteyko and control groups were living in rural area, this in accordance with other studies done in Egypt by **Abd El-fatah et al. (2020)** who reported that, two-thirds of the study participants living in rural and by **El-fadl & Sheta (2019)** who reported that the majority of the sample were rural areas residing. In contrary, a study done in Turkey by **Gemicioglu et al., (2019)** reported

that about half of the studied subjects lived in urban areas.

Concerning medical history for asthma about two-thirds of the studied elderly in the buteyko and half of control groups suffered from asthma from one to three years ago. This may be due to a lack of awareness among the elderly of the seriousness of the disease and not seeking medical attention or diagnosis until the disease has worsened and that is more persistent and strikes younger people than older people when it first manifests. This finding is dissimilar to a study done in Egypt by **Abd El-fatah et al. (2020)** who reported that less than two-thirds of the sample has asthma since 6 – 10 years and other study done in Romania by **Marincu et al. (2015)** who pointed out that elderly people were readmitted to hospital complaining of asthma from five to ten years. In Egypt **Abd El-Rahman et al. (2015)** discovered that bronchial asthma has affected almost two-thirds of elderly population for more than ten years. Also, in Turkey **Ozturk et al. (2015)** found that the average duration of asthma in elderly people was13.7±15.4 years.

As regards to the medication taken for asthma, it was observed that all elderly patients 100% in both groups take corticosteroids and bronchodilators. These findings may be justified by, asthma medications are essential for the condition of elderly patients and they may have fear of worsening their status that can interfere with their activities of daily living. The same findings were reported in a study took place in Turkey by **Gemicioglu et al. (2019)** who reported that, for both groups long-acting beta 2-adrenergic agonists and inhaled corticosteroids were the most often prescribed drugs. This present study revealed that more than two-thirds of the study participants had previous hospitalization from 1 to 5 times. This may be due to the chronicity of the disease, noncompliance with their medications and not following the safety precautions to decrease asthma attacks. This is in accordance with a study done in Egypt by **Abd El-Rahman et al. (2015)** who reported that two-thirds of the studied participants had previous hospitalization from one time and more. On the other hand, a study done in Egypt by **Nafie et al. (2017)** reported that more than three-quarters of bronchial asthma patients weren't admitted at hospital during the past year.

In relation to compliance with medications, the current study reported that more than half of the studied participants in the Buteyko and control groups were compliant with medication. In this regard, a study done in Egypt by **Nafie et al. (2017)** reported that more than three-quarters of bronchial asthmatic patients were compliant with medication.

This study demonstrated that about three-quarters of the asthmatic elderly patients were suffering from hypertension. This may be attributed to aging and the age related changes in arterial stiffness, decreased its elasticity and other physiological changes can increase developing hypertension risk. This is supported by a study carried out in Turkey by **Gemicioglu et al. (2019)** who revealed that hypertension was the most frequently observed comorbidity in the elderly group. In contrast, a study done in Japan by **Adachi et al. (2019)** reported that the most common comorbidity was allergic rhinitis/pollinosis.

The current study clarifies that two-thirds of the studied subjects in both groups have impaired asthma control before the training program implementation. This in accordance with a study done in Egypt by **Mohamed et al., (2018)** who reported that less than half of the elderly patients were uncontrolled before intervention.

After implementing Buteyko breathing exercises the present study reported that there was statistically significant variance in the Buteyko group at 3 months after the training program (post 1) and the improvement maintained at 6 months after training program (post 2) (P= 0.001). Uncontrolled asthma patients decreased from two-thirds of elderly patients in the study group before training program to more than a quarter post 1 to one-fifth post 2 after training program. Compared to the elderly patients in the control group had no statistically significant differences at 3 and 6 months after training program. The delivery of the Buteyko method will help enhance asthma management, as indicated by the significant difference in the mean scores of the control and experimental groups. This might be because, as part of the breathing technique, the Buteyko approach recommends nose breathing over oral breathing. The benefits of nasal breathing include the removal of allergens and dust particles from the air, humidification, and the generation of nitric oxide, which causes the airways to dilate **(Beachey, 2022)**. Therefore, nasal breathing may have contributed to the improvement of the asthmatic patients' quality of life by lowering their symptoms.

This is in accordance with a study conducted in Egypt by Mohamed et al. (2018) support this claim, showing that patients' control over their bronchial asthma significantly improved when pre- and post-test results for BBT were compared (*p*= 0.000). The study also revealed that, in terms of

asthma control classification following BBT instructions, over half of the asthmatic participants had well-controlled asthma levels, while nearly half had partially controlled asthma levels. In the same line other studies done in Egypt by **Mohamed et al., (2019)** reported that there was a positive effect for practicing Buteyko breathing technique on reducing asthma symptoms severity, and by **Abd Elmawla et al. (2023)** demonstrated a significant improvement in the mean score of asthma control test (ACT) after implementing Buteyko exercise for 4 weeks. Additionally, a study conducted in India by **Prem et al., (2013)** found that while the pranayama and control groups did not exhibit improvement in asthma control scores, the buteyko group showed a substantial improvement in asthma control in the study group. This might be because, as part of the breathing technique, the Buteyko approach recommends nose breathing over oral breathing.

Furthermore, a study conducted in India by **Prasanna et al. (2015)** found that while asthma control was initially poor in both the Buteyko and control groups, some study participants' daily asthma symptoms improved in both groups after beginning Buteyko exercise. At the conclusion of the two-month research period, there was a noticeable improvement in the asthma control of both the Buteyko and control groups. Between the Buteyko and control groups, there was a statistically significant difference in asthma control ($p < 0.05$).

The current study demonstrated that the total practice score of the Buteyko group increased significantly immediately after the training program, and the improvement was slightly decreased in the practice mean score of the Buteyko group after 3 and 6 months (Post 1 & post 2) and remain differ significantly in comparison before training sessions. This is supported by a study done in Egypt by **Labieb et al. (2020)** who found that the Buteyko group's improvement in the practical level was statistically significantly different from the control group's (pre-, 2-month, and 6-month).

The results of this study showed that there was inadequate practice prior to the training program's implementation. The majority of elderly patients in the Buteyko group had fair and good practices at the program's immediate, three, and six-months, indicating statistically significant improvement in total score practice following the intervention. These results were consistent with those of **Labieb et al., (2020)** who found that prior to the training program's implementation; there was a low degree of practice. Following the intervention, the Buteyko group showed a statistically significant improvement in total score practice, with most patients exhibiting satisfactory and satisfied practices at the program's immediate, two, and six-month. Additionally, **Amer et al., (2018)** revealed that regular breathing exercises practice and coughing exercises improve the performance of the elderly by improving their ability to control their breathing and expel sputum. Through continual training sessions, step-by-step demonstrations of each practical component, and demonstrations of each step, the researcher conducted an immediate posttest to make sure the elderly had learned in an appropriate manner.

The present study demonstrated that a positive significant correlation was found between total practice score and asthma control. As total practice score improved also asthma control improved. This is attributed to the elderly patients in the Buteyko group followed the Buteyko breathing exercise training and associated instructions to help to improve hypoventilation and increase their control on asthma symptoms thus helping to improve their quality of life.

6- Conclusion

Elderly asthmatic patients can safely benefit from Buteyko breathing exercises. Improving asthma control was a benefit of doing the Buteyko breathing exercise program. The total practice score and asthma control were found to positively and significantly correlate.

7- Recommendations

- Development of educational and training programs for all elderly patients in all health care hospitals to increase their benefits from the effect of Buteyko exercise.
- Provide older persons who have asthma a complete, simplified booklet with illustrations that explains asthma and how to manage it, allowing them to better control and manage their asthma-related behaviors.
- Creating educational and training programs for all hospital staff members, including nurses, which emphasize the use of complementary therapy as Buteyko breathing exercises for asthma patients.

8- References:

Abd El-fatah, S., Abd Elzaher, O., & Abd-Elraziek, E. (2020). Modified Nursing Program to Improve Health Condition Asthmatics Older Adult. *Egyptian Journal of Health Care*, *11*(1), 329-353

Abd Elmawla R. A., Zahran, W. E. K., & Elsaid, D. M. (2023). Comparison of the Effects of Buteyko and Diaphragmatic Breathing Technique on Improving Pulmonary Functions and Asthma Control among Patients with Bro. *Egyptian Journal of Nursing and Health Sciences*, *4*(3), 57-75.

Abd El-Rahman, B., Abd El-Hamed, H. S., Abd El-Aziz, M. S., Abd El-Aal, E. M., & Morsy, H. A. A. (2015). Quality of life among elderly people with bronchial asthma in Benha city. *Unpublished Master's thesis, In nursing science, Faculty of Nursing, Benha University, Egypt*, 85-88.

Adachi, M., Hozawa, S., Nishikawa, M., Yoshida, A., Jinnai, T., & Tamura, G. (2019). Asthma control and quality of life in a real-life setting: a cross-sectional study of adult asthma patients in Japan (ACQUIRE-2). *Journal of Asthma*, *56*(9), 1016-1025.

Amer F., Eldakhakhny A., Ahmed A., & Taha N., (2018). Effect of Nursing Intervention Program on Patients knowledge and practice regarding Breathlessness in patients with Chronic Obstructive Pulmonary Disease, *Zagazig Nursing Journal*, *14*(1), 76- 92.

Barakat, N. M. A. E. (2017). Effect of risk factors bronchial asthma on elderly health related quality of life at Assiut University Hospital, Egypt. *International Journal of Advanced Nursing Studies*, *6*(1), 1.

Bass, p. (2021). Can Buteyko Breathing Improve Your Asthma?. Retrieved 17 January 2021, from https://www.verywellhealth.com/how-do-i-perform-buteyko-breathing-200874

Beachey, W. (2022). *Respiratory Care Anatomy and Physiology E-Book: Foundations for Clinical Practice*. Elsevier Health Sciences.

Buteyko Breathing Association (2021). Buteyko Breathing Technique Retrieved 17 January 2021, from https://www.buteykobreathing.org/

Davidson, J. (2021). How Asthma Can Take a Toll on Your Health Long-Term. Retrieved 14 June 2021, from https://www.verywellhealth.com/the-effect-of-asthma-on-long-term

Dunn, R. M., Busse, P. J., & Wechsler, M. E. (2018). Asthma in the elderly and late‐onset adult asthma. *Allergy*, *73*(2), 284-294.

El-fadl, N. M. A., & Sheta, H. A. E. (2019). Effect of an Educational Program Regarding Self-Care Strategies for Patients with Bronchial Asthma on Their Knowledge and Practice. *IOSR-JNHS*, *8*(1), 18– 27. https: // doi. org/ 10. 9790/ 1959- 0801071827.

Gemicioglu, B., Bayram, H., Cimrin, A., Abadoglu, O., Cilli, A., Uzaslan, E., ... & Misirligil, Z. (2019). Asthma control and adherence in newly diagnosed young and elderly adult patients with asthma in Turkey. *Journal of Asthma*, *56*(5), 553-561.

Hassan, S., (2015). A Study of Morbidity Pattern among Geriatric Population in Fayoum Governorate, Egypt. *J Am Sci 2015*, *11*(4), 90-95, (ISSN: 1545-1003), Available at http://www. jofamericanscience. org.

Herscher, M. L., Wisnivesky, J. P., Busse, P. J., Hanania, N. A., Sheng, T., Wolf, M. S., &Federman, A. D. (2017). Characteristics and outcomes of older adults with longstanding versus late-onset asthma. *Journal of Asthma*, *54*(3), 223-229

Hsu, J., Chen, J., &Mirabelli, M. C. (2018). Asthma morbidity, comorbidities, and modifiable factors among older adults. *The Journal of Allergy and Clinical Immunology: In Practice*, *6*(1), 236-243.

Juniper, E. F., Svensson, K., Mörk, A. C., & Ståhl, E. (2005). Measurement properties and interpretation of three shortened versions of the asthma control questionnaire. *Respiratory Medicine*, *99*(5), 553-558.

Labieb, M., Mohamed, S., El-Aziz, A., Nermeen, M., Hassan, A., & Fahmy, H. (2020). Impact of Implementing Nursing Protocol on Respiratory Function of Elderly Patients' with Chronic Obstructive Pulmonary Disease. *Assiut Scientific Nursing Journal*, *8*(20.00), 38-52.

Lowery, E. M., Brubaker, A. L., Kuhlmann, E., & Kovacs, E. J. (2013). The aging lung. *Clinical Interventions in Aging*,8, 1489-1496.

Marincu, I., Frent, S., Tomescu, M. C., & Mihaicuta, S. (2015). Rates and predictors of uncontrolled bronchial asthma in elderly patients from western Romania. *Clinical Interventions in Aging*, 963-967.

Mohamed Y., Elderiny S., & Ibrahim L., (2019). The effect of Buteyko breathing technique among patients with bronchial asthma: Comparative study. *International*

Journal of Midwifery and Nursing Practice, *2*(2): 01-10.

Mohamed, E. M. H., ELmetwaly, A. A. M., & Ibrahim, A. M. (2018). Buteyko breathing technique: a golden cure for asthma. *Am J Nurs*, *6*(6), 616-624.

Nafie, R., Mohamed, M. A., Elhawary, A., & El-Shelkamy, H. (2017). Assessment of bronchial asthma management among adult patients in Chest Department of Zagazig University Hospitals in the period (2011–2012). *Egyptian Journal of Chest Diseases and Tuberculosis*, *66*(2), 197-205.

Nanda, A., Baptist, A. P., Divekar, R., Parikh, N., Seggev, J. S., Yusin, J. S., &Nyenhuis, S. M. (2020). Asthma in the older adult. *Journal of Asthma*, *57*(3), 241-252

Ozturk, A. B., Pur, L. O., Kostek, O. S. M. A. N., & Keskin, H. A. V. V. A. (2015). Association between asthma self-management knowledge and asthma control in the elderly. *Annals of Allergy, Asthma & Immunology*, *114*(6), 480-484.

Park, S. Y., Kim, J. H., Kim, H. J., Seo, B., Kwon, O. Y., Chang, H. S., ... & Cho, Y. S. (2018). High prevalence of asthma in elderly women: findings from a Korean national health database and adult asthma cohort. *Allergy, asthma & Immunology Research*, *10*(4), 387.

Prasanna, K., Sowmiya, K., & Dhileeban, C. (2015). Effect of buteyko breathing exercise in newly diagnosed asthmatic patients. *International Journal of Medicine and Public Health*, *5*(1), 77.

Prem, V., Sahoo, R. C., & Adhikari, P. (2013). Comparison of the effects of buteyko and pranayama breathing techniques on quality of life in patients with asthma - a randomized controlled trial. *Clinical Rehabilitation*, *27*(2):133-41.

Refaat, A., & Gawish, M. (2015). Effect of physical training on health-related quality of life in patients with moderate and severe asthma. *Egyptian Journal of Chest Diseases and Tuberculosis*, *64*(4), 761-766.

Ross, J. A., Yang, Y., Song, P. X., Clark, N. M., & Baptist, A. P. (2013). Quality of life, health care utilization, and control in older adults with asthma. *The Journal of Allergy and Clinical Immunology: In Practice*, *1*(2), 157-162.

Shahin, W., Kennedy, G. A., & Stupans, I. (2020). The Consequences of General Medication Beliefs Measured by the Beliefs about Medicine Questionnaire on Medication Adherence: A Systematic Review. *Pharmacy*, *8*(3), 147.

Singh G & Raghavendran M (2022). Buteyko Breathing Technique. *Journal of Nursing Education and Practice.7* (2), 13-16.

Uchmanowicz B., Panaszek B., Uchmanowicz I., & Rosińczuk J., (2016). Sociodemographic factors affecting the quality of life of patients with asthma. *Patient Preference and Adherence.10*: 345–354. Doi: 10.2147/PPA.S101898.

Yawn, B. P., & Han, M. K. (2017, November). Practical considerations for the diagnosis and management of asthma in older adults. *In Mayo Clinic Proceedings. 92*(11), pp. 1697-1705). Elsevier