American Journal of Nursing Research, 2018, Vol. 6, No. 6, 616-624
Available online at http://pubs.sciepub.com/ajnr/6/6/32
Published by Science and Education Publishing
DOI:10.12691/ajnr-6-6-32

Buteyko Breathing Technique: A Golden Cure for Asthma

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Received September 01, 2018; Revised October 12, 2018; Accepted October 28, 2018

Abstract The Buteyko Breathing Technique (BBT) is distinctive breathing therapy that uses control breath and breath-holding exercises to treat a large vary of health conditions believed to be connected to hyperventilation and low carbon dioxide. **Aim:** To evaluate the effect of Buteyko breathing technique on patients with bronchial asthma. **Setting:** This study was conducted in chest disease department at Port-said El- Masah El- Bahry Hospital. **Method:** Quasi-experimental design was utilized in this study on a purposeful sample of (50) patients through pre and post program implementation. **Tools:** Two tools were used, tool I: An interviewing questionnaire include; patients demographic data, and clinical data. Tool II: Asthma assessment questionnaire include; Asthma Severity Questionnaire and Asthma control questionnaire. **Result:** Showed that all asthma severity and asthma control items were a highly significant improved after applied BBT at p value <0.001, with significant improvement in (FEV1) after applied BBT that reflected through 64% and 36% of participants had intermittent and mild (FEV1). **Conclusion:** This study support the effectiveness of Buteyko breathing exercise over the standard treatment in asthmatic patients. There was a statistically significant improvement of daily Asthma Control, Asthma severity, pulmonary function-forced expiratory volume in 1s (FEV1) and peak expiratory flow rate (PEFR), in patients after applied Buteyko breathing exercise for one months over pre applied it. **Recommendations:** The researchers recommend that Buteyko breathing technique be added as a possible medical and nursing intervention in managing asthmatic adults.

Keywords: *asthma control, asthma severity, bronchial asthma, Buteyko Breathing Technique*

Cite This Article: Eman Mahmoud Hafez Mohamed, Aml Ahmed Mohammed ELmetwaly, and Ateya Megahed Ibrahim, "Buteyko Breathing Technique: A Golden Cure for Asthma." *American Journal of Nursing Research*, vol. 6, no. 6 (2018): 616-624. doi: 10.12691/ajnr-6-6-32.

1. Introduction

Asthma is the commonest type of chronic respiratory diseases and could be a major public health issue globally, affecting individuals of all ages, genders and ethnicities [1]. Asthma could be a significant burden, not solely in terms of health care costs but also of lost productivity and reduced participation in family life [2]. Asthma attack could be a disease characterised by long airway inflammation with respiratory symptoms such shortness of breath, chest tightness and cough mostly at night or within the early morning [3].

Most common manifestation of asthma is hypocapnia induced spasm in the bronchus which caused by hyperventilation to decrease further loss of CO2. This transient airway obstruction ends up in hypoxemia and consequent ventilation/perfusion ratio (V/Q) mismatch that causes further hyperventilation and further loss of CO2.

This leads to increases respiratory muscle load and work of breathing, whereas the continual reduction in PaCO2 leads to respiratory alkalosis that is the most prevalent acid base imbalance among asthmatics [4]. Knowing for an undeniable fact that bronchial asthma is a chronic pathology, a consistent breathing training like Buteyko breathing technique is found to be the foremost effective complementary technique that ought to performed to regularize respiration patterns through lowering breathing rate and increasing the duration of exhalation [5].

The Buteyko Breathing technique is a unique breathing therapy that uses control of breath and holding breathing exercises to treat a varied range of health conditions believed to be connected to hyperventilation and low carbon dioxide. Dr. Konstantin Buteyko is that the developer of the new fundamental, drug free medical care for asthma, renowned these days as the Buteyko breathing technique, and discovered the previous mentioned truth relating to the most explanation for bronchial spasm in asthma so he verified that

hyperventilation is the main part within the etiology and pathological process of asthma [2].

The understanding of this mechanism was the root for the development of the BBT, that reverses not only bronchial asthma but also all other hyperventilation allied diseases often associated with asthma, as bronchitis, coughing, allergy, rhinitis, high blood pressure etc., [6].

Buteyko technique aims to diminish hyperventilation by teaching individuals a way to hold their breath and integrate "shallow breathing" exercises with relaxation. Furthermore this technique recommends the utilization of the diaphragm for breathing at all times, and participants are discouraged from using their accessory muscles for breathing. This technique encourages participants to use nasal breathing at all times [7].

The nasal passages are physiologically healthier at filtering and humidifying inhaled air. Moreover, nitric oxide (NO) is secreted as a result of Buteyko breathing technique application causing bronchodilation whereas solely reckoning on nasal respiration [8]. In addition to Buteyko technique can reduce the dependence and consumption of short acting β2-agonists, as a bronchodilator, eventually resulting in overall improvement within the quality of life [9]. BBT proposes also to calculate the carbon dioxide levels in the blood stream by employing a variation of the breath holding time, known as the "Control Pause". Breath holds are often measured in seconds, and is believed to correlate to one's health condition [10].

1.1. Significant of the Study

Asthma could be a serious public health challenge, affecting millions worldwide, putting an increasing burden on governments, healthcare infrastructure, families, patients and caregivers. Statistics from the 2013Global Burden of Disease (GBD) study estimates that worldwide about 489,000 people died from bronchial asthma in 2013, and therefore the range of disability-adjusted life years lost because of bronchial asthma was over twenty two million, that translates to nearly 1% of all DALYs lost [11]. Pharmacologic management of bronchial asthma is incredibly helpful within the event of an asthma attack. The disadvantage of using long-term pharmacological therapy is that it has side effects especially if it does not control treatment [12]. A variety of clinical trials indicate that BBT could be a successful treatment for bronchial asthma [13]. Therefore this study was conducted to evaluate the effect of Buteyko breathing technique on patients with bronchial asthma.

2. Aim of the Study

To evaluate the effect of Buteyko breathing technique on patients with bronchial asthma.

2.1. Hypothesis

Asthmatic patients who apply Buteyko breathing technique will have improvement in their pulmonary function-forced expiratory volume in 1s (FEV1) and peak expiratory flow rate (PEFR), asthma severity, asthma control, and decreased medication used.

3. Method

Research Design:

A quasi-experimental design was utilised to realize the aim of the current study.

3.1. Setting of the Study

This study was conducted in chest disease department and followed on outpatient of chest disease clinic, Port-said El- Masah El- Bahry Hospital which is the only chest hospital situated at Port Said Governorate.

3.2. Sampling

A purposive sample of 50 asthmatic patients within the previous mention sitting. The researchers selected the patients who met the following inclusion and exclusion criteria.

Inclusion criteria: Patients from both sexes, the patients would be previously diagnosed as bronchial asthma, and the age of the patients ranged between 20 and 60 years old.

Exclusion criteria: Previous instructed in the Buteyko method, cardiac diseases, chest infection**,** pregnant women and mental retarded patients.

Sample size: was calculated using epidemiological information (EPI info.) program version 6.02 after taking into consideration the total number of asthmatic patient admitted to Port-said El- masah el- bahry Hospital, alpha error 5% (=confidence level=95%) Beta error 20% (=study power=80%). *Sample Size* = $\frac{Z2*(p)*(1-p)}{C2}$ = (50.1) Where: Z=Z value (e.g. 1.96 for 95% confidence level), P = Percentage picking a choice, expressed as decimal, (.5 used for sample size needed), C = Confidence interval, expressed as decimal.

3.3. Tools of Data Collection

Two tools were used to collect the data by the researchers as the following:

Tool I: An interviewing questionnaire: This tool was developed and used by the researchers after extensive literature review and it included two parts:

Part (1): Patients demographic data, it was composed of five items such as sex, age, marital status, level of education, and occupation.

Part (2): Clinical data; this part include (14) items which used to collect patient's clinical data as height, weight, BMI, smoking habit, duration of asthma, current pharmacotherapy used, and number of rescue medication used in past four weeks.

Tool II: Asthma assessment Questionnaire sheet: it was adopted from [14,15], which consisted of two parts;

Part 1: Asthma Severity Questionnaire, it was used to assess severity level of asthma according to the criteria set by [14]. It included six symptoms namely Daytime symptoms, nocturnal symptoms, short-acting beta-agonist used, Interference with normal activities and (PEFR) value. Spearman's coefficients were computed to evaluate the concordance between the identified scores and a

categorical classification of asthma severity, which was defined according to the Global initiative for Asthma (GINA) guidelines The Lin's concordance correlation coefficient was used (a value ≥ 0.80 indicates a good replicability) [15]. This category divided patients into the levels of asthma severity to; Intermittent, Mild, Moderate, and Severe; this depending on the appearance of the previous mentioned six symptoms as: (1 symptom = intermittent asthma, 2 symptoms = mild asthma, 3 – 4 symptoms = moderate asthma, and 5 - 6 symptoms = severe asthma).

Part 2: Asthma control questionnaire (ACQ): according to GINA-2017 criteria, these criteria have four items asking patients about daytime and nighttime symptoms of asthma, activity limitation, and reliever needed for symptoms more than twice/week [16]. The ACQ has been validated for use as a self-administered tool in-person, at home, or by telephone.40 Moderate to strong correlations resulted from comparing the ACQ with the AQLQ (r = 0.76), [17] Mini Asthma Quality of Life Questionnaire (r = 0.72 and 0.74), the Medical Outcomes Survey Short Form-36(SF36) (r = 0.19–0.55), 56 and the ACT (r = 0.82 to = 0.89) [18,19,20]. This category divided patients into the levels of asthma control to; uncontrolled, partly controlled, and well controlled asthma this depending on the appearance of the previous four mentioned symptoms as: (No symptoms means asthma well controlled, 1 - 2 symptoms = asthma partly controlled and 3 - 4 symptoms = asthma uncontrolled).

3.4. Validity and Reliability

For validity purposes, the researchers conducted an extensive literature review and developed the questionnaires from the previously used Tools and reviewing the pertinent reviews. Tools I, was designed by the researchers and revised by five experts in the field of medical-surgical nursing in the Faculty of Nursing of Aswan and Mansoura Universities (for content validity).

3.5. Pilot Study

A pilot study was conducted to assess the applicability of the Tools, the feasibility of the study and to estimate the time needed for data collection. It was conducted on 10 % (5) of the total participants according to the selection criteria. All patients participated in the pilot study excluded from the study sample. Based on the results of the pilot study and expert's opinion, modifications and omissions of some details were done and then set the final fieldwork schedule.

3.6. Fieldwork

This study was carried out through three consecutive phases: interviewing & assessment phase, implementation phase and evaluation phase. The data collection period was done for three months from the beginning of 1/5/2018 through 30/7/2018.

3.6.1. The Interviewing and Assessment Phase

During this phase, the researchers explained the aim of the study, Tools components, and steps of Buteyko technique (BBT). The time needed for completing the questionnaire was ranged from 15 - 20 minutes for each patient.

3.6.2. The Implementation Phase

- In this phase, the selected patients who were recruited were interviewed individually by the researchers two times throughout the study.
- The first interview was carried out by the researchers for each participant for collecting baseline data concerning their demographic, medical data, asthma severity level and asthma control level. The interview carried out at their departments in the hospital then followed in outpatient clinics. It took about 15 - 20 minutes using tool (I and II). To complete these tools the researcher followed:

Measurement of height

Each patient stand facing the height tape measurement with straight back and bare feet, and the measurement was made to calculate the predicted PEFR.

1. The predicted PEFR: was calculated by the following equation:

$$PEFR\ (L/min) = [height\ (cm) - 80]x5.$$

2. Measurement of PEFR:
   - Each patient was examined in the upright sitting position.
   - The cartoon mouth piece was adjusted to the mouth piece of the peak expiratory flow meter and the pointer was switched to zero.
   - Instruct the patient to hold the peak flow meter level (horizontally) and to keep his fingers away from the pointer then ask him to take a deep breath and close his lips firmly around the cartoon mouthpiece.
   - Ask the patient to blow as hard as he can as blowing out candles on a birthday cake and ask him to remember the speed of his blow that is being measured.
   - Take the reading then pointer was switched return back to zero.
   - Each patient repeated this three times and the highest reading was recorded. Each patient was assessed for 4 consequent days and the highest reading was recorded.
   - The study was described here the PEFR and FEV1 [21].
   - The PEFR% was obtained by dividing the measured PEFR over the predicted PEFR and by it to 100 according to the following equation.

$$PEFR\ \% = \frac{measured\ PEFR}{Predicted\ PEFR} x100.$$

   - Instructions given about BBT steps by using booklet and PowerPoint, this plan addressed each participant possibilities and the obstacles to achieve the agreed priorities of the used Buteyko Technique, which depending on three steps [22]:

Step 1: The ''Control pause (CP)'' breathing test:

- Ask the patient to sit in an upright chair and adopt a good posture. Relax the shoulders and rest lower back against the back of the chair.

- Ask the patient not to change breathing before taking his CP. Take a small breath in (2 s) and a small breath out (3 s). Hold his nose on the "out" breath, with empty lungs but not too empty. Holding his nose is necessary to prevent air entering into the airways.
- Count how many seconds that he can comfortably last before the need to breathe in again. Hold his breath until feeling the first need to breathe in. Release the nose and breathe in through it.
- Inform the patient that his first intake of breath after the CP should be no greater than his breath prior to taking measurement; the patient should not hold his breath for too long as this may cause him to take a big breath after measuring the CP.

Step 2: Shallow breathing Sit up straight:

- Monitor the amount of air flowing through nostrils by placing finger under patient's nose in a horizontal position. finger should lie just above top lip, close enough to nostrils so that the patient can feel the airflow, but not so close that the air-flow is blocked. Now, breathe air slightly into the tip of the nostrils.
- Breathe in a flicker of air (may be 1 cm) with each breath. As the patient exhale, pretend that finger is a feather. Breathe out gently onto the patient finger so that the feather does not move. When the patient breathes out, the more warm air he feel, the bigger he is breathing.
- Concentrate on calming his breath to reduce the amount of warm air he feel on his finger. As the patient reduces the amount of warm air onto his finger, he will begin to feel a need or want for air. Try to maintain the need for air for about 4 min.

Step 3: Putting it together Take Control pause:

- Reduced breathing for 4 min. Wait 2 min and take Control pause. Reduced breathing for 4 min. Wait 2 min and take Control pause.
- Then the patients received the designed BBT, and they were on their medical treatment.
- Each patient was trained by Buteyko breathing technique twice per week, and the session was about (20 min). The first week each patient of this group trained by Buteyko breathing technique intensively for 4 days then the following 3 weeks were 2 sessions per week. The time of the session was in the morning at least two hours after meals.
- Each patient performed the BBT by himself at home twice daily (in the morning and in the evening, at least 2 h after meals) during the time of the study.

o The second interview was carried out by the researchers for each patient individually after implementing the educational intervention using the Tool II.

3.6.3. The Evaluation Phase

This phase was emphasized on estimating the effect of an educational intervention for improving patient's pulmonary function-forced expiratory volume in 1s (FEV1) and peak expiratory flow rate (PEFR), asthma severity, asthma control, and medication used, among patients, through a comparison between pre and post applying educational intervention.

3.7. Ethical Considerations

- Informed consent was obtained from patients after explanation of the aim of the study.
- Privacy and confidentiality are assured to the study subjects.
- Patients were informed that their participation is voluntary and they have the right to be withdrawn from the study with a full respect.

3.8. Limitation of the Study

The study was restricted by the small sample size, the availability of facilities specialized in evaluation and treatment of bronchial asthma and some patients do not believe in efficacy of chest physical therapy as helpful treatment for bronchial asthma, the patient ability to complete the whole program (4 weeks), psychological and physiological status of patients may influence severity and recurrence of bronchial asthma attacks which have an effect on the treatment and evaluation. Lastly the patient might not do the program at home.

3.9. Statistical Analysis

The collected data were scored, tabulated and analyzed using (SPSS) version 20. The collected data were presented in tables and graphs using the actual numbers and percentages. Appropriate statistical tests were used to analyze the data as, chi-square test (X2), independent sample t-test. The level of significance was set at $p < 0.05$ and highly significance at $p < 0.001$.

4. Result

Table 1: Showed the characteristics of the studied asthmatic patients, 66% of them were males and 36% in age group (45-54) years with mean age 47.74± 9.68. The same table illustrated 50% of them were had secondary level of education.

Table 1. Number and percent distribution of patients according to their demographic characteristics

Parameter	N=50	%
age:		
less than 35	8	16
35-44	8	16
45-54	18	36
55-65	16	32
Mean of age:	47.74± 9.68	
Gender		
Male	33	66
female	17	34
Occupation:		
Governmental worker	33	66
Non-governmental worker	11	22
House wife or not working	6	12
Educational level		
Illiterate	10	20
Primary	7	14
secondary	25	50
University and above	8	16

Table 2: Demonstrated that 54% of the participants had normal body weight, while 30% of them had over weight. On the other hand 54% of the patients were smoker with 40% of them had asthma frequency between 6 -12 months. In addition to long acting medications used by the participants to control their asthma symptoms, the result revealed, 74%, 64%, 56%, 44%, and 38%, were used Leukotriene modifiers, Mast cell stabilizers, Corticosteroids, Xanthine derivatives, and Long acting beta2 adrenergic respectively, while 56% used Short acting beta2-adrenergic for quick symptoms relief.

Table 3: Showed that all asthma severity items were a highly significant improved after applied BBT at p value <0.001, which proved it through two variables *first*, measured the forced expiratory volume in one second (FEV1) which reflected that, 38% and 6% from the participants had moderate and sever FEV1 before prevention on the other hand after prevention applied for one month the patients exhibits increased FEV1 that reflected through 64% and 36% of them had intermittent and mild FEV1, which consider sensitive indicator for improving asthma severity level.

On the other hand the same table offer the *second* proved on the effectiveness of BBT through total asthma severity score which revealed, 70% and 30% from the participants had mild and moderate asthma severity respectively before intervention, while after applying BBT, the same table found marked improvement through, 46% and 54% of them had intermittent and mild asthma severity respectively.

Table 4: Illustrated that, the peak expiratory flow (PEF), had significantly maximize the speed of participants' expiration after followed BBT instructions at P value < 0.001.

Table 5: Demonstrated that all asthma control items were a highly significant improved after applied BBT at p value <0.001, which proved through total asthma control score which revealed, 56% and 44% from the participants had partly controlled and uncontrolled asthma respectively before intervention, while after applying BBT by one month, the same table found marked improvement through, only 4% from 50 asthmatic patients had uncontrolled asthma level.

Table 6: Illustrated that all patients demographic data had no significant effect on asthma severity level and asthma control before or after applied BBT except smoking habit which noticed through the result that had significant effect on asthma severity after intervention at P value < 0.05 in addition to age that had a negative significant effect on asthma control post applied BBT at P value < 0.05.

Table 2. Number and percent distribution of patients according to their past medical history

Parameter	N=50	%
BMI		
Less than 18.5	3	6
18.5 - 24.9	27	54
25 - 29.9	15	30
More than 30	5	10
Smoking habits		
Smoker	27	54
Non	23	46
Duration of asthma		
less than 6 months	18	36
6-12 months	20	40
more than 12 months	12	24
Medication used (long acting control medications)		
Corticosteroids	28	56
Mast cell stabilizers	32	64
Long acting beta2 adrenergic	19	38
Xanthine derivatives	22	44
Leukotriene modifiers (inhibitor)	37	74
Quick relief medication used		
Short acting beta2-adrenergic	28	56
Anticholinergic	34	68

Table 3. Number and percent distribution of patients according to their severity of bronchial asthma

Parameter		pre		post		X^2	P value
		N=50	%	N=50	%		
Day time Symptoms	Intermittent	5	10	32	64	40.066	**0.000
	Mild	17	34	15	30		
	Moderate	22	44	2	4		
	Severe	6	12	1	2		
Night time awakenings	Intermittent	8	16	33	66	43.53	**0.000
	Mild	14	28	17	34		
	Moderate	21	42	0	0		
	Severe	7	14	0	0		
Short-acting beta2-agonist use	Intermittent	6	12	40	80	49.47	**0.000
	Mild	23	46	9	18		
	Moderate	17	34	1	2		
	Severe	4	8	0	0		
Interference with normal activity	Intermittent	23	46	36	72	14.89	*0.002
	Mild	15	30	14	28		
	Moderate	9	18	0	0		
	Severe	3	6	0	0		
Lung function (FEV1)	Intermittent	5	10	32	64	42.31	**0.000
	Mild	23	46	18	36		
	Moderate	19	38	0	0		
	Severe	3	6	0	0		
Total severity							
Intermittent		0	0	23	46	39.03	**0.000
Mild		35	70	27	54		
Moderate		15	30	0	0		
Severe		0	0	0	0		

*: Statistically significant at $p \leq 0.05$, ** highly statistically significant at $p \leq 0.001$

Table 4. Number and percent distribution of patients according to their PEFR

Parameter	Mean	Std. Deviation	T test	P value
Pre PEFR	429.8000	43.35379	-24.159	**0.000
Post PEFR	458.0000	42.99976		

** Highly statistically significant at $p \leq 0.001$.

Table 5. Number and percent distribution of patients according to their control of bronchial asthma

Parameter		**pre**		**post**		**X^2**	**P value**
		N=50	%	N=50	%		
Day time Symptoms	Yes	33	66	10	20	21.58	** 0.000
	No	17	34	40	80		
Night time awakenings	Yes	36	72	8	16	31.81	** 0.000
	No	14	28	42	84		
Reliever needed for symptoms more than twice/week	Yes	33	66	7	14	28.16	** 0.000
	No	17	34	43	86		
Interference with normal activity	Yes	40	80	6	12	46.53	** 0.000
	No	10	20	44	88		
Classification of Asthma Control							
Well-Controlled	0		0	26	52	43.38	** 0.000
Partly Controlled	28		56	22	44		
Uncontrolled	22		44	2	4		

** Highly statistically significant at $p \leq 0.001$.

Table 6. Correlation among socio demographic characteristics, severity and control in pre and post intervention

		Severity pre	**Severity post**	**Control pre**	**Control post**
Gender	R	-.286*	.069	-.041	.085
	P value	.044	.632	.778	.556
Age	R	-.014	.176	.070	-.332*
	P value	.922	.222	.628	.019
Level of education	R	.031	-.236	.015	-.076
	P value	.829	.099	.919	.602
Occupation	R	-.181	.148	-.007	.002
	P value	.208	.305	.962	.989
Smoking habits	R	-.254	.288*	-.010	-.067
	P value	.075	.042	.947	.643
Duration of asthma per month	R	.046	.065	.244	-.086
	P value	.753	.654	.087	.555
BMI	R	.025	-.217	.060	-.054
	P value	.860	.131	.680	.710

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

5. Discussion

Buteyko technique is an adaptation of the Russian technique which was first introduced in Australia but is now used worldwide. It includes the same focus on ventilation control [23]. Buteyko method would bypass the adverse effects of steroids, patient's quality of life can be improved and most importantly this would be cost-efficient. Also, the patient compliance could can be higher than steroids [24]. Therefore, this study was done to evaluate the effect of Buteyko breathing technique on patients with bronchial asthma.

Regarding to demographic data, the finding of this study revealed that two third of the study participants were males, while more than one third of them belonged to the age group (35-44) years with mean 47.74± 9.68, this incompatible with McHugh, et al., (2003) [24], who found in their study more than three quarter of the participants were females. While Hassan, et al., (2012) **[2]** agreed with the finding who found that, less than three quarter of their participants were males with mean age (42.2 ± 7.12) years.

As relation to body mass index Tarraf, et al (2018) [25] found that less than half of their participants had over body weight and more than one quarter of them were obese, which matched with the current study which revealed that more than one quarter of the participants had over weight, also more than one quarter of them were obese. This finding was in accordance with Hall, et al., (2017) [26] who found that the main value of BMI was (29.25±2.05) kg/m^2 in their participants study. According to smoking habit, Tarraf, et al (2018) [25] illustrated that more than one third from their participants had smoking habit, this was in harmony with the study which showed that less than two third of the study subject were smoker. On the contrary to Cooper, et al., (2003) [27], who found that all their study subject were nonsmoker.

Regarding to asthma medications used, the present study found that, near to three quarter of the participants

used Leukotriene modifiers (inhibitor), also about two third of patients used Mast cell stabilizers, while more than of them used Corticosteroids medication, on the other hand more than one third of them used Long acting beta2 adrenergic and Xanthine derivatives medication to overcome asthma symptoms. In the harmony with Sorkness, et al., (2007) [28] who found that less than one third from their participants used Leukotriene modifier but with less response than the study. On the same line Stern,et al., & Slader, et al., (2006) [29,30] found on their study nearly half of their participant used corticosteroids, while less than one quarter of them used Long Acting Beta Agonist (LTRAs), also more than half of the patients were prescribed an Inhaled corticosteroids ICS (glucocorticoids or steroids). Concerning to quick relief medication used, Bowler, et al., (1998) [31] who illustrated that the majority of their study used Short-Acting Beta-Agonists (SABAs), this coincide with the current study which found that more than half of the participants also used same medication (SABAs) to relive asthma symptoms. Similarly with the study done by Angus, et al., (2005) [32] who found that nearly the entire of their study subject used (SABAs). This might be due to the action of these drugs can reduced inflammation, swelling, and mucus production in the airways of a person with asthma which allowing people with symptoms of asthma to had better control over their condition

As regard to assess asthma severity, the present study showed that, there was a significant improvement in patients' severity of bronchial asthma after compared pre and post-test for BBT used, in addition to total asthma severity the present study revealed that, less than half of the participants had intermittent symptoms, while more than half of them had mild symptoms, this mean that there was an improvement in all asthma severity dimensions after used BBT.

This finding was in parallel with Lina, et al., (2013) [33] who showed that there was a significant difference between the pre-test and post-test mean scores of the comparing the pre-test with the post-test mean scores, which means that their participants experienced very mild to mild symptoms after one month of follow-up after used Buteyko method.

This might be due to, asthmatic patients suffered from hyperventilation which cause a decrease in the amount of blood gases (called carbon dioxide, or CO2). This decrease lead to patient's bronchospasm and accumulation of secretion. BBT aims to decrease hyperventilation by teaching people how to hold their breath and incorporate "shallow breathing" exercises with relaxation. That allow improving normal gas exchange which relives bronchospasm that lead to improve asthma severity symptoms.

These results concur with the findings of the study conducted by Thomas, et al., (2009) & Hassan, et al., (2012) [2,34] which showed the positive effects of Buteyko technique in decreasing recurrence and severity of the main bronchial asthma symptoms including nocturnal waking, symptoms of activity limitation, shortness of breath, wheezing and use of inhaled corticosteroids. A randomized control trial was also done that resulted in improvements in asthma-specific health status and other patient-centered measures.

As regard to forced expiratory volume in one second (FEV1) the current study reflected that, there was a significant increase in FEV1vlue between asthmatic patients after applied BBT by one month which consider sensitive indicator for improving asthma severity level. This coming in agreement with the study done by ROY, (2013) [35] who suggested that patient had reduction in their respiratory rate that leaded to improve FEV1 value. On the other hand this result come in the opposite of the result that don by Cooper, et al., (2003) [27] who found that, there was no significant difference in bronchial responsiveness or FEV1after applied BBT. This result supported by

These results fulfilled the hypothesis that was stated; applying Buteyko breathing technique will improve asthma severity and improve FEV1.

In relating to peak expiratory flow rate ***(PEFR);*** the present study demonstrated that, there was a statistical significant difference of when compared pre with post PEFR after applied BBT which reflected that before applied BBT the Flow rate lessens which mean the airways are blocked, but after applied BBT by one month the result showed that significant improvement in PEFR, which indicates improve maximum speed of expiration. In agreement with Hassan, et al., (2012) [2] who found that there was an improvement in PEFR with their participant 51% in study group and 3.6% in control group. This might be due to scientific action of Buteyko technique based on improve bronchospasm which lead to increase maximize speed of expiration.

This is come in support with an old study by Buteyko, & Genina, (1981) [36] who found that within 1-5 days after applied BBT, the patients were able to stop the attacks, cough, blocked nose, and wheezing, using the method. Observations in 1–3 months showed considerable improvements (cessation of heavy attacks or a total disappearance of the symptoms) in 83%, some improvement (less heavy attacks and considerable reduction in medication) in remaining 17%. Their average control pause (CP) increased from 4 to 30 s, a CO2 from 25 to 36 mm Hg. Normal blood pressure, and forced expiratory volume raised over 5 times. Significant increases in lung volume, and expiratory speed. In disagreement with McHugh, et al., (2003) [24] who recorded no change in forced expiratory in their study, conversely the trial documented no adverse effects from the use of Buteyko program.

These results proved the hypothesis that was stated; applying Buteyko breathing technique will enhance patients' peak expiratory flow rate (PEFR).

According to assess asthma control, The study done by Lina, et al., (2013) [33] regarding to asthma control, they found there was a significant difference in the asthma control post-test mean scores between the control group and experimental groups. The significant difference in their scores means that the administration of Buteyko method will help improve asthma control as reflected in the mean scores of both control and experimental group. On the other hand the study found that there was a significance of improving the condition of asthmatic patients as well as in reducing the use of inhaled corticosteroids as measured by question number six of the ACQ.

In the accordance with the study finding which proved that there was a significant improvement in patients' control of bronchial asthma after compared pre and post-

test for BBT used, which showed that regarding classification of asthma control after followed BBT instructions, more than half of the asthmatic participant were had well-controlled asthma level, while near to half of them had partly controlled asthma level. In addition to Short-acting beta2-agonist used to improve asthma condition, the study had found, the majority of the participants were stop it after applying BBT. This might be due to BBT previously improve asthma severity symptoms due to previous mentioned rational which lead to improve asthma control level.

These findings run parallel with the study conducted by Cowie, et al., (2008) [37] which aimed to establish whether Buteyko Method can improve asthma control, with a secondary aim of determining its effect on use of steroid inhalers. On average the Buteyko group showed a reduction in the use of inhaled steroids by nearly 40%, with 14 out of 56 people (25%) stopping using steroid treatment altogether. Before the intervention, 40% in the Buteyko group had control of their asthma. After the intervention, improvements in asthma control were found asthma control raised to 79% of those in Buteyko group.

These results fulfilled the hypothesis that was stated; applying Buteyko breathing technique will improve asthma control and will decrease asthma medication use.

According to the correlation among socio demographic characteristics, severity and control in pre and post intervention, the current study offered that there was no statistically differ after pre and post applied BBT for asthma severity and asthma control in relation to gender, level of education, duration of asthma per month, and BMI. This may reflect, BBT effect not controlled by gender, level of education, or BMI, but can give a significant effect for all patients. On the other hand the study showed that, there was a significant effect from smoking habits on asthma severity level after applied BBT, in addition to there was a significant effect from age on asthma control after followed BBT instructions. In a contrary with McHugh, et al., (2003) [24] who found that there was no significant differences between the BBT group and the control group on the basis of age, smoking status, β2-agonist dose or inhaled steroid dose with asthma symptom score, and asthma symptom score.

6. Conclusion

The results of this study support the effectiveness of Buteyko breathing exercise over the standard treatment in asthmatic patients. There was a statistically significant improvement of daily Asthma Control, Asthma severity, FEV1 and PEFR in the patients after applied Buteyko breathing exercise for one months over pre applied it, plus it is safe, equally efficacious and cheap.

7. Recommendations

- The researchers recommend that Buteyko breathing technique be added as a possible medical and nursing intervention in managing asthmatic adults.
- Further studies regarding Buteyko Method to be conducted, to evaluate its difference from other breathing techniques in controlling and managing asthma attacks, its effect on the community setting, and long-term trials with larger population bases.
- Handout with Buteyko breathing technique should be distributed and be available for every asthmatic patient admitted to chest department.

Acknowledgments

Researchers wish to offer their gratitude and appreciation to all those who have assisted in this research.

References

[1] Asher, M. I., & Ellwood, P. (2014). The global asthma report 2014.

[2] Hassan, Z. M., Riad, N. M., & Ahmed, F. H. (2012). Effect of Buteyko breathing technique on patients with bronchial asthma. *Egyptian Journal of Chest Diseases and Tuberculosis*, *61*(4), 235-241.

[3] Prasanna, K. B., Sowmiya, K. R., & Dhileeban, C. M. (2015). Effect of Buteyko breathing exercise in newly diagnosed asthmatic patients. *International Journal of Medicine and Public Health*, *5*(1).

[4] Mousavi, S. A. J., Fereshtehnejad, S. M., Khalili, N., Naghavi, M., & Yahyazadeh, H. (2014). Arterial blood gas and spirometry parameters affect the length of stay in hospitalized asthmatic patients. *Medical journal of the Islamic Republic of Iran*, *28*, 4.

[5] Narwal, R., Bhaduri, S. N., & Misra, A. (2012). A Study of effects of Buteyko Breathing Technique on Asthmatic Patients. *Indian Journal of Physiotherapy & Occupational Therapy*, *6*(4).

[6] Kenner, A. M. (2011). *Breathtaking: Contemporary Figures of US Asthma Care* (Doctoral dissertation, Rensselaer Polytechnic Institute).

[7] Villareal, G. M. C., Villazor, B. P. U., Villegas, A. M., Visaya, P. S. N., Vista, M. E., & Tan, C. B. (2014). Effect of Buteyko Method on Asthma Control and Quality of Life of Filipino Adults with Bronchial Asthma. *The Journal of Macro Trends in Health and Medicine*, *1*, 44-60.

[8] Bruton, A., & Lewith, G. T. (2005). The Buteyko breathing technique for asthma: a review. *Complementary therapies in medicine*, *13*(1), 41-46.

[9] Thomas, M., & Bruton, A. (2014). Breathing exercises for asthma. *Breathe*, *10*(4), 312-322.

[10] Villareal, G. M. C., Villazor, B. P. U., Villegas, A. M., Visaya, P. S. N., Vista, M. E., & Tan, C. B. (2014). Effect of Buteyko Method on Asthma Control and Quality of Life of Filipino Adults with Bronchial Asthma. *The Journal of Macro Trends in Health and Medicine*, *1*, 44-60.

[11] Renolleau-Courtois, D., Lamouroux-Delay, A., Delpierre, S., Badier, M., Lagier-Tessonnier, F., Palot, A., ... & Chanez, P. (2014). Home-based respiratory rehabilitation in adult patients with moderate or severe persistent asthma. *Journal of Asthma*, *51*(5), 552-558.

[12] Ducharme, F., & di Salvio, F. (2004). Anti- leukotriene agents compared to inhaled corticosteroids in the management of recurrent and/or chronic asthma in adults and children. *Cochrane Database of Systematic Reviews*, (1).

[13] Sahat, C. S., Irawaty, D., & Hastono, S. P. (2011). Peningkatan kekuatan otot pernapasan dan fungsi paru melalui senam asma pada pasien asma. *Jurnal Keperawatan Indonesia*, *14*(2), 101-106.

[14] National, A. E., & Prevention, P. (2007). Expert Panel Report 3 (EPR-3): guidelines for the diagnosis and management of asthma-summary report 2007. *The Journal of allergy and clinical immunology*, *120*(5 Suppl), S94.

[15] Page, P. M., Broek, J. L., Bousquet, J., Baena-Cagnani, C. E., Bonini, S., & Canonica, G. W. (2017). Global strategy for asthma management and prevention. *Glob Initiat Asthma*, *126*(3).

[16] Global Initiative for Asthma (GINA). (2012). Global Strategy for Asthma Management and Prevention, updated 2017. *Available on www. ginasthma. org*.

[17] Nguyen, J. M., Holbrook, J. T., Wei, C. Y., Gerald, L. B., Teague, W. G., Wise, R. A., & American Lung Association Asthma Clinical Research Centers. (2014). Validation and psychometric properties of the Asthma Control Questionnaire among children. *Journal of Allergy and Clinical Immunology*, *133*(1), 91-97.

[18] Schatz, M., Sorkness, C. A., Li, J. T., Marcus, P., Murray, J. J., Nathan, R. A., ... & Jhingran, P. (2006). Asthma Control Test: reliability, validity, and responsiveness in patients not previously followed by asthma specialists. *Journal of Allergy and Clinical Immunology*, *117*(3), 549-556.

[19] Juniper, E. F., O′ byrne, P. M., Guyatt, G. H., Ferrie, P. J., & King, D. R. (1999). Development and validation of a questionnaire to measure asthma control. *European respiratory journal*, *14*(4), 902-907.

[20] Xin, Z. H. O. U., Ding, F. M., Lin, J. T., Yin, K. S., Ping, C. H. E. N., He, Q. Y., ... & Wang, C. Z. (2007). Validity of asthma control test in Chinese patients. *Chinese medical journal*, *120*(12), 1037-1041.

[21] Juniper, E. F., O'BYRNE, P. M., Ferrie, P. J., King, D. R., & Roberts, J. N. (2000). Measuring asthma control: clinic questionnaire or daily diary? *American journal of respiratory and critical care medicine*, *162*(4), 1330-1334.

[22] McKeown, P. (2007). Buteyko Breathing Clinic Worldwide Training for Buteyko Practitioners.

[23] 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), 133-141.

[24] McHugh, P., Aitcheson, F., Duncan, B., & Houghton, F. (2003). Buteyko Breathing Technique for asthma: an effective intervention. *Journal of the new zealand medical association*, *116*(1187).

[25] Tarraf, H., Aydin, O., Mungan, D., Albader, M., Mahboub, B., Doble, A., ... & El Hasnaoui, A. (2018). Prevalence of asthma among the adult general population of five Middle Eastern countries: results of the SNAPSHOT program. *BMC pulmonary medicine*, *18*(1), 68.

[26] Hall, C., Nici, L., Sood, S., ZuWallack, R., & Castro, M. (2017). Nonpharmacologic therapy for severe persistent asthma. The Journal of Allergy and Clinical Immunology: In Practice, 5(4), 928-935.

[27] Cooper, S., Oborne, J., Newton, S., Harrison, V., Coon, J. T., Lewis, S., & Tattersfield, A. (2003). Effect of two breathing exercises (Buteyko and pranayama) in asthma: a randomised controlled trial. *Thorax*, *58*(8), 674-679.

[28] Sorkness, C. A., Lemanske Jr, R. F., Mauger, D. T., Boehmer, S. J., Chinchilli, V. M., Martinez, F. D., ... & Bloomberg, G. R. (2007). Long-term comparison of 3 controller regimens for mild-moderate persistent childhood asthma: the Pediatric Asthma Controller Trial. *Journal of Allergy and Clinical Immunology*, *119*(1), 64-72.

[29] Stern, L., Berman, J., Lumry, W., Katz, L., Wang, L., Rosenblatt, L., & Doyle, J. J. (2006). Medication compliance and disease exacerbation in patients with asthma: a retrospective study of managed care data. *Annals of Allergy, Asthma & Immunology*, *97*(3), 402-408.

[30] Slader, C. A., Reddel, H. K., Spencer, L. M., Belousova, E. G., Armour, C. L., Bosnic-Anticevich, S. Z., ... & Jenkins, C. R. (2006). Double blind randomised controlled trial of two different breathing techniques in the management of asthma. *Thorax*, *61*(8), 651-656.

[31] Bowler, S. D., Green, A., & Mitchell, C. A. (1998). Buteyko breathing techniques in asthma: a blinded randomised controlled trial. *Medical journal of Australia*, *169*(11-12), 575-578.

[32] Angus, R., Reagon, R., & Cheesbrough, A. (2005). Short-acting β2-agonist and oral corticosteroid use in asthma patients prescribed either concurrent beclomethasone and long-acting β2-agonist or salmeterol/fluticasone propionate combination. *International journal of clinical practice*, *59*(2), 156-162.

[33] Lina, R. C., Leysa, M. D. V., Libozada, Z. D., Lirio, M. F. I., Liwag, A. A., Ramos, G. D., & Natividad, M. M. (2013). Effectiveness of Buteyko method in asthma control and quality of life of school-age children.

[34] Thomas, M., McKinley, R. K., Mellor, S., Watkin, G., Holloway, E., Scullion, J., ... & Pavord, I. (2009). Breathing exercises for asthma: a randomised controlled trial. *Thorax*, *64*(1), 55-61.

[35] ROY, P. (2013). *TO COMPARE THE EFFECTIVENESS OF BUTEYKO BREATHING TECHNIQUE AND DEEP BREATHING TECHNIQUE IN PATIENTS WITH UPPER ABDOMINAL SURGERIES* (Doctoral dissertation).

[36] Buteyko, K., & Genina, V. (1981). The Results of BVB Method Trial at The Department of Children's Diseases. *First Moscow Medical Institute*.

[37] Cowie, R. L., Conley, D. P., Underwood, M. F., & Reader, P. G. (2008). A randomised controlled trial of the Buteyko technique as an adjunct to conventional management of asthma. *Respiratory medicine*, *102*(5), 726-732.