



Effectiveness of Buteyko Method in Asthma Control and Quality of Life of School-age Children



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ABSTRACT

Background: Asthma affects not only the physiological status of school-age children but also their overall functional capacity. This may eventually impede personality development if not managed promptly and adequately.

Objective: This study aimed to determine the effectiveness of Buteyko Method in improving asthma control and quality of life of school-age children.

Methods: This study utilized a pre-test – post test design to measure the changes in asthma control and quality of life after the administration of Buteyko Method. Fourteen (14) subjects diagnosed with bronchial asthma, age 7 - 11 years old participated in the study. They were equally divided into two groups: the control group received no intervention while the experimental group was asked to attend sessions of Buteyko Method lecture and demonstration. The experimental group was visited for three (3) consecutive weeks to monitor their progress and compliance. Moreover, each group was asked to answer ACQ pre- and post-intervention and PAQLQ before the start of the intervention phase and every week during the follow-up visits.

Results: In comparing the asthma control pre-test and post-test mean scores of the control group, no significant difference was noted ($p=0.177$) while the experimental group showed a significant difference after the administration of Buteyko Method ($p=0.002$). On the contrary, the quality of life pre-test and post-test mean scores of the control group showed no significant difference in any week within one month of follow-up ($p=0.736, 0.604, 0.689$). On the other hand, the experimental group showed a significant difference on the third visit ($p = 0.035$) and fourth visit ($p=0.002$) but no significant difference on the second visit ($p=0.111$).

Conclusion: The use of Buteyko Method within 3-4 weeks as an adjunct to conventional management of asthma helps in improving asthma control and quality of life of school-age children.

Keywords: *Buteyko Method, Asthma, School-age children, Asthma Control, Quality of life*

Introduction

Asthma is defined as an inflammatory disease of the airways manifested by coughing, wheezing, shortness of breath and chest tightness

(Centers for Disease Control and Prevention, 2012). It is considered as a chronic illness which affects not only the physiological status of the patient but also his over-all functional capacity and productivity. In fact,

approximately 235 million people suffer from asthma and it is the most common chronic disease among children (World Health Organization, 2011).

In a recent study on the prevalence of asthma in 12 Asia Pacific Countries, de Guia states that 10.7 million Filipinos are suffering from asthma and 49% of them have uncontrolled symptoms. In the Philippines, limited reports showed a prevalence rate of 12% in children aged 13-14 years old and 12-22% in older age groups (Mendoza, De la Cruz, Banzon, Ayuyao & De Guia, 2007). Furthermore, according to American Academy of Allergy Asthma & Immunology (AAAAI), asthma accounts for approximately 500,000 hospitalizations each year and it is the third-ranking cause of hospitalization among children under 15 years old (United States Environmental Protection Agency, 2012).

The possible effects of asthma to school-age children are often attributed to restrictions in activity. Considering the fact that these children are in the phase of Industry vs. Inferiority according to Erik Erikson's Psychosocial Theory, this chronic illness in its acute exacerbation can hinder a child's development as it limits his opportunity to perform his role not only in school and at home but also in the community. Thus, failure to feel a sense of accomplishment can result to the development of inferiority (Cherry, 2011).

Through this stage, the child is also expected to acquire and master new skills and to assume responsibilities. Occurrence of situations such as physical and mental limitations may lead to the development of a sense of inadequacy or failure to feel a sense of accomplishment (Hockenberry & Wilson, 2007).

At their young age, children may not be able to comprehend the complexities of the diagnosis and treatment. Thus, confusion may arise and children may think that their

illness is a punishment for his or his parent's sins. They may also view their condition as permanent and may fear that it would progressively worsen. As a result, their misconception about their illness can possibly lead to inability to deal with the symptoms and to cope on a physical and psychological level (Theofanidis, 2007).

In connection to this, it is necessary to give prompt management to adequately control asthmatic symptoms and minimize the occurrence of acute exacerbation; thus, preventing its drastic effects from restricting the child's development. This can be achieved through pharmacological management and other complementary alternative medicine (CAM) therapy as an adjunct. An example of CAM therapy is Buteyko Method which was developed in Russia in the year 1952 by Dr. Konstantin Buteyko who postulated that asthma is caused by hyperventilation. This technique aims to train asthmatic clients to reduce ventilation by educating them about the proper way of holding their breath at functional residual capacity and about the importance of mouth-taping at night to increase alveolar and arterial carbon dioxide tension (Cooper, Osborne, Harrison & Tattersfield, 2009).

With the aforementioned problems, this research study is geared towards determining the effectiveness of Buteyko Method as a safe nonpharmacotherapeutic method of alleviating symptoms of asthma to decrease treatment costs and to prevent the aggravation of the client's condition. It also aims to educate asthmatic clients regarding adequate asthma control through proper breathing to maximize their functional capacity and ability to perform physical activities. In connection to this, the researchers aim to determine the effectiveness of Buteyko Method in asthma control and quality of life of school-age children.

Literature Review

Theoretical Framework

The study utilized Myra Levine's Conservation theory as it focuses on promoting adaptation and wholeness using the principle of conservation of structural, personal and social integrity. Conservation of structural integrity refers to the maintenance and restoration of the body structure to prevent physical breakdown and to promote healing. On the other hand, the conservation of personal integrity addresses each individual as someone who strives for recognition, respect, self awareness and self determination while the conservation of social integrity refers to the preservation of human interaction (Fandino, et. al., 2009). In connection to this, the research study is geared towards controlling symptoms of asthma to help these school-age children continue performing their role in home, school and community for them to achieve a sense of accomplishment despite the physical limitations due to their chronic condition.

Research Questions

This research study aimed to determine the effectiveness of Buteyko Method in asthma control and in improving the quality of life of school-age children. It sought to answer the following questions:

1. What are the asthma control pre-test mean scores of the control and experimental group?
2. Is there a significant difference in the asthma control pre-test mean scores between the control and experimental group?
3. What are the asthma control post-test mean scores of the control and experimental group?

4. Is there a significant difference between the asthma control pre-test and post-test scores of the:
 - 4.1. control group?
 - 4.2. experimental group?
5. What are the quality of life pre-test mean scores of the control and experimental group?
6. Is there a significant difference in the quality of life pre-test mean scores between the control and experimental group?
7. What are the quality of life post-test mean scores of the control and experimental group?
8. Is there a significant difference between the quality of life pre-test and post-test scores of the:
 - 8.1. control group?
 - 8.2. experimental group?
9. Is there a significant difference between the asthma control post-test scores of the control and experimental group?
10. Is there a significant difference between the quality of life post test-scores of the control and experimental group?

Research Hypotheses

Null hypothesis 1 (H_01): There is no significant difference in asthma control pre-test mean scores between the control and experimental group.

Null hypothesis 2 (H_02): There is no significant difference between the asthma control pre-test and post-test scores of the control group.

Null Hypothesis 3 (H_03): There is no significant difference between the asthma control pre-test and post-test scores of the experimental group.

Null Hypothesis 4 (H_04): There is no significant difference in quality of life pre-test mean scores between the control and experimental group.

Null Hypothesis 5 (H_05): There is no significant difference between the quality of life pre-test and post-test scores of the control group.

Null Hypothesis 6 (H_06): There is no significant difference between the quality of life pre-test and post-test scores of the experimental group.

Null Hypothesis 7 (H_07): There is no significant difference between the asthma control post-test scores of the control and experimental group.

Null Hypothesis 8 (H_08): There is no significant difference between the quality of life post test-scores of the control and experimental group.

Review of Related Literature

Buteyko Method

Buteyko Method is an alternative breathing exercise that can help patients control the symptoms of asthma (Godfrey, 2010). Buteyko Method was developed by a Ukrainian physician named Dr. Konstantin Buteyko in the year 1950. He postulated the "Hyperventilation Theory" which considers hyperventilation as the primary cause of the disruption in homeostasis. This disruption is characterized by an imbalance in the level of carbon dioxide in the blood. Carbon dioxide is known to be a smooth muscle relaxant of both bronchial and arterial walls. Decreased levels of carbon dioxide may lead to a myriad of symptoms and conditions including exacerbation of asthma such as bronchial spasm, chest tightness,

breathlessness, inflammation of airways and increased mucus production.

The four cardinal rules of Buteyko Method are as follows: (1) keeping the mouth closed; (2) keeping the back straight; (3) breathing softly and quietly; and, (4) eating only when hungry.

Asthma

Asthma is defined as an inflammatory disease of the airways manifested by coughing, wheezing, shortness of breath and chest tightness (Center for Disease and Control Prevention, 2012). It is considered as a chronic illness which affects not only the physiological status of the patient but also his over-all functional capacity and productivity. In fact, approximately 235 million people suffer from asthma and it is the most common chronic disease among children. In the Philippines, limited reports showed a prevalence rate of 12% in children aged 13-14 years old and 12-22% in older age groups (Mendoza, De la Cruz, Banzon, Ayuyao & De Guia, 2007). Asthma affects 235 million people today and the prevalence is rising (The Global Asthma Report 2011. Paris, France: The International Union Against Tuberculosis and Lung Disease, 2011). According to asthma statistics compiled by the American Academy of Allergy Asthma & Immunology (AAAAI), there are about 23 million people, including almost 7 million children, having asthma; an average of 1 out of every 10 school-aged children has asthma.

When the breathing passages become irritated or infected, an attack is triggered. The attack may occur suddenly or develop slowly over several days or hours. The main symptoms that signal an attack are wheezing, breathlessness, chest tightness, coughing and difficulty of speaking.

Symptoms may occur during the day or at night (Schiffman, 2009).

Certain things cause asthma “attacks” or make asthma worse. These are called triggers. Some common asthma triggers are: (1) allergens such as house dust mites, animal dander, cockroaches, mold and pollens; (2) infections of the airways; (3) Irritants in the environment such as smoke, air pollution, cold or dry air, strong fragrances or volatile organic compounds in sprays, and cleaning products; (4) About 80% of people with asthma develop wheezing, coughing, and a tight feeling in the chest when they exercise; and (5) stress.

Medications are used to treat, prevent and control asthma symptoms, to reduce the number and severity of asthma episodes and to improve airflow. There are two main types of asthma medications: (1) Anti-inflammatory medications reduce swelling and mucus production in the airways. (2) Bronchodilators relax the muscle bands that tighten around the airways and help clear mucus from the lungs.

School-age Children

School-age children are children ages 6 to 12 years old who are primarily attending to school. They usually have smooth and strong motor skills. However, their coordination, endurance, balance, physical abilities and fine motor skills may vary. These skills can affect a child's ability to write neatly, dress appropriately, and perform other activities. There will be big differences in height, weight, and build among children of this age range. The genetic background, as well as nutrition and exercise, may also affect a child's growth and development.

A school-age child's coping with concerns related to normal growth and development involves family support. A

functional family nurtures school age children in five essential ways such as by meeting their basic needs including food, clothes, & shelter; by encouraging learning; by developing self-esteem; by nurturing peer friendship; and by providing harmony & stability.

Methods

Research Design

This study utilized a quasi-experimental design since not all of the three elements of a true experiment were attained. In this study, the element of manipulation is attained through administering an intervention in the experimental group and withholding the said intervention from the control group (Polit & Beck, 2008). The manipulation of the study is the Buteyko Method. Control is achieved through strict adherence to the inclusion criteria, setting the environment conducive for learning in the first Buteyko session and through the use of age-appropriate tools to facilitate learning in school-age children. Randomization was not met because the researchers utilized a purposive, convenience sampling in gathering subjects for both experimental and control group. This study also utilized a pre-test - post-test design which is commonly used to compare groups and to measure changes after administering an experimental treatment (Dimitrov & Rumrill, 2003).

Study Locale

This research study was conducted in two public elementary schools in Sta. Cruz, Manila namely Padre Gomez Elementary School and Francisco Balagtas Elementary School after the approval of the schools division superintendent. In collaboration with the school nurse, the researchers conducted a survey to determine the number

of students who were diagnosed with bronchial asthma. In addition, lecture and demonstration were done at Mary Chiles General Hospital and follow-up visits were done in the subjects' respective homes.

Population and Sampling

School-age children from 7-11 years old were chosen considering that this age group is greatly affected by asthma in terms of their personal and social development (WHO, 2011). According to Jean Piaget's Theory of Cognitive Development, ages 7-11 years old are capable of using logical reasoning. The criteria for selecting the subjects are: (1) age 7-11 years old; (2) are able to read and write (3) their condition was diagnosed as bronchial asthma by a pediatrician (4) are free from pneumonia, infectious disease, lung disease, physical disabilities and psychiatric disorders which was confirmed by their school nurse and their health was further assessed by a medical doctor expert in the field of family medicine; and, (5) management of asthma must only include medications such as inhaled corticosteroids and bronchodilators and no other alternative treatment as revealed by their primary caregiver as they accomplish a health history form.

School-age children who have met the inclusion criteria were included as part of the experimental group after their parents gave their consent. To ensure that adequate attention was given during each lecture and demonstration, maximum of ten (10) subjects were included in the experimental group (Lapa & Lapa, 2011). On the other hand, those who agreed to be interviewed were included as part of the control group wherein no intervention was administered.

Research Instruments

After receiving a letter of permission from the author the study utilized the following questionnaires: the Filipino versions of Pediatric Asthma Quality of Life Questionnaire (PAQLQ(S)) and Asthma Control Questionnaire (ACQ). PAQLQ(S) is designed to measure functional problems as a result of asthma exacerbation while ACQ is developed to measure both the adequacy of asthma control which occurs either spontaneously or as a result of the treatment (Juniper, Bousquet, Abetz & Bateman, 2006). In addition, Buteyko Steps Diary was also used in order to keep track of each subject's progress and compliance as they perform Buteyko Steps Exercises.

The Filipino version of PAQLQ(S) (Palatanungan sa Kalidad ng Buhay ng mga Batang May Asma) has 23 questions which covers 3 domains (symptoms, activity limitation and emotional function) and was administered through interview. The subjects were asked to think about how they have been during the previous week because there is a strong evidence that 7 days is the maximum length of time over which younger children can recall their experiences with any degree of accuracy (Juniper, 2012). Each subject was asked to respond to each of the 23 questions on a 7-point scale (7 = no impairment due to asthma, 4 = moderate degree of impairment, 1 = severe impairment) using a green or blue card. The color of the card which they used depends upon the question. The overall PAQLQ(S) score is the mean of all 23 responses and the individual domain scores are the means of the items in those domains (Juniper, Guyatt, Feeny, Griffith & Ferrie, 2006).

The Filipino version of ACQ (Palatanungan Tungkol sa Pagkontrol ng Asma o Hika) has 6 questions and FEV% to measure the effect of asthma treatment such as bronchodilators. However, though some

doctors consider peakflow or spirometry as a gold standard in measuring lung function or airway obstruction, Buteyko practitioners consider this mode of measurement as an act of hyperventilation which causes further constriction of the airways (McKeown, 2004). Hence, in this study, FEV% was not included as part of the assessment parameters in determining the effectiveness of Buteyko Method. Instead, subjects were merely asked to recall how their asthma has been during the previous week and to respond to the symptom and bronchodilator use questions on a 7-point scale (0= no symptoms, 1=very mild symptoms, 2=mild symptoms, 3=moderate symptoms, 4=quite severe symptoms, 5= severe symptoms, 6=very severe symptoms). The questions are equally weighed and the obtained ACQ score is the mean of the 6 questions and therefore between 0 (totally controlled) and 6 (severely uncontrolled) (Juniper, Guyatt, Feeny, Griffith & Ferrie, 2006).

The two instruments underwent linguistic validation conducted by Mapi Research Institute. In addition, these were also submitted to the following individuals for content validity: two professors from a college of nursing; lecturer in pediatric nursing who is a masterate degree holder; and a licensed Buteyko practitioner and a medical doctor expert in the field of family medicine.

The two questionnaires were pilot-tested to ten (10) school-age children who met the inclusion criteria and were excluded from the actual data collection. Cronbach's alpha was utilized to determine the reliability of both instruments which revealed a value of 0.816 for ACQ and 0.858 for PAQLQ(S). Hence, both ACQ and PAQLQ(S) were considered to have a relatively high internal consistency.

Data Gathering Procedure

Before the intervention phase, a letter of permission signed by the Dean of the College of Nursing was sent to the office of the schools division superintendent for approval. After receiving a letter of endorsement, the researchers went to the five public elementary schools indicated in the letter to conduct a survey. In collaboration with the school nurse, asthmatic children were identified in each grade level. A written consent was given to each child who met the inclusion criteria and was asked to return the consent upon approval of their parents. Full disclosure and informed consent were provided to the willing subjects in the presence of their parents or primary caregiver. The subjects were asked to answer the questionnaires through an interview (PAQLQ(S) and ACQ) to assess their condition before conducting the intervention.

Under the supervision of a licensed Buteyko practitioner and a medical doctor, Buteyko Method was administered to the experimental group while no intervention was administered to the control group. Each group consists of seven (7) subjects. The subjects in the experimental group were requested to attend five (5) sessions of lecture and demonstration.

For the first few hours of the first session, orientation for both parent and child was done. Overview of the Buteyko Method and objectives of the study were discussed. In addition, instructions about how they will be able to participate in the program were also given.

The subjects were trained by a licensed Buteyko practitioner. Each step of Buteyko Method was taught and at the end of each demonstration, each subject was asked to do a return demonstration. This includes the Buteyko Steps Exercises that will monitor their progress as well as their compliance.

After the subjects learned Buteyko Steps Exercises, they were instructed to regularly do this technique at home. Parents were asked to help their children practice twelve (12) repetitions per day: four (4) repetitions in the morning, four (4) repetitions in the afternoon and four (4) repetitions in the evening. The parents were asked to record the number of steps done by their children in their Buteyko Steps Diary. Lastly, health teachings about lifestyle modification as well as the importance of mouth-taping at night were also discussed. Weekly follow-up was done to assess the subjects' progress and to render further health teachings related to Buteyko Method. During each follow-up, each subject was asked to answer only the PAQLQ(S). After one month of intervention, the subjects were required to answer the same set of questionnaires (ACQ and PAQLQ(S)). The persons who conducted the pretest interview were the same persons who conducted the post-test interview.

Statistical Treatment

The researchers utilized the t-test to determine the effectiveness of Buteyko Method in controlling the symptoms of school-age children. Using SPSS version 20, the results of the pre- and post-test were compared using a paired t - test for both ACQ and PAQLQ (S). On the other hand, post-test scores of experimental and control group in both ACQ and PAQLQ(S) were compared using independent t-test.

Ethical Considerations

The researchers utilized the Principle of Nonmaleficence, wherein this research must encompass the maxim: "Above all, do no harm" (Polit & Beck, 2008). Therefore, the appropriate balance of risk and potential benefit of the research was considered in

such a way that any possible danger to the child while undergoing the Buteyko method was assessed with the help of a licensed Buteyko practitioner who is also a medical doctor. The researcher was prepared to terminate research if there is reason to suspect that continuation would result in injury, death, disability, or undue distress to study participants (Polit and Beck, 2008). The use of data monitoring committees was implemented to document every outcome with precision and honesty to get a reliable outcome. Subjects will be assured that their participation or the information they will provide will not be used against them to promote freedom from possible exploitation.

Before conducting the research, the person's self-determination was exercised through informed consent given to the parents or guardian of the child. The subjects and their primary caregiver should be given the right to ask questions, to refuse to give information and to terminate their participation. According to the right to full disclosure, the researcher will have to fully describe the nature of the study, the person's right to refuse participation, the researcher's responsibilities, and the likely risks and benefits that would be incurred before beginning the study (Polit and Beck, 2008). Lastly, the information that was given by each subject was kept in strictest confidence (Polit & Beck, 2008).

Results and Discussion

Comparison of Pre-test Asthma Control and Quality of Life

Table 1 presents the asthma control and quality of life pre-test mean scores of both control and experimental group which reflects the severity of symptoms and degree of impairment associated with asthma before intervention was administered.

Table 1.

Comparison of Asthma Control and Quality of Life Pre-test Mean Scores of the Control and Experimental Group

	Control		Experimental		t value	p value
	Mean	SD	Mean	SD		
Pre-test Asthma Control	3.714	0.951	3.714	0.951	0.000	1.000
Pre-test Quality of Life	3.000	0.577	3.714	0.756	1.987	0.070

*Significant at < 0.05

**Significant at ≤ 0.01

As shown in Table 1, the asthma control pre-test mean scores of both control and experimental group are 3.714. Using independent t-test with 0.05 margin of error, it was revealed that there is no significant difference ($t=0.000$, $p=1.000$) in the pre-test mean scores between the control ($M=3.714$, $SD=0.951$) and experimental group ($M=3.714$, $SD=0.951$). This means that the subjects in both control and experimental groups have moderate to quite severe symptoms before intervention was administered. Likewise, it indicates that the control and experimental group were comparable.

In addition, the quality of life pretest mean scores of the control group has a pre-test mean score of 3.000 while the experimental group has a pre-test mean score of 3.714. These values are interpreted as severe to moderate degree of impairment. In addition, using independent t-test, it was found out that there is no significant difference in the pre-test mean scores between the control and experimental group. This means that the control and experimental group have the same quality of life before the intervention phase.

Comparison of Pre-test and Post-test Asthma Control

Table 2 reflects the asthma control pre-test and post-test mean scores as well as the result of t-test for both experimental and

control group. This depicts the subjects' asthma control before and after one month of follow-up.

Table 2.

Comparison of Asthma Control Pre-test and Post-test Mean Scores of the Control and Experimental Group

	Pre-test		Post-test		t value	p value
	Mean	SD	Mean	SD		
Control	3.714	0.951	2.714	0.951	1.528	0.177
Experimental	3.714	0.951	1.714	0.756	5.292	0.002**

*Significant at ≤ 0.05

**Significant at ≤ 0.01

Results revealed that the pre-test mean scores of the control and experimental group are both 3.714 (moderate to quite severe symptoms associated with asthma) before intervention was administered.

Comparing the pre-test with the post-test mean scores, the control group showed a post-test mean score of 2.714 which means that the subjects experience mild to moderate symptoms after one month of follow-up. This slight improvement in asthma control is associated with the use of prescribed asthma medications (Juniper, 2012). On the other hand, the experimental group showed a post-test mean score of 1.714 which means that the subjects experience very mild to mild symptoms related to asthma after the administration of Buteyko Method.

Using paired t-test, it was found out that there is no significant difference between the pre-test and post-test mean scores of the control group ($t= 1.528$, $p=0.177$).

On the contrary, comparing the pre-test and post-test mean scores of the experimental group using the same statistical analysis, a t-value of 5.292 and a p value of 0.002 were obtained. This shows that there is a significant difference between the pre-test and post-test mean scores of the

experimental group. This means that the administration of Buteyko Method brought a significant improvement in asthma control.

These results concur with the findings of the study conducted by Hassan, Riad and Ahmed in 2012 which showed the positive effects of Buteyko Method 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. (Thomas, et al., 2008)

The improvement in asthma control in the Buteyko group could be a result of improvement in "hidden hyperventilation" as claimed by Buteyko. There is evidence of hyperventilation causing decreased CO₂ levels, resulting in asthma symptoms and also linked to a lower perceived general health (Ritz T., 2008). The reasons for the improvement in total score of quality of life are due to the Buteyko breathing involving a period of breath holding interspersed with periods of shallow breathing, accompanied

by physical activities to increase build up of CO₂. The increase in CO₂ leads to dilatation of smooth muscles in the walls of the bronchi, bronchioles and alveolar ducts, and therefore optimizes ventilation perfusion matching (Venkatesan, Sahoo, & Adhikari, 2012). The Buteyko and pranayama techniques both advise nasal breathing over oral breathing as part of the breathing technique. The advantages of nasal breathing include the filtration of air for allergens and polluting dust, humidification and production of nitric oxide, which results in bronchodilation of the airways (Bjemer, 1999).

Pre-test and Weekly Quality of Life Post-test Mean Scores

Table 3 shows the pre-test mean scores (first visit) and weekly post-test mean scores (second, third and fourth visits) of both experimental and control group. The values presented in the table below are the average of the scores obtained using the PAQLQ which depicts the quality of life of school-age children after one month of follow-up.

Table 3.

Quality of Life Pre-test and Weekly Post-test Mean Scores of the Control and Experimental Group

Control				Experimental			
Pre-test	Weekly Post-test Mean Scores			Pre-test	Weekly Post-test Mean Scores		
1st Visit	2nd Visit	3rd Visit	4th Visit	1st Visit	2nd Visit	3rd Visit	4th Visit
3.000	3.143	3.143	2.857	3.714	4.571	5.000	5.571

As shown in Table 3, results revealed a value of 3.000 (severe to moderate degree of impairment) as the pre-test mean score of the control group which was taken during the first visit. Weekly post-test mean scores were obtained on the succeeding visits wherein a value of 3.143 was acquired on both second and third visit and 2.857 on the fourth visit. As compared

to the pre-test mean score, a decrease in the post-test mean scores was observed which may be interpreted as a decline in the quality of life associated with asthma.

On the other hand, a value of 3.714 was obtained as the pre-test mean score of the experimental group. Comparing this value to the scores obtained on the succeeding visits, it was observed that there

is a gradual increase in the post-test mean scores wherein a value of 4.571 was obtained on the second visit, 5.000 on the third visit and 5.571 on the fourth visit. These post-test scores are interpreted as moderate degree of impairment to no impairment. Hence, administration of Buteyko Method results to an improvement in the quality of life among asthmatic school-age children.

Table 4.

Comparison of the Weekly Quality of Life Pre-test and Post-test p-values of the Control and Experimental Group

	Control				Experimental			
	1st visit	2nd visit	3rd visit	4th visit	1st visit	2nd visit	3rd visit	4th visit
Pre-test - Post-test	-	0.736	0.604	0.689	-	0.111	0.035*	0.002**

* Significant at $p \leq 0.05$

** Significant at $p \leq 0.01$

Utilizing paired t-test with 0.05 margin of error, results revealed that there is no significant difference (2nd visit = 0.736, 3rd visit = 0.604, 4th visit = 0.689) in the quality of life of the control group in any week within one month of follow-up.

On the other hand, using the same statistical analysis, it was found out that there is no significant difference in the post-test mean scores of the experimental group on the 2nd visit ($p = 0.111$). However, a significant difference was noted on both 3rd week and 4th week ($p = 0.035$ and 0.002). In addition, the p-value obtained on the fourth visit ($p = 0.002$) showed the highest significance compared to the second and third visit. This means that the administration of Buteyko Method within 3-4 weeks may yield to a significant improvement in the quality of life of asthmatic school-age children.

These results run parallel with the findings of a study about the effects of Buteyko Method and Pranayama wherein both groups showed a significant improvement in asthma quality of life which

Comparison of Quality of Life Weekly Post-test Mean Scores

Table 4 shows the comparison between the p-values of weekly post-test mean scores obtained for both control and experimental group which depict the subjects' quality of life within one month of follow-up.

covers four subdomains (symptoms, activity, emotion and environment), whereas the control group did not show a significant improvement. In addition, the Buteyko group demonstrated significant improvement in asthma control, whereas the pranayama and control groups did not show an improvement in Asthma Control Questionnaire scores. In conclusion, the results demonstrated better trends of improvement in the Buteyko group on quality of life and asthma control than in the pranayama group (Venkatesan, Sahoo, & Adhikari, 2012).

In a study by Bowler et al, 1998, there is 54% improvement in administering Buteyko Method in the quality of life questionnaire at (6) six weeks. Also, according to Godfrey, 2010, in most cases, patients will see a benefit of Buteyko Method in the first few weeks. In addition, according to the statements of Patrick Mckeown, there is 50% less wheezing, coughing, and breathlessness within the two weeks of administering Buteyko Method for asthma.

Comparison of Asthma Control Post-test Mean Scores

Table 5 shows the post-test mean scores of both control and experimental

groups. This reflects the comparison between the asthma control of both groups after one month of follow-up.

Table 5.

Comparison of the Asthma Control Post-test Mean Scores of the Control and Experimental Group

	Control		Experimental		T value	p value
	Mean	SD	Mean	SD		
Post-test	2.714	0.951	1.714	0.756	2.178	0.050*

*Significant at ≤ 0.05

**Significant at ≤ 0.01

An independent t-test showed a significant difference ($t=2.178$, $p=0.050$) in the asthma control post-test mean scores between the control group ($M=2.714$, $SD=0.951$) and experimental groups ($M=1.714$, $SD=0.756$).

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.

Comparison of the Quality of Life Post-test Mean Scores

Table 6 shows the comparison between the quality of life weekly post-test score of the control and experimental group.

Table 6.

Comparison of the Quality of Life Post-test Mean Scores of the Control and Experimental Group

	Control		Experimental		t-value	P value
	Mean	SD	Mean	SD		
2nd Visit	3.143	1.215	4.571	1.134	2.274	0.042*
3rd Visit	3.143	0.810	5.000	1.155	3.357	0.006**
4th Visit	2.857	0.810	5.571	0.787	6.008	0.000**

*Significant at ≤ 0.05

**Significant at ≤ 0.01

An independent t-test showed a significant difference in the post-test mean scores between the control and experimental group on the second visit ($t=2.274$, $p=0.042$), third visit ($t=3.357$, $p=0.006$) and fourth visit ($t=6.008$, $p=0.000$). The significant difference in their scores means that the use of the Buteyko Method helps school-age children in achieving an improved quality of life.

The aforementioned results reinforce the significance of complementary alternative medicine (CAM) such as breathing techniques in 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. These findings run parallel with the study conducted by Cowie, Conley, Underwood, & Reader, 2008 which aims 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 and 44% in the control group had control of their asthma. After the intervention, improvements in asthma control were found in both groups with asthma control having risen to 79% of those in Buteyko group and to 72% in the control group. Both groups showed a significant improvement in their quality of life. (Cowie, Conley, Underwood, & Reader, 2008).

Furthermore, the results also strengthen the benefit of CAM to asthmatic children who experience cost barriers to conventional asthma care in facilitating improved asthma control (Shen & Oraka, 2012).

Conclusion

The use of Buteyko Method as an adjunct to conventional management of asthma showed a significant improvement in asthma control and in promoting a better quality of life among school-age children with bronchial asthma. This statement is supported by the results of the study which showed a decrease in frequency of asthma-related symptoms, activity limitation as well as bronchodilator use and an improvement in emotional function after 3-4 weeks of Buteyko Method administration.

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