Effect of Self-Care Module on Selected Outcomes among Patients with Bronchial Asthma

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Abstract

Background: Bronchial asthma is considered one of the major problems of health care systems in many countries. Asthma in particular, affects the quality of life, social and economic issues, and can lead to poor health outcomes. Self-care management is a keystone in asthma management. It helps patients achieve better control of their bronchial asthma symptoms and is vital for their overall health and well-being. Self-care module improves asthma knowledge and treatment adherence, decreases disease-related events, and improves the patient's self-efficacy. **Aim:** was to evaluate the effect of self-care module on selected outcomes among patients with bronchial asthma. **Design:** A quasi experimental (pre-posttest control group design) was utilized. **Tools:** Patient's Demographic and Medical background Questionnaires; Asthma patient's knowledge questionnaires; Morisky Medication Adherence Scale; and Self Efficacy for Managing Chronic Disease. **Setting:** a study was carried out in the chest outpatient clinics at El-Kaser El Aini Hospital, Cairo University -Egypt. **Sample:** A convenient sample of 60 adult male & female patients over six consecutive months. **Results:** There were statistically significant differences between the study and control groups after implementing the self-care module regarding patients' knowledge ($\chi2= 20.376$, P- value= 0.000), medication adherence ($\chi2= 6.513$, P- value = 0.039), and self-efficacy ($\chi2=21.337$, P- value= 0.000). **Conclusion:** the self-care module has a positive significant effect on improving patients' asthma-related knowledge, medication adherence, and self-efficacy. **Recommendation:** Promotion and development of self-care modalities for patients with bronchial asthma. Replicating the study to a large sample size from diverse geographic areas is recommended.

Keywords: Bronchial asthma, Self care Module, patient's asthma Knowledge, Medication Adherence & Self-Efficacy.

Introduction

Bronchial asthma is a chronic inflammatory disease of the lungs that considered one of the main problems of health care systems in various countries **(Haghighi et al., 2021)**. In the last few years, the prevalence of the disease has been increased nearly all over. Internationally, bronchial asthma has been shown to affect 12.8% of populations aged from 30 to 59 years old and 4% to 8% in the population older than 65 years old **(Chen, et al., 2020)**. In Egypt, the incidence of bronchial asthma was reported to be 9.4% of populations **(Hussein, et al., 2020)**.

Bronchial asthma is manifested by unpredictable and recurrent symptoms, changeable airflow obstruction, and bronchospasm. Symptoms include periods of wheezing, coughing, chest tightness, and dypnea. These periods of symptoms may occur a few times a day or a few times per week depending on patients' conditions, they may become worse at night or with exercise **(Abo El-Fadl, & Sheta, 2019)**. In fact, timing and frequency of asthma attacks are often difficult to predict. Accordingly, patients with asthma must always adjust themselves to the undefined nature of their disease while at home, at work, and while participating in additional and social activities **(Chen, et al., 2020)**.

Chronic symptoms and exacerbations of asthma possibly impair physical and psychological health of patients and their families, resulting in direct or indirect economic costs and even avoidable deaths **(Liao, et al., 2019)**. An effective method to decrease these costs and the harm caused by asthma disease, is the patient's self-care management **Farzandipour, et al., (2017)**: Mancuso, **Sayles, & Allegrante, (2010)**. In fact, the focal aim of asthma management is to control the disease and let patients to live the usual and healthy life. This could be achieved through shared efforts in drug therapy and patient's self-care. Indeed, patients require to utilize drugs correctly and manage for a long time. This may be achieved if patients obtain adequate direction on how to use drugs and get sufficient information about the disease **(Liao, et al., 2019; Steurer-Steyetal., 2015).** Patients must also be alert that adherence to the management plan is the basis of asthma treatment. On the other hand, asthma is an unpredictable disease, meaning that even when a patient has attained a well-controlled asthma symptom, an asthma attack can still happen. For that reason, patients should know how to manage their illness and/or how to get assist from the health care providers in case of asthma worsening **(Nguyen, et al., 2018)**.

Education in self-care is an important basis in asthma management. Self-care is anexpression used for any formal patient instruction programs aimed at teaching skills to the greatest management of the disease process, altering patients' styles, and dealing with the disease. Self-care programs vary from providing of written material only, to more concentrated patient management, including exercise instructions **Gardner, et al., (2021) & Ali, et al., (2016).**

Self- care modules help patients achieve better control of their asthma symptoms and are vital for the overall health and wellbeing. Evidence showed that self-care education has caused improved quality of life and decreased health care loads **(Haghighi, et al., (2021)**. Apparently, self-care module is useful to control and lessen so far as possible the symptoms and complications and help the patient how to attain possible ability for implementing activities of daily living. It improves asthma knowledge concerning appropriate use of medication, pulmonary restoration, movement and exercise, diet, smoking termination, infection control, individual hygiene and preserve normal sleeping pattern (**Pinnock, (2015); Sharma, et al., (2016) & Olivera et al., (2016)**.

In addition, various studies have shown that self-care educational modules improve medication adherence and improve the patient's self-efficacy. Adherence is known as the degree to which patient's behavior change in term of taking medications, following diets, or exercising and other lifestyle changes. Actually, adherence along with efficacy are essential components in the success of any preventive and the therapeutic efforts. **Hussein, et al., (2020); Abegaz, et al., (2020).** Self-efficacy is a key aspect in the bronchial asthma management. It appears to have a strong influence on choice making, on the amount of effort made, and the perseverance applied to perform behavior.

Self-efficacy in asthma management is a patients' faith that can actually do the behaviors' and skills which are believed essential to help them. Self-efficacy requires decision to help in determining which activity to perform, for each situation a patient can face, in order to manage their asthma (**Hussein, et al., 2020**). Nurses play a vital role in preventing asthma attacks or decreasing its severity through education. Proposing teaching modules about bronchial asthma care are very important to improve and maintain capability of self-management based on scientific evidence of knowledge and practice (**Askeret al., 2015**).

Significance of the Study

Asthma is a common chronic respiratory disease, distressing more than 334 million people of all ages worldwide and it is expected that the number of patients with asthma will be elevated by 100 million more by 2025. Asthma negatively influences the different areas of patients normal life, due to the enduring treatment and the various attacks of symptoms. Asthma is a main cause of morbidity and mortality and forces a major load on patients, families, and healthcare delivery systems (**Abo El-Fadl, &Sheta, 2019; Farzandipouretal., 2017**). The helpful method to lessen the expenses and the harm caused by asthma, like most of the chronic diseases, is the management of the illness by the patients (self-care) (**Hodkinsonet al., 2020**). Self-care educational module provided through the current study could assist patients to live the greatest possible quality of life with their chronic condition. Furthermore, the findings of the current study could provide an evidence-based practice information for nurse educators, nurse researchers, and clinicians working with bronchial asthma patients. Therefore, the aim of the current study was to evaluate the effect of self-care module on selected outcomes among patients with bronchial asthma.

Aim of the study

The aim of the current study was to evaluate the effect of self-care module on selected outcomes (bronchial asthma knowledge, medication adherence, and self-efficacy) among patients with bronchial asthma.

Research Hypotheses

To fulfill the aim of the current study, the following hypotheses were postulated:

H_1: Patients who receive the self-care module will have higher total mean scores of bronchial asthma knowledge than those patients who receive the routine hospital care only.

H_2: Patients who receive the self-care module will have higher total mean scores of asthma medication adherence than those patients who receive the routine hospital care only.

H_3: Patients who receive the self-care module will have higher total mean scores of self-efficacy than those patients who receive the routine hospital care only.

Operational Definitions

Self-care Module:

A developed written self-care module (Handout booklet) that was prepared by the researchersand included provision of general knowledge of asthma that encompass the following: pathophysiology of asthma, signs &symptoms, diagnosis, risk factors, the reason of taking the different types of medication, the management of environmental asthma activates, the recognition/management of asthma exacerbations, the use of drug inhalers, and the proper diet. In addition, the module included what patients should do to

monitor and control symptoms, and how to prevent the exacerbations using a colored pictures and figures.

Selected outcomes:

The selected outcomes in the current study included the following:

Asthma knowledge: It is a quantitative score of patient's knowledge as measured by Asthma patient' knowledge questionnaire which was developed by the researchers and included40 questions to be answered by the patient before and after giving the self-care module.

Patient's asthma medication adherence: It is a quantitative score of medication adherence measured by the Morisky Medication Adherence Scale (MMAS-8-Item) (**Morisky, et al., 2008**).

Self-efficacy: It is a quantitative score that represent the confidence to accurately interpret symptoms and follow through with appropriate self-care as measured by the Self Efficacy for Managing Chronic Disease 6 Items Scale (**Lorig et al., 2001**).

Methods

Research Design:

A quasi-experimental (pre-posttest control group) design was employed. The quasi-experimental research design involves manipulating the independent variable to observe the effect on the dependent variable. The pre-test and post-test results help establish the effectiveness of the intervention measures proposed in the research (**Polit, & Beck, 2017**).

Setting:

The current study was carried out in the chest outpatient clinics in El- Kaser El Aini hospital, Cairo University -Egypt.

Sample:

A convenientsampleof60 adult patients (male and female) that divided into two equal groups (30 patients each): 1- the study group who obtained the self-care module added to the regular hospital care; and 2- the control group who received the regular hospital care were constituted the present study sample. The inclusion criteria were as follows: age between 18-60; diagnosed with bronchial asthma; can read and write; able to communicate; controlled diabetes and controlled hypertension; and not suffering from other inflammatory disorders. The researchers started with the control group to avoid contamination.

Tools:

Data pertinent to the current study was collected using the following four tools:

Patient's Demographic and Medical background Questionnaires was developed by the researchers and it consisted of two parts: first part is related to the personal data that included questions regarding to gender, age, marital status, level of education,

smoking history; while the second part was related to medical information that included questions regarding duration of the current disease, past history, family history, current symptoms, current medication, and allergy history.

Asthma patient's knowledge questionnaires: which was developed by the researchers based on literature review and included 40 questions as follows: 25 true and false (T & F) questions and 15 MCQ. The questionnaire was aimed to assess patient's knowledge before and after providing the self-care module. Total grades of the questionnaires 40 grades, one score for the correct answer of MCQ and T & F question. If the patient answered incorrect answer, or choose (I don't know response) will be considered zero score. Total scores of 60% and above (24 and more grades) was considered satisfactory knowledge. While scores less than 60 % (less than 24 grades) were considered unsatisfactory knowledge. Content validity of this tool was tested by panel of five experts. Three of them were faculty members in Medical Surgical Nursing field from- Faculty of Nursing, Cairo University and two specialized physicians. The reliability of the tool was established after data collection, it was 0.80.

Morisky Medication Adherence Scale (MMAS-8-Item): an adopted tool developed by Morisky, Ang, Krousel-Wood, &Ward (2008) that included 8 questions based on patient's experience with asthma medication. The response for the first 7 questions is either Yes (zero score) or No (one score). While the response for question 8 is likert scale from 1-4 as follows: all the time (zero), usually (1score), sometimes (2scores), once (3scores), and never (4 scores). The total score of the scale is 11. The scale is divided into three levels of categories as follows: high medication adherence (from 8and above scores); medium medication adherence (from 6 to less than 8); and low medication adherence (less than 6 scores). Scale's reliability analysis of Morisky Medication Adherence Scale (MMAS-8-Item) revealed an overall Cronbach's alpha of 0.753 (showing good internal consistency) (**Plakas, et. al., 2016**). The tool was translated into Arabic by the researchers. The reliability of the Arabic version of this tool was established after data collection and it was 0.78.

Self- Efficacy for Managing Chronic Disease 6 Items Scale: an adopted tool developed by **Lorig et al., 2001**. It is 6-items scale contains items taken from several self-efficacy scales developed for the Chronic Disease Self-care study. It is used to identify how the patients with chronic disease (bronchial asthma) were confident in doing certain activities regularly and keep it from interfering with the things they want to do such as, fatigue. Physical

discomfort, emotional distress, symptoms, different tasks, and activities, and doing things other than just taking medications. The score for the scale is the mean of the six items, mean scores of 1, 2, 3 are considered (Low self-efficacy); mean scores of 4,5,6,7 are considered (Moderate self-efficacy); mean scores of 8,9,10 are considered (High self-efficacy). The internal Consistency Reliability of the tool was 0.91**(Marconcin, et al., 2021).**The tool was translated into Arabic by the researchers. The reliability of the Arabic version of this tool was established after data collection and was 0.92.

Ethical Considerations

Official approval was obtained from the Research Ethics Committee at Faculty of Nursing, Cairo University (IRB2019041701). All participants wereprovided with information forms detailing the aim; significance; and process of the study. They also were given the chance to ask questions about the research; and were completely guaranteed that they could extract from the study at any time without any negative consequences. Participant informed consent was obtained prior to commencement of data collection. Anonymity and confidentiality of the collected data was assured through coding as well as keeping the documents in a safe locked place.

Procedure

Once official permission was granted to proceed with the study, the researchers identified the potential subjects who meet the study inclusion criteria. Data was collected through three phases and as follows: a) In the first phase (preparatory and assessment phase), the researchers explained the nature and purpose of the study, written informed consent was obtained from the participants, then the demographic and medical data was gathered using tool (I) by the researchers through face to face interview. In addition, every participant (either in control or study group) was given a pretest of 40 questions tool (II) to be answered in half an hour and to be filled by the participants. After that, every patient in both groups was asked by the researchers about the medication adherence and self-efficacy using the tools (III & IV). Tools were filled by the researchers, and this takes about 10-20 minutes with every patients. b) In the second phase (implementation phase), the control group received the routine hospital care and was reassessed after one month using the same three tools (II, III, & IV). While the study group was given the self-care module, the researchers explained its purpose, content, and how to go through it.

The module was explained to patient in 4 sessions, one every week during the weekly follow up on the outpatient clinics. The 1st session included the definition, causes and risk factors of bronchial asthma. The 2nd session included the clinical manifestations, diagnosis, types, nutrition, and bronchial asthma. While the 3rd session involved medical management and the practical use of the different types of drug inhaler. The 4th session included the common mistakes regarding using drug inhalers, prevention of bronchial asthma, nursing management and health teaching related to bronchial asthma. Each session took about 30 to 45 minutes. Furthermore, participants in the study group was followed up by the researchers during the week through phone call to ensure that they are adhering to the module instructions and to remind them with the following session, c) The third phase was the evaluation phase, every participant in the study and control group was evaluated after one month during the follow up clinic visits by giving them the post test (tool II) for half an hour. Then, the medication adherence and self-efficacy tools (III & IV) was completed again by the researchers in 10 - 20 minutes.

Statistical Analysis

The gathered data was tabulated, computed, and analyzed using the new version of Statistical Package for Social Science (SPSS) version 20 (Social Science, IBM, USA, 2020). Data were presented using descriptive statistics in theform of frequencies, percentage, etc. As well inferential tests were utilized such as t test, $\chi 2$ test, …etc. Statistical significance was considered at P-value less than or equal to 0.05.

Results

Statistical results of the present study are offered in three sections as follows: **Section1:** Describes personal demographic characteristics and medical data of the study and control groups (Tables 1-2). **Section 2:** Delineates hypothesis testing for being supported or not (Figures 1-3 and Tables 3-5). **Section 3:** Clarifying other additional findings as the correlation between selected demographic characteristics and medical data with medication adherence, self-efficacy, and post-knowledge testscoresamong study and control groups (Table 6). In addition, regression coefficients analysis of self-care module on patient knowledge scores and (medication adherence, and self-efficacy) among study and control groups (Tables7-8).

Section (1):
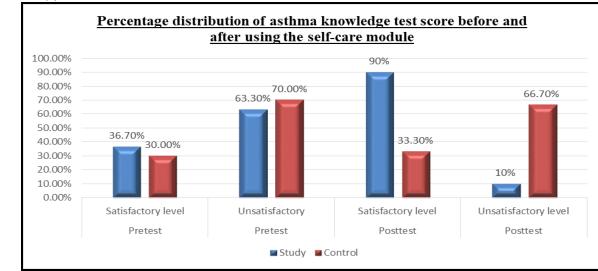**Table (1): Percentage distribution of personal demographic characteristics of study and control groups (n= 60).**

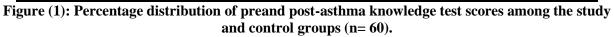| Variables	Study group (30)		Control group (30)		χ^2	P- value
	No.	%	No.	%		
Age / Yrs:						
1. 20 < 30	5	16.7%	5	16.7%		
2. 30 < 40	10	33.3%	10	33.3%	0.536	0.911
3. 40 < 50	6	20.0%	8	26.7%		
4. 50 < 60	9	30.0%	7	23.3%		
Mean ± SD	40.40±11.35		40.17±10.85			
Gender:						
1. Male	13	43.3%	12	40.0%	0.069	0.793
2. Female	17	56.7%	18	60.0%		
Marital status						
1. Married	18	60.0%	20	66.7%		
2. Single	5	16.7%	5	16.7%	0.505	0.918
3. Divorced	1	3.3%	1	3.3%		
4. Widow	6	20.0%	4	13.3%		
Education Level:						
1. Cannot read or write	8	26.7%	5	16.7%		
2. Can read and write	11	36.7%	11	36.7%		
3. Primary School	1	3.3%	0	0.0%	3.026	0.696
4. Preparatory	3	10.0%	6	20.0%		
5. Secondary	6	20.0%	6	20.0%		
6. Post graduate	1	3.3%	2	6.7%		
Place of Residence:						
1. Urban	5	16.7%	7	23.3%	0.417	0.519
2. Rural	25	83.3%	23	76.7%		
Occupation:						
1. Worker	9	30.0%	8	26.7%		
2. Farmer	4	13.3%	3	10.0%		
3. Employee	0	0.0%	1	3.3%	1.242	0.871
4. House wife	12	40.0%	13	43.3%		
5. Student	5	16.7%	5	16.7%		
Smoking:						
1. Yes	8	26.7%	4	13.3%	1.667	0.197
2. No	22	73.3%	26	86.7%		

* Significant ≤ 0.05 (2 – tailed).

Table (2): Percentage distribution of medical data of both study and control group (n= 60).

Variables	Study group (30)		Control group (30)		χ^2	P- value
	No.	%	No.	%		
Duration of bronchial asthma						
- Less than 1 year	7	23.3%	5	16.7%		
- 1 year and less than 3 years	14	46.7%	16	53.3%	0.700	0.873
- 3 years and less than 6 years	3	10.0%	4	13.3%		
- More than 10 years	6	20.0%	5	16.7%		
Mean ± SD	3.97±0.9		3.67±0.7			
Presence of chronic diseases:						
- Yes	17	56.7%	14	46.7%	0.601	0.438
- No	13	43.3%	16	53.3%		
Chronic diseases:						
- Hypertension	3	17.6%	2	14.3%		
- Neurological disease	1	5.9%	1	7.2%		
- Diabetes and hypertension	6	35.3%	7	50.0%	1.140	0.888
- Diabetes, hypertension, and cardiac	4	23.5%	3	21.4%		
- Liver disease	3	17.6%	1	7.1%		
Family history of bronchial asthma:						
- Yes	20	66.7%	17	56.7%	0.635	0.426
- No	10	33.3%	13	43.3%		
Clinical manifestations of bronchial asthma:						
- Dyspnea	6	20.0%	6	20.0%		
- Dyspnea and cough	7	23.4%	6	20.0%	0.128	0.998
- Dyspnea, cough, and chest pain	13	43.3%	14	46.7%		
- Dyspnea, Cough, and nasal discharge	4	13.3%	4	13.3%		
Medication of bronchial asthma:						
- Bronchodilator and antibiotic	9	30.0%	9	30.0%		
- Bronchodilator, anti-inflammatory and antibiotic	20	66.7%	17	56.7%	2.043	0.563
- Bronchodilator and anti-inflammatory	1	3.3%	4	13.3%		

* Significant ≤ 0.05 (2 – tailed)

Section (2):

Figure (1): Percentage distribution of preand post-asthma knowledge test scores among the study and control groups (n= 60).
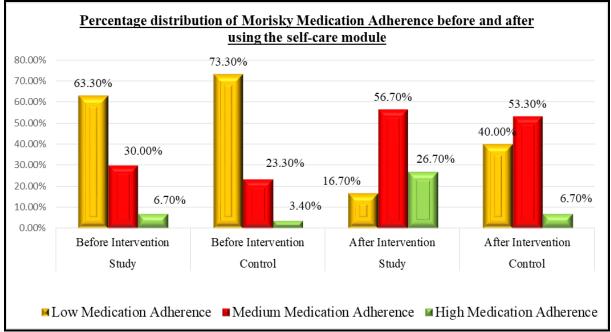
Figure (2): Percentage distribution of Morisky Medication Adherence before and after using the self-care module among study and control groups (n= 60).
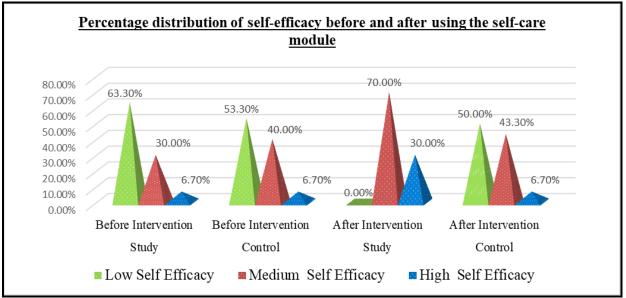

Figure (3): Percentage distribution of self-efficacy before and after using the self-care module among study and control group (n= 60).

Table (3): Comparison of the mean pre and post-asthma knowledge test scores among study and control groups (n= 60).

Knowledge score	Study group (30)	Control group (30)	T-test	P- Value
	Mean ± SD	Mean ± SD		
- Pre asthma knowledge test scores	22.0 ±3.08	21.50± 3.246	0.612	0.543
- Post-asthma knowledge tests cores	29.93± 4.601	25.63± 5.543	3.270	0.002*

* Significant ≤ 0.05 (2 – tailed).

Table (4): Comparison of the mean of morisky medication adherence scale before and after using the self-care module among study and control groups (n= 60).

Knowledge score	Study group (30) Mean ± SD	Control group (30) Mean ± SD	T-test	P- Value
-Medication adherence scalebefore using the self-care module.	5.37 ±1.326	5.23 ± 1.194	0.409	0.684
-Medication adherence scale after using the self-care module.	7.07 ± 1.780	6.07 ± 1.081	2.630	0.011*

* Significant ≤ 0.05 (2 – tailed).

Table (5): Comparison of the mean of self-efficacy before and after using the self-care module among study and control group(n= 60).

Knowledge score	Study group (30) Mean ± SD	Control group (30) Mean ± SD	T-test	P- Value
-Self-efficacy before using the self-care module.	24.07±11.30	24.57 ± 10.99	0.174	0.863
-Self-efficacy after using the module	36.20 ± 10.93	28.77 ± 12.67	2.438	0.018*

* Significant ≤ 0.05 (2 – tailed).

Section 3:

Table (6): Correlation between medication adherence score, self-efficacy, and post knowledge test score and selected items of demographic and medical data (n= 60)

Variables	Medication adherence score	Self-efficacy Score
1. Post knowledge test score	Correlation: 0.262 P-value: 0.043*	Correlation: 0.459 P-value: 0.000*
2. Age	Correlation: 0.002 P-value: 0.986	Correlation: 0.042 P-value: 0.747
3. Duration of bronchial asthma	Correlation: 0.073 P-value: 0.578	Correlation: 0.020 P-value: 0.876

**Correlation is significant at the 0.05 level (2 – tailed)*

Table (7): Regression Coefficients analysis of self-care module on patient's knowledge scores and medication adherence among study and control group (n= 60)

Predictors	Unstandardized Coefficient		Standardized Coefficient	t- Value	P- Value	r	R^2	ANOVA	P- Value
	B	SE	Beta						
Constant	4.519	1.008		4.482	0.000	0.262	0.069	4.286	0.043*
Medication adherence	0.074	0.036	0.262	2.070	0.043*				

* Significant ≤ 0.05 (2 – tailed).

Table (8): Regression Coefficients analysis of Self Care Module on patient's knowledge scores and self-efficacy among study and control group (n= 60)

Predictors	Unstandardized Coefficient		Standardized Coefficient	t- Value	P- Value	r	R^2	ANOVA	P- Value
	B	SE	Beta						
Constant	3.919	7.405		0.529	0.599	0.459	0.210	15.451	0.000*
Self-efficacy	1.028	0.262	0.459	3.931	0.000*				

* Significant ≤ 0.05 (2 – tailed).

Table (1): Clarifies that (33.3%) of the study and control groups' ages ranged between 30 to less than 40 years old with mean of (40.40± 11.35) for the study group, and (40.17± 10.85) for the control group. Female gender represents (56.7%, and 60.0% respectively) of both study and control groups. In relation to marital status (60.0%, and 66.7% respectively) of both study and control groups were married. According to education level (36.7%) of both study and control groups can read and write. As regards place of residence (83.3%, and 76.7% respectively) of both groups had lived in rural areas. With reference to occupation, (40.0%, and 43.3%respectively) of both study and control groups

were housewives. In relation to smoking (73.3%, and 86.7% respectively) of both study and control groups were nonsmokers. There were no statistical significant differences between the study and control groups in relation to personal demographic characteristics.

Table (2): Shows that (46.7%, 53.3% respectively) of both study and control groups had bronchial asthma for1 year and less than 3 years. (56.7%, 46.7%respectively) of both study and control groups had chronic diseases. (35.3%, 50.0%respectively) of both study and control groups had diabetes and hypertension. (66.7%, 56.7%respectively) of both study and control groups had a family history of bronchial asthma. In relation to clinical manifestations of bronchial asthma, (43.3%, 46.7 respectively) of both study and control groups had dyspnea, cough, and chest pain. (66.7%, 56.7%respectively) of both study and control groups received bronchodilator, anti-inflammatory and antibiotic medications for bronchial asthma. In addition, there was no statistical significant difference between both groups regarding medical data.

Figure (1): Illustrates that (63.30% and 70.0% respectively) of both the study and control groups had unsatisfactory levels in the pre-test knowledge exam. While (90% and 33.30% respectively) of both groups had a satisfactory level in the post-test knowledge exam regarding bronchial asthma after using self-care module. In addition, there was no statistical significant difference between both groups regarding pre-test knowledge exam (χ^2= 0.300, P- value= 0.584). While, there was statistical significant difference between both groups regarding post-test knowledge exam (χ^2= 20.376, P- value= 0.000).

Figure (2): Elucidates that (63.30% and 73.30%respectively) of both study and control groups had low medication adherence levels before intervention. While (56.70% and 53.30%respectively) of both study and control groups had medium medication adherence levels regarding bronchial asthma medication after using self-care module. Moreover, there was no statistical significant difference between both groups regarding medication adherence levels before intervention (χ^2=0.803, P-value= 0.669). While, there was statistical significant difference between both groups regarding medication adherence levels after intervention (χ^2= 6.513, P-value = 0.039).

Figure (3): Illuminates that (63.30% and 53.30%respectively) of both study and control groups had low self-efficacy scores before intervention. While (70 % and 43.30%respectively) of both study and control groups had medium self-efficacy scores after using self-care module. Moreover, there was no statistical significant difference between both groups

regarding self-efficacy levels before intervention (χ^2= 0.686, P- value=0.710).While there was statistical significant difference between both groups regarding self-efficacy scores after intervention (χ^2=21.337, P-value= 0.000).

Table (3): Represents that, there was no statistical significant difference between study and control groups in pre asthma knowledge test scores (t=0.612 at p=0.543). While there was statistical significant difference between study and control groups in post-asthma knowledge test scores (t=3.270 at p=0.002).

Table (4): Clarifies that, there was no statistical significant difference between study and control groups in medication adherence scores before using the self-care module (t=0.409 at p=0.684). While there was statistical significant difference between study and control groups in medication adherence scores after using the self-care module (t=2.630 at p=0.011).

Table (5): Shows that, there was no statistically significant difference between study and control groups in self-efficacy scores before using the self-care module (t=0.174 at p=0.863). However, there was statistical significant difference between study and control groups in self-efficacy scale after using the self-care module (t=2.438 at p=0.018).

Table (6): Illustrates that, there was a positive correlation between post-knowledge test scores with medication adherence scores and with self-efficacy scores.

Table (7): Reveals that (ANOVA = 4.286 and P value = 0.043) and (t- value: 2.070 and P- value= 0.043) indicated that using self-care modules on patients' knowledge is significantly affecting medication adherence scores. In addition, every increase in scores of patient's knowledge after using self-care module with one unit will increase the prediction of medication adherence score as the B= (0.074).

Table (8): Indicates that (ANOVA = 15.451 and P value = 0.000) and (t- value: 3.931 and P- value= 0.000) indicated that using self-care modules on patients' knowledge scores is significantly affecting self- efficacy scores. In addition, every increase in scores of patient's knowledge after using self-care module with one unit will increase the prediction of self- efficacy scores as the B=(1.028).

Discussion

Bronchial asthma is one of the major chronic diseases that confronts health care systems. In fact, asthma negatively affects the different aspects of patient's quality of daily living due to the long-term management and several attacks. Auseful method to lessen the expenses and the harm caused by asthma is the control of the disease by the patients (self-care), in

addition to the medication regimen. Therefore, the aim of the current study was to evaluate the effect of self-care module on selected outcomes among patients with bronchial asthma.

Regarding the personal demographic characteristics of the participants included in the present study, the findings revealed that one third of the participants in both control and study groups were between 30-40 years old. While nearly one quarter of both groups were between 40-50 years old and between 50-60 years old. These findings are inconsistent with **Hussein, Samer, & El Sayed, (2020)** who motioned that the majority of their study sample were above 40 years old. The results are also not matching the study that was done by **Abo El-Fadl, & Sheta, (2019)** which disclosed that, more than half of patients were aged between 41 and 50 years old.

Moreover, the findings are not in agreement with Ibrahim, **Shahin, & Abdelkader (2019) & Mohammed, et al., (2018)** who mentioned that half of the studied patients were between 40-60 years old. However, the findings are consistent with Nguyen, **Huynh, & Chavames (2018)** who found that half of the studied patients were between 36-60 years old. The findings are also corresponding to **Abegaz, et al., (2021)** who revealed that nearly half of the study sample were between 35-54 years old. The findings are incongruence with **Honkamäkia et al., 2019** concluded that adult-diagnosed asthma became the dominant phenotype by age of 50 and 38 years old in men and women, respectively. This discrepancies in age among various studies could be due to culture and environmental differences. Concerning gender, more than half of the current study participants were female in both groups. This result is corresponded to **Abegaz, et al., (2021); & Ibrahim, et al., (2019)** studies that revealed that more than half of the patients were female. This finding is also in agreement with **Honkamäkia et al., 2019** who concluded that the incidence of adult-onset asthma peaks is in middle-aged women. This could explain the incongruity of the ranged age of the current study, as female exceeded male in both groups.

On the other hand, this finding is not matching **Abo El-Fadl, & Sheta, (2019)** who revealed that more than half of patients were male. In relation to marital status, the current study finding illustrated that two third of both groups were married. This finding is in accordance with Hussein, **Samer, & El Sayed, (2020); Abo El-Fadl, &Sheta, (2019)** who reported the same finding. In addition, the current study findings revealed that one third of both groups can read and write and the majority were not working. These results could explain the fact that most of the current study participants were housewives. Furthermore, most female have poorly controlled

asthma due to exposure to house dust mite, thus this could explain the reason that more than half of the current study participants were female.

Regards to the place of residence, two third of the control group and more than two third of the study group were from rural areas. This finding is matching **Mohammed, et al., (2018)** who reported that the majority of the studied patients were from rural area. This could be explained in light of considering lack of health facilities in rural areas. On the other hand, this result is inconsistent with **Hussein, et al., (2020)** who displayed that more than half of patients in both the study and control groups were living in urban areas. Concerning smoking history, the majority in both groups were not smokers. This could be because more than half of the participants were female. Female is uncommon smoke in Egyptian culture. This result is not in agreement with **Abo El-Fadl, & Sheta, (2019)** study which revealed that more than half of the studied subjects were smokers.

Regarding the medical data of the current study participants, the findings exposed that near half of both groups were having duration of the disease between one and less than three years. This result could be explained in light of that the majority of the current study participants were young age ranged between 30-40 years old. This finding is not in harmony with **Mohammed, et al., (2018) & Abo El- et al., (2019)** who reported that half of the participants were more than 5 years duration period. Moreover, the current study findings displayed that more than half of the study group and nearly half of the control group were associated with chronic diseases. Diabetes and hypertension constituted the highest dominant chronic diseases among both groups. This finding goes in the same line with **Mohammed, et al., (2018)** who reported that half of the studied patients were having chronic illness. Conversely, this finding does not match **Abegaz, et al., (2021)** who presented that less than quarter of the study participants had co morbid illnesses and most of them were having chronic heart failure.

As regards family history, more than half of the studied groups had a positive family history. This result is congruent with **Mohammed, et al., (2018)** who mentioned that one third of the studied subject had family history of first-degree relation. The findings are also agreed with **Ibrahim, et al., (2019)** studies which displayed that nearer than half of the sample were having family history of bronchial asthma. In addition, the current result illustrated that the most apparent symptoms among both groups were: dyspnea, cough, and chest pain. These findings are matching **Ibrahim, et al.,** study which showed that half of the subject were suffering from more than two symptoms as dyspnea, cough, and wheezes. In

relation to medication, the majority in both groups were taking three types of medications: bronchodilators, anti-inflammatory, and antibiotics. This finding is compatible with **Abo El-Fadl, & Sheta, (2019)** who mentioned that study subjects were taking more than one type of medication and bronchodilators is the main medications.

Evidently patients' education is essential aspect in the treatment of asthma to increase patients' knowledge, enhance medication adherence, and to improve self-efficacy. Regarding asthma knowledge, the current study findings revealed that about two thirds of both groups had unsatisfactory levels of asthma knowledge in the pretest. This could be explained in light of most of the participants were from rural areas, with low educational levels and to the fact that almost half of them were housewives. Moreover, the current findings disclosed that there was no significant difference between both groups in the pre-test asthma knowledge exam which reflected the homogeneity of the two groups. This finding is similar to the results of a study done by **Nguyen, et al., (2018)** which showed that asthma knowledge among adult patients in Vietnam was low and the study revealed this to the low educational level. The findings are also consistent with Abo **El-Fadl, & Sheta, (2019)** who reported that most of the study subjects had unsatisfactory asthma knowledge before implementing the educational program and interpreted the reason to the fact that participants were from country regions and had low level of educational.

On the other hand, the current findings showed that the majority of the study group had a satisfactory level in the post-test asthma knowledge exam, on the contrary only one third of the control group had satisfactory level in the post -test exam. The results presented a high statistical significance difference among the two groups with regards to asthma knowledge improvement which answers the first current study hypothesis. This result could be because of the effect of the implementation of self-care module by the researchers. This finding is compatible with Ali, Gameel, & Abou Elmaati, (2016) study which revealed a significant improvement in patient knowledge regarding asthma after implementation of the self-management program. The findings are also in accord with Hussein, Samer, & El Sayed, (2020); Sharma, Kumar, &Venkateshan, (2016) who reported a highly statistically significant differences between study and control group pre- post and follow up after implementation of self-learning module in relation to the total knowledge and total practice.

In relation to medication adherence, it apparently from the findings that about two third of both groups were having a low medication adherence level (pre-test)before using the self-care module. This could be

as a result of lack of knowledge as two third of the studied subjects showed unsatisfactory level of asthma knowledge in the pre-test. In addition, medication related factors such as the difficulties of using the inhaler, the frequency of the dose, and the cost of the medication. The current findings disclosed that there was no significant difference among both groups in the medication adherence level before intervention, which reflected the homogeneity of the two groups. This result is incongruent with **Ali, et al. 2020** who concluded that adherence to medication is low in Egyptian asthmatics. However, the study result is not in the same line with **Amin, et al., (2019)** who reported that only one third of the participants had poor medication adherence and two third had intermediate and good adherence.

On the other side, the current study findings showed that after using the self-care module, about half of both groups had a medium medication adherence level, while quarter of the study group had a high medication adherence level compared with the minority among the control group who had a high medication adherence level. The study result showed statistical difference between the two groups after intervention which answered the second proposed hypothesis. This findings is consistent with **Hussein, et al., (2020)** study which revealed a highly statistically significant differences among pre-post and follow up implementation of self-learning module of patients' adherence with medication regimen between study and control group. The reason for the improvement in medication adherence level of the study group in the post-test is the effect of the intervention (self-care module). However, the minor improvement of medication adherence level among the control group in the post-test could be explained in light ofthe presence of several factors rather than knowledge that could affect medication adherence. Therefore, findings suggest another study to examine the factors that could influence medication adherence among bronchial asthma patients.

Concerning self-efficacy, the present findings showed that more than half of both groups had low self-efficacy scores in the pre-test. This could be related to lack of knowledge. The findings disclosed that there was no significant difference among both groups in the self-efficacy scores before the intervention, which revealed the homogeneity of the two groups before intervention. These results are similar to **Mohammed, et al., (2018)** who reported that the majority of patients had low self-efficacy before implementation of the educational program. Nevertheless, the current findings showed that, there was a statistical difference between the two groups in the post-test in relation to self-efficacy scores. Apparently, two thirds of the study group had

medium self-efficacy scores and about one third of the group had a high self-efficacy scores. On the contrary, less than half of the control group had medium self- efficacy scores, while very few of them had a high scores. This could be due to the effect of knowledge gained from the self-care module. This finding agrees with many studies **Hussein, et al., (2020); Amin, et al., (2019) & Mohammed, et al., (2018**) which found that patients' self efficacy was improved with the improving of patients' knowledge. This result is also supported by, **Hafezieh, et al., (2020)** who concluded a significant positive correlation among self-management, knowledge, and self-efficacy. Furthermore, the current study findings illustrated a positive correlation between the post-knowledge test scores with the medication adherence scores and with self-efficacy scores as well. These findingsare matching many studies **Hussein, et al., (2020); Amin, et al., (2019) &Mohammed, et al., (2018)** that explored a positive relation between knowledge gained, medication adherence and patient's self-efficacy. On the other side, results confirmed that age, and duration of the disease has no correlation with medication adherence scores and self-efficacy scores as well. This results in the same line of **Ibrahim, et al., (2019)** who reported no statistical significant relation between patients' demographic characteristics and self-efficacy.

Conclusion
Based on the findings of the present study, it could be concluded that, the implementation of the self-care module has a significant effect on improving patient's asthma knowledge, medication adherence, and patient's self-efficacy. These results supported all the proposed hypotheses.

Recommendation
Based on the current study findings, it is recommended to:
- Promotion and development of self-care modalities for patients with bronchial asthma.
- Further study assesses factors affecting medication adherence, and self-efficacy among Patients with bronchial asthma.
- More studies to assess the effect of using the self-care module on patients satisfaction and quality of life.
- Duplication of the study on a large sample size from different geographic areas to obtain more generalization.

Implications:
Nursing practice:
Nurses are the health staff members who interact for a long period of time with patients. Patients with

bronchial asthma suffer from serious complications such as episodes of wheezing, coughing, chest tightness, and dypnea that produce physical inactivity or functional limitations. Therefore, nurses should act as an active member in supporting these patients by enabling them to acquire a sufficient knowledge regarding bronchial asthma, how to control its episodes, proper use of the different kinds of drug inhaler, prevention of bronchial asthma complications. Considering the proper use of self-care module may contribute to improvement of patients outcomes and their quality of life.

Nursing education:
As for nursing education implications, the implementation of self-care module can be a reference framework that would be taught in basic and continuing education programs. Additionally, this study may serve as a practice framework for the future development of further evidence-based nursing practice.

Conflict of interest: 'The Authors declare that there is no conflict of interest.

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